

TSU

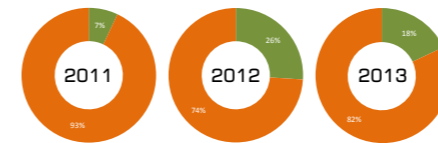
SCIENCE

№ 6, DECEMBER, 2014



CONTENTS

TSU SCIENCE • 2014



3 TSU – A BRIEF OVERVIEW OF SCIENTIFIC ACTIVITY AND GRANTS

Over 200 scientific projects are presently being implemented at TSU.

6 TWENTY YEARS OF JOINT RESEARCH

10 INTERFACIAL BIONANO-SCIENCE AT TBILISI STATE UNIVERSITY: ACHIEVEMENTS AND PERSPECTIVES FOR GEORGIA

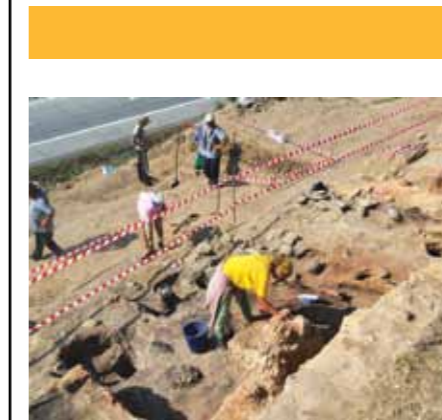
13 THE IMPACT OF MAD-NEULI MINING ON THE SOIL AND WATER OF THE BOLNISI REGION



17 THE COMET EXPERIMENT AT J-PARC: A STEP TOWARDS SOLVING THE MUON ENIGMA



21 THE ECOLOGICAL CONDITION OF THE BLACK SEA – ASSESSMENTS BY TSU SCIENTISTS



25 FOOD AND VEGETATION IN KARTLI IN THE 5th-4th CC BC: FINDINGS ON GRAKLIANI HILL



28 THE GERMAN WAY OF LIFE IN THE CAUCASUS

31 THE IVIRON MONASTERY DURING THE OTTOMAN EMPIRE

34 LAFFER-KEYNESIAN SYNTHESIS AND MACROECONOMIC EQUILIBRIUM



39 THE STOCK MARKET IN GEORGIA: THE CURRENT REALITY AND AN UNCERTAIN FUTURE



TSU SCIENCE

Editorial Board:

Vladimer Papava – Rector, Academician of the Georgian National Academy of Sciences, Chairman of the Editorial Board
Levan Aleksidze – Deputy Rector, Academician of the Georgian National Academy of Sciences, Professor, Deputy Chairman of the Editorial Board
Merab Eliashvili – Deputy Rector, Professor, Deputy Chairman of the Editorial Board
Giorgi Gvedashvili – Professor, Head of the Department of Scientific Research and Development
Revaz Gachechiladze – TSU Professor, corresponding member of the Georgian National Academy of Sciences
Alexander Rondeli – TSU Professor
Iago Kachkachishvili – TSU Professor
Tamaz Jologua – TSU Associate Professor
Elguja Khintibidze – TSU Professor, Academician of the Georgian National Academy of Sciences
Rismag Gordeziani – TSU Professor, Academician of the Georgian National Academy of Sciences
Apolon Silagadze – TSU Professor, corresponding member of the Georgian National Academy of Sciences
Guram Lortkipanidze – TSU Emeritus, corresponding member of the Georgian National Academy of Sciences
Zaza Aleksidze – TSU Emeritus, Academician of the Georgian National Academy of Sciences
Irine Melikishvili – TSU Emeritus, corresponding member of the Georgian National Academy of Sciences
Shota Samsonia – TSU Professor, Academician of the Georgian National Academy of Sciences
Nodar Tsintsadze – Professor, Academician of the Georgian National Academy of Sciences
Lia Matchavariani – TSU Professor
Gia Sirbiladze – TSU Professor
Grigol Sokhadze – TSU Associate Professor
Karlo Akimidze – TSU Associate Professor
Davit Gordeziani – TSU Emeritus
Mikheil Gedevarishvili – TSU Emeritus
Roman Shakarishvili – TSU Professor, Academician of the Georgian National Academy of Sciences
Lavrenti Managadze – TSU Emeritus, Academician of the Georgian National Academy of Sciences
Tevdore Ninidze – TSU Professor
Lado Tchanturia – TSU Professor
Besarion Zoidze – TSU Professor
Iuri Ananiashvili – TSU Professor
Temur Shengelia – TSU Professor, full member of the Georgian Academy of Economic Sciences
Nugzar Paitchadze – TSU Associate Professor
Nana Mamagulishvili – TSU Head of the Department of Public Relations

Editor – Tamar Khorbaladze
English Language Editor:
 Mary Ellen Chatwin
The following persons worked on the edition:
 Lela Mchedlidze, Tamar Katsitadze,
 Natia Aladashvili, Tinatin Tabidze
Design – Zaza Gulashvili
Cover Design – Nino Kutateladze

TSU Public Relations Department, December, 2014

CONTENTS

41 THE ROLE OF SOCIAL NETWORKS IN GEORGIAN PARTY POLITICS



44 MEN AND GENDER RELATIONS IN GEORGIA

48 TSU INSTITUTE OF GENDER STUDIES

49 THE CENTER FOR RESEARCH OF ISSUES ON PERSONS WITH DISABILITIES

50 TSU RESEARCH IN THE DEPARTMENT OF COGNITIVE AND CLINICAL NEURO-PSYCHOLOGY



52 EPIZOOTIC ACTIVITY OF NATURAL FOCI OF PLAGUE IN GEORGIA

55 ANDROGEN DEFICIENCY AND INSULIN RESISTANCE IN OBESE MALE PATIENTS

58 MANY GEORGIANS SUFFER FROM THYROID DISORDERS



61 TSU – AT THE EXHIBITION OF GEORGIAN INNOVATIONS AND INVENTIONS

62 LABOR LAW FOR THE IMPROVEMENT OF THEORETICAL KNOWLEDGE AND ACTIVE LEGISLATION

64 A GENERAL ANALYSIS OF CORPORATE GOVERNANCE

66 INNOVATIVE RESEARCH IN TRANSNATIONAL CRIMINAL LAW

68 TSU INTERNATIONAL CONFERENCES

TSU – A BRIEF OVERVIEW OF SCIENTIFIC ACTIVITY AND GRANTS

Looking at the dynamics of projects submitted for scientific grant competitions it is obvious that TSU scholars stand out. The number of grants awarded to projects over the past two years to the Ivane Javakishvili Tbilisi State University (TSU) significantly exceeds that of previous years. More than 300 projects are being implemented at TSU, including at least 250 national and 46 international projects. The 2013 budget of the university envisaged some 23,837,000 GEL, or 35.8% of the total budget for research activity. The 2014 figures show an increase according to preliminary data. According to the Thomson Reuters database, TSU scholars published 354 scientific papers in highly respected/impact factor journals in 2013. The same year 45 doctoral degrees were awarded at TSU.

The main sources of financing for scientific research are government and international science grants, which TSU scholars obtain through corresponding competitions. As the 2014 data of the TSU Department of Scientific Research and Development shows, the total value of projects that won competitions comprise 7.9 million GEL, and includes 179,177 GEL co-funding by the TSU.

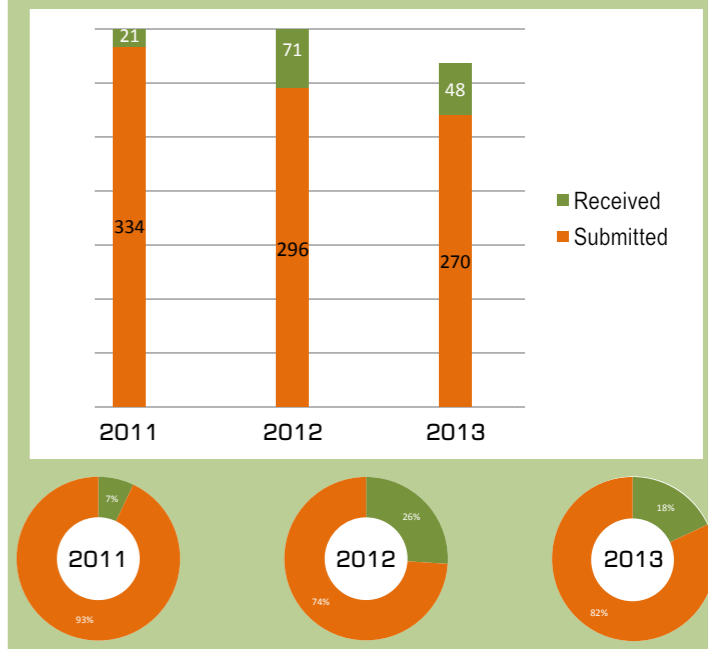
In 2013, TSU employees took part in a number of competitions such as the state science grants competitions for fundamental and applied research (FR, AR); the government grants competitions for joint research with Georgian compatriots working abroad (DI); a competition for the purchase of scientific-research equipment (AP); a science grant competition for the research of Georgian material and spiritual heritage abroad (ME); the 2013 state science grant competition “Georgian Electronic Vocabularies” (LE); a conference grants competition (CG); a winter school funding sub-program; the Presidential science grants competition for young researchers (PG); the doctoral program grants competition (DO); the fifth and the sixth joint competitions organized for the Targeted Research and Development Program by the Science and Technology Center of Ukraine and the Shota Rustaveli National Science Foundation (MTCU - SRNSF); a joint SRNSF and CNRS competition; a joint competition of the Shota Rustaveli National Science Foundation and Germany’s Forschungszentrum Jülich; and a joint education program grants competition; TEMPUS IV 6 competition.

According to the results of almost all competitions, TSU leads in both number and amounts of projects funded. The dynamics of projects submitted by TSU to scientific competitions announced by the Georgian National Science Foundation and the Shota Rustaveli National Science Foundation show that TSU scholars continue to be distinguished for being very active, and the number of grants awarded to them in the past two years significantly exceeds previous years: in 2006 some 180 projects were submitted with only 22 financed; in 2007 out of 142 projects, 23 received funding; in 2008 163 were submitted and 35 funded; 2009 saw the funding of 29 projects out of 129 submitted; in 2011, after these two principle foundations merged, 334 projects were submitted though only 21 projects

YEARLY DYNAMICS OF PROJECTS SUBMITTED/RECEIVED FROM TSU TO GEORGIAN NATIONAL SCIENCE FOUNDATION AND RUSTAVELI NATIONAL SCIENCE FOUNDATION



YEARLY DYNAMICS OF PROJECTS SUBMITTED FROM TSU AFTER THE MERGER OF THE FOUNDATIONS (DI, AR, FR)



received funding; in 2012, some 71 projects out of 296 submitted were financed while in 2013, 48 out of 270 were funded.

State science grants to support fundamental research in 2013 were awarded to a total of 86 projects of which 33 projects were submitted by TSU scholars and one co-authored by the TSU. By the number of projects awarded grants, TSU is far ahead of other Georgian universities. The scientific work at TSU is carried out by faculties as well as by 16 scientific-research institutes. According to 2013 data, projects awarded grants include 13 projects by TSU institutes and 14 by TSU faculties. The leader among the faculties having secured grants for their projects in competitions for fundamental research is the Faculty for Exact and Natural Sciences. The leaders among institutes are the TSU Andronikashvili Institute of Physics and the TSU Rustaveli Institute.

The 2013 state science grants competition to support applied research was successful for TSU – out of total 27 projects financed, nine were submitted by TSU scholars (see diagram № 4). The highest number of projects won by TSU was authored by scholars of TSU faculties, followed by the TSU Melikishvili Institute of Physics and Organic Chemistry

and the TSU Tvalchrelidze Institute of Mineral Resources. The 2013 state grants competitions for joint research with Georgian compatriots working abroad resulted in financing for 12 projects, including seven submitted by TSU. Among these, the Faculty of Exact and Natural Sciences and the TSU Andronikashvili Institute of Physics are also in the lead. Out of 89 grant applications in the competition to purchase scientific equipment, 22 were from TSU. Among the projects that won, six were authored and one co-authored by TSU.

The results of the 2013 science grant competition for the research of Georgian material and spiritual heritage abroad saw two out of six grants awarded to TSU scholars. The 2013 state grant competition “Georgian Electronic Vocabularies” saw TSU win one out of four grants. The results of conference grants competition showed that 11 projects of 31 awarded were submitted by TSU. The winter school financing subprogram of the Support to Higher Educational Institution Program run by the Georgian Ministry of Education and Sciences allocated funding to a total of eight projects of which four were from TSU.

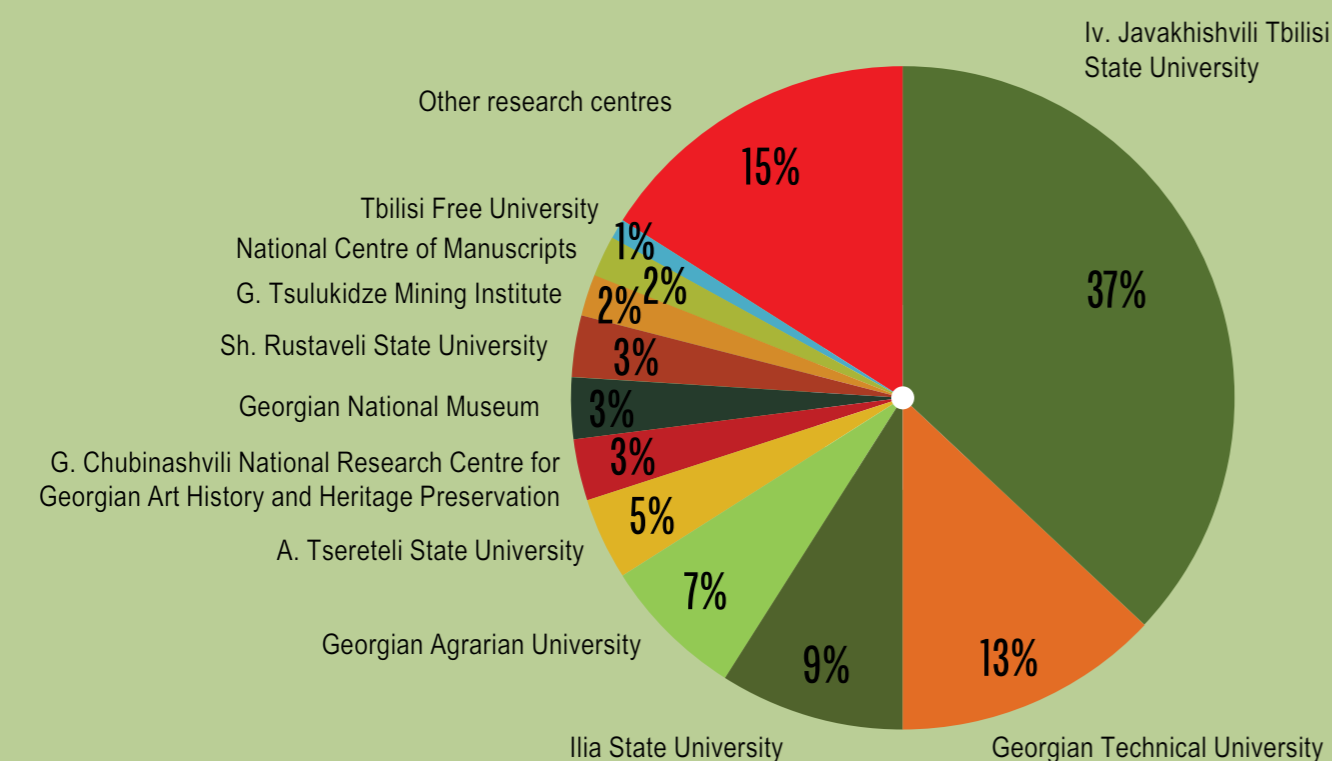
Presidential science grants for young

scholars allocated 69 grants in total – 41 for doctoral and 28 for master’s degree studies. Of these, 23 were received by TSU (15 for doctoral and eight for master’s degree studies). According to the results of doctoral degree program grants competitions in 2013-2014, the total of 252 projects submitted saw 135 awarded. TSU submitted 99 projects of which 60 projects secured funding.

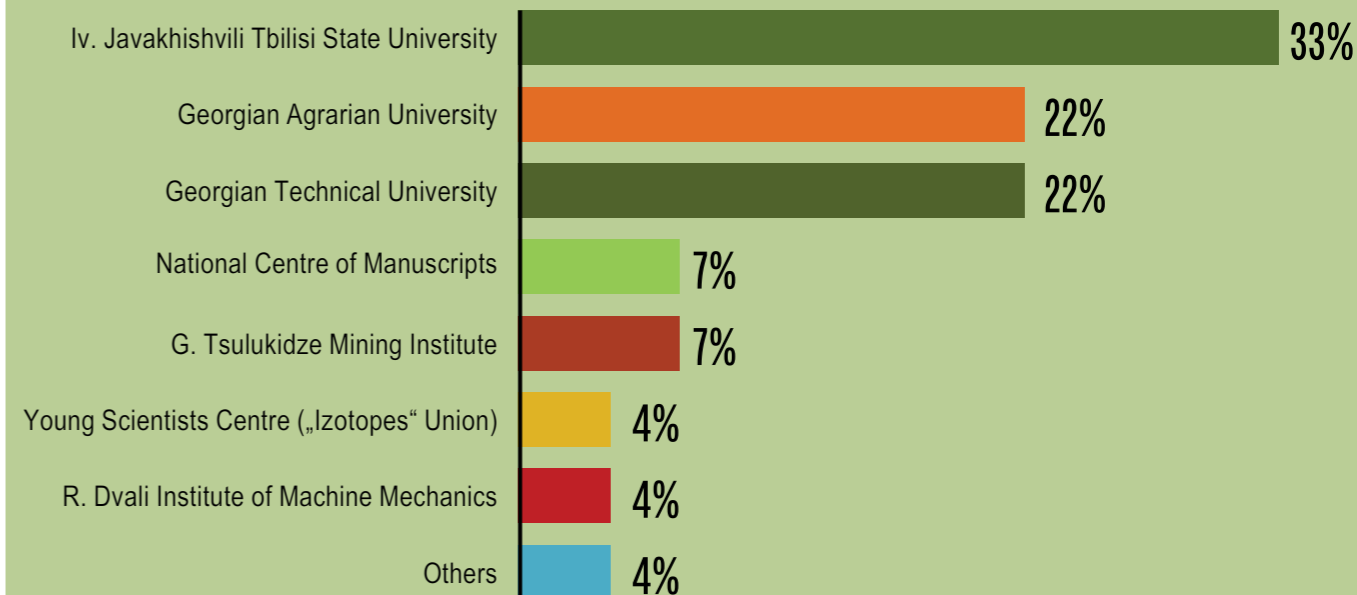
From 144 projects submitted to MTCU-SRNSF, 20 projects were from TSU. A total of nine projects were awarded grants, including four from TSU. According to the results of a competition announced in 2013 within the framework of a joint program of the Shota Rustaveli National Science Foundation and the French National Centre for Scientific Research (CNRS), three projects were announced as winners of which two were from TSU.

The 2013 competition announced under a joint research and educational program of the Shota Rustaveli National Science Foundation and Germany’s ForschungszentrumJülich, awarded grants to all three projects submitted, one of which was from TSU. The TEMPUS IV 6th call, saw a total of 55 projects submitted and 19 projects funded, including 11 that will be implemented with the participation of TSU.

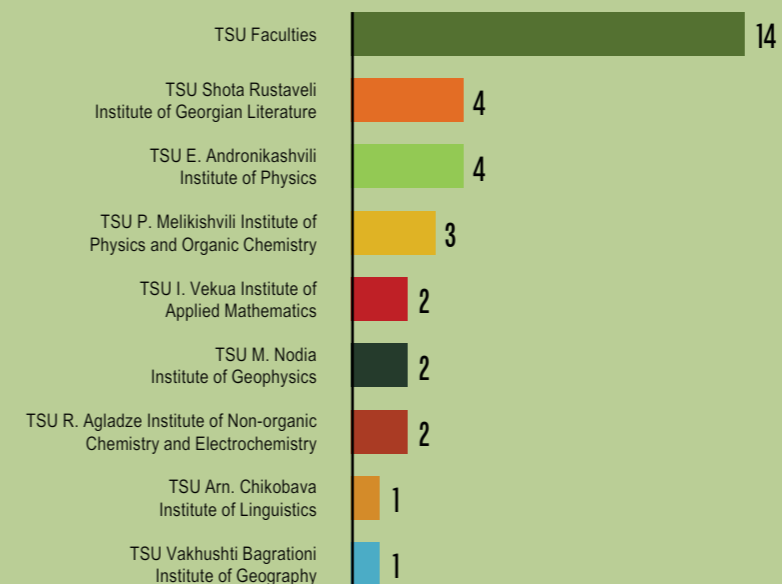
RESULTS OF THE CALL FOR STATE GRANTS FOR FUNDAMENTAL RESEARCH 2013



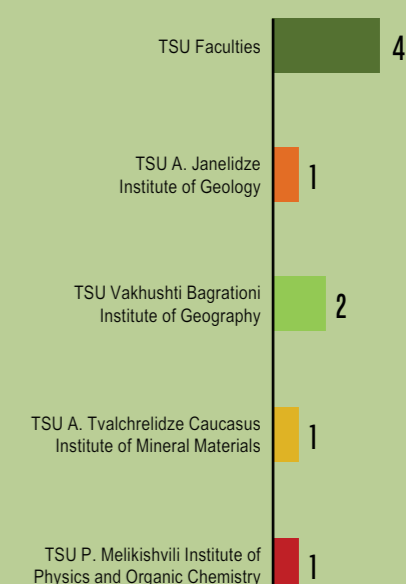
RESULTS OF THE CALL FOR STATE GRANTS FOR APPLIED RESEARCH 2013



PROJECTS WINNING THE COMPETITION OF STATE GRANTS FOR FUNDAMENTAL RESEARCH 2013



PROJECTS WINNING THE COMPETITION OF STATE GRANTS FOR APPLIED RESEARCH 2013



TWENTY YEARS OF JOINT RESEARCH



Snowflake



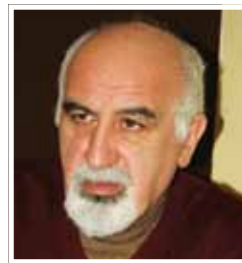
Petunia



Tornado and lightning



Water drop



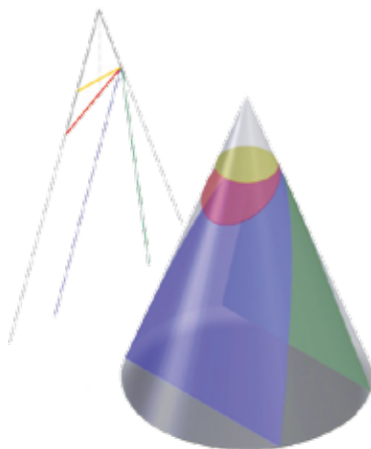
ILIA TAVKHELIDZE

Associate Professor of the Faculty of Exact and Natural Sciences of Iv. Javakhishvili Tbilisi State University, Doctor of Physical and Mathematical Sciences
 Awarded:
 1984 – I. Vekua Prize of the Georgian Academy of Sciences;
 2009 – Nikolai N. Bogoliubov's memorial medal of the Ukrainian Mathematical Congress.
 Collaborations with Lomonosov Moscow State University (Russia), University of Roma I "La Sapienza" and University of Salerno (Italy), Westminster University, London, University of Heidelberg and University of Cologne (Germany); Vilnius University (Lithuania).
 Participant and organizer of international scientific forums.
 Author of approx. 70 scientific articles.

Natural forms affect all of us, not only for their beauty but also for their diversity. It is still not known whether forms define the essence of the phenomena associated with them, or vice versa--that forms are natural consequences of the phenomena.

Since ancient times, scientists have tried different methods to study forms and their properties. In mathematics, the study of form has often used geometric approaches. Over time research has led researchers in beautiful as well as interesting and challenging directions. Plato and his school emphasized the study of pure geometric shapes (vonήτά – mental) and their properties, while Archimedes, Apollonius of Perga, Euclid, Heron and their followers used geometric methods to explain phenomena (αίσθητα – Observable, classification of Geminus of Rhode I B.C).

In the early 17th century an inevitable conclusion of the study of Kepler and Galilei was that the trajectory of objects was directly related to the study of conic sections (second order plane lines). This insight has been further strengthened with Newton's law of gravitation. Although Newton's approach was



Conical sections

originally geometric, mechanics and other natural sciences have developed rapidly and over time mathematicians have used different approaches, including calculus, algebra and others. This process permitted René Descartes and Pierre de Fermat to create the foundations of analytical geometry and more expanded applied methods in geometry. This permitted mathematicians to calculate the form of objects and the trajectory of their motions using analytical formulas.

Although a complete overview is impossible in one article, we have chosen two approaches that have been developed almost simultaneously since 1994 by two different teams—one by a Belgian group and the other by a Georgian-Italian team. In 1994, the Belgian scientist Johan Gielis became interested in the possibility of the analytical representation of the forms of plants. He continued in the footsteps of the French mathematician, Gabriel Lamé, and wrote the so-called „superformula“ now known as the Gielis Superformula.

$$\rho(\theta) = \left[\left| \frac{\cos \frac{m_1 \theta}{4}}{A} \right|^{n_1} + \left| \frac{\sin \frac{m_2 \theta}{4}}{B} \right|^{n_2} \right]^{\frac{1}{n_3}}$$

When (m1=m2=4, A=B=1 and n1=n2= n3=n) the Superformula represents Lamé's curves.

There was a very interesting and unexpected occurrence. Using a specific selection of parameters for the Superformula, the team discovered that it describes the forms of many organisms. A beautiful book was devoted to these issues and published in Belgium in 2003 (Johan Gielis - Inventing the Circle: The Geometry of Nature). This scientific approach

became very popular and the formula was adopted by many mathematicians, including Tom Gerats (Netherlands), Yohan Fougerolle (France), Pierpaolo Natalini (Italy) and others.

The Georgian-Italian group was founded by two professors, Paolo Ricci and Ilia Tavkhelidze, who have worked since 1998 on how the solution of the boundary-value problem for the partial differential equation depends on the geometrical structure of domain. The natural extension of the problems had been formulated in various forms by the teachers of these scientists, Ilia Vekua, Gaetano Fichera and Olga Oleinik. It is very important to have an analytical representation of the geometry of the domain in order to carry out fundamental work on these problems. After using the theories of the outstanding French scientist Gaspard Monge (teacher of Gabriel Lamé) for several years, and starting from and developing out of the ideology of the local toroidal coordinates, it became possible to create an analytical representation of a wide class of geometric shapes and surfaces. Today, this domain is referred to as GRT (Generalized Revolving and Twisting) figures or, sometimes as Surfaces of Revolution. These figures are mathematically represented as follows:

$$X(\tau, \theta, \psi) = \left[R_1(\theta) + p(\tau, \theta, \psi) \cos(\psi + m^{-1}ng(\theta)) \right] \cos(\theta)$$

$$Y(\tau, \theta, \psi) = \left[R_2(\theta) + p(\tau, \theta, \psi) \cos(\psi + m^{-1}ng(\theta)) \right] \sin(\theta)$$

$$Z(\tau, \theta, \psi) = Q(\theta) + p(\tau, \theta, \psi) \sin(\psi + m^{-1}ng(\theta))$$

The authors represent objects using the geometric essence of five different functions and two parameters (i.e. what process each of them defines). With this presentation, it was possible to describe the Generalized Möbius-Listing's bodies and surfaces and to study the unique and interesting properties of these objects. A final paper on these investigations was published as "The Classification of a Wide Set of Geometric Figures, Surfaces and Trajectories" in Rendiconti Accademia Nazionale delle Scienze detta dei XL, Memorie di Matematica e Applicazioni, Serie V, vol.XXX, Parte 1, 2006 - 124 o, Dalla Fondazione (1782) Roma, pp. 191-212 by I.Tavkhelidze and P.E. Ricci,.

Of particular interest was part of I. Tavkhelidze's work based on the formula/ representation (2), in which he studied the cutting of Generalized Möbius-Listing's surfaces. Since 2007, these results have been presented at several international conferences and were specially mentioned at the Ukrainian Mathematical Congress in 2009 (Kiev, Ukraine).

The group has further expanded to work jointly with other Italian colleagues such as Caterina Cassisa, Diego Caratelli and Sergio Camiz. The practical significance and new perspectives of this new collaboration attracted the Georgian physician, Professor Mamanti Rogava, who posed a new set of challenges to his colleagues: Whether they can record the complex motion of a complex geometric object's analytical formula. He identified one of the most important applied fields for the application of the study of forms-- the dynamics of human organs.

The year 2010 was a turning point for both groups – Paolo Ricci, Diego Caratelli and Johan Gielis met at an international conference and introduced other members of the groups to each other via Internet. They had a common task, but their approaches were different. After presenting the methods, Ilia Tavkhelidze proposed the idea of using Johan Gielis' representation twice in the representation formula written by his group. Consequently, the Gielis shape started "to rotate" around the Gielis curve. In turn, a Belgian-Dutch-French group showed interest in cutting generalized Möbius Listing bodies and launched joint research that is still intensively underway.

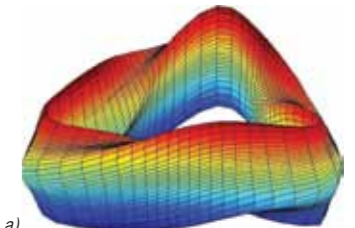
The essence of one "unexpected" phenomenon is as follows: Usually after one cutting, an object is split into two parts. The "Möbius strip" is a well-known exception, however, which still remains whole after cutting. It became evident that three-dimensional Möbius Listing bodies could yield more than two objects with only a single cutting. These are not mere theoretical results, as real-life examples demonstrated. Studying the shape, structure, twists and other properties of these objects proved an extremely important problem, not only from a mathematical point of view, but also for their application in studying mathematical models like the structure of plants, cell formation, animal dynamics and complex molecular chemical structures. The geometrical



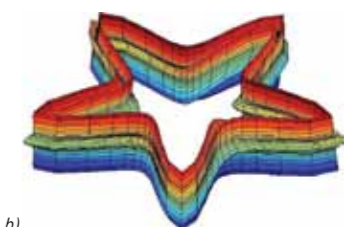
Generalised Möbius-Listing surface constructed according to Tavkhelidze-Ricci analytic representation



one variant of geometric model of the human organ

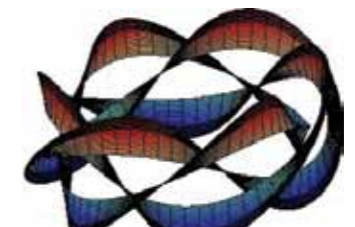


a)

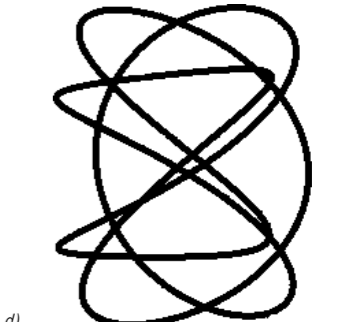


b)

Examples of figures constructed according to Tavkhelidze's method based on Gielis' superformula



c)



d)

Some examples of geometric objects which appear after cutting of Möbius-Listing surfaces

The Georgian-Italian group was founded by two professors, Paolo Ricci and Ilia Tavkhelidze, who have worked since 1998 on how the solution of the boundary-value problem for the partial differential equation depends on the geometrical structure of domain. The natural extension of the problems had been formulated in various forms by the teachers of these scientists, Ilia Vekua, Gaetano Fichera and Olga Oleinik. It is very important to have an analytical representation of the geometry of the domain in order to carry out fundamental work on these problems.

figures studied proved to be very interesting from an aesthetic point of view, and during the summit 'Mathematics and Art' organized by the Royal Flemish Academy of Belgium in 2012, the report prepared by the group created a significant interest. In 2013 this work was published by the Lincei Academy ("About 'Bulky' Links, Generated by Generalized Möbius-Listing's bodies GMLn3", I. Tavkhelidze, C.Cassisa, J.Gielis and P.E.Ricci, Rendiconti Lincei Mat. Appl. 24 (2013), pp. 11-38).

The members of the Georgian-Italian group joined the process of understanding the problem put forward by their colleagues – whether shapes existing in nature are somehow strictly determined by their functionality and purpose, or are determined by forces of nature acting in the past. For example, is the shape of a flower pre-determined by its future purpose, or is it shaped by natural forces and elements, such as wind, gravity and ambient temperature. Joint work was undertaken as a result of very intensive activities by Johan Gielis, Diego Caratelli, Yohan Fougerolle, Paolo Emilio Ricci, Ilia Tavkhelidze and Tom Gerats. This resulted in the publication of "Universal Natural Shapes: From Unifying Shape Description to Simple Methods for Shape Analysis and Boundary Value Problems", in journal PlosONE, 27,IX, 2012, pp.1-18. This article unites the opinions of scientists from a number of universities, such as

the University of Antwerp (Belgium), Delft University of Technology (Netherlands), the University of Burgundy (France), Campus Bio-Medico University (Italy) and Tbilisi State University. Later in 2012 several professors from the Universities of Salerno (Italy), Vilnius (Lithuania) and Baku (Azerbaijan) also joined the activity.

During the same period, an analytical representation of "difficult" movements of shapes was developed at the Tbilisi State University which later laid the foundation for receiving new results from a mathematical point of view.

$$X(\tau, \psi, \theta, t) = T_1(t) + [R(\theta, t) + p(\tau, \theta, t) \cos(\psi + n(\theta) + g(t))] \cos(\theta + M(t))$$

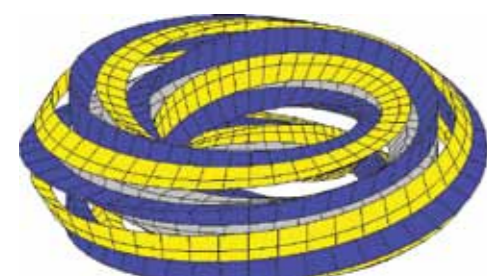
$$Y(\tau, \psi, \theta, t) = T_2(t) + [R(\theta, t) + p(\tau, \theta, t) \cos(\psi + n(\theta) + g(t))] \sin(\theta + M(t))$$

$$Z(\tau, \psi, \theta, t) = T_3(t) + Q(\theta, t) + p(\tau, \theta, t) \sin(\psi + n(\theta) + g(t))$$

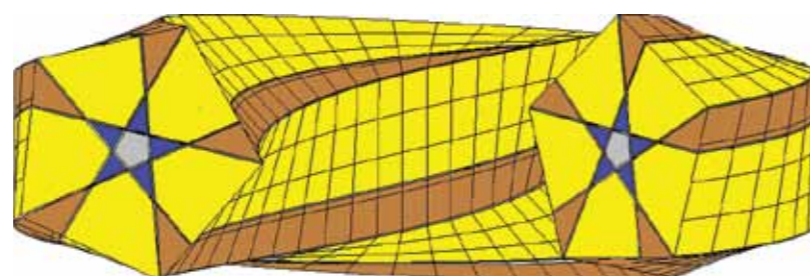
Using the given formulas, it is possible to provide non-trivial geometrical figures and their movements by selecting seven functions $(T_1(t), T_2(t), T_3(t), R(q,t), p(t,y,q,t), g(t), n(q), M(t), K(q,t))$ from a geometrical point of view, and to split difficult movements into "elementary movements."

The results obtained by the joint international and interdisciplinary group are an important precondition for the modern understanding of certain tasks that arise in fields such as the practice of medicine, in biology, in nanotechnology, and determining antenna patterns, etc. Joint activity with Professor Vilija Targamadze from the University of Vilnius has revealed the use of this trend in problem-based learning (PBL), by taking into consideration the complexity of the issue, its originality and "endlessness".

These approaches paved the way for an active involvement by computer technologies in the process of understanding the most difficult practical and theoretical issues through mathematical modeling. Quite different approaches by Yohan Fougerolle from the University of Burgundy, and Levan Roinishvili from St. Andrew, the First-Called Georgian University of the Patriarchate of Georgia, are noteworthy. This team group received a proposal from Springer Publishing to publish their scientific work as a book. At the initiative of the Belgian team, the Institute of Geometry at the Antwerp Institute of Geometry will finance a PhD program in geometry for three PhD students at TSU, as well as a program on mathematics for computer science with the Italian partners, and a part of the program on computer modeling with the French collaborators.



An object which is split into three after one cutting



An object which is split into four after one cutting

MEMBERS OF THE GROUP:



ILIA TAVKHELIDZE
(Mathematician),
Iv. Javakhishvili Tbilisi
State University, Faculty of
Exact and Natural Sciences,
University Street 2, 0186,
Tbilisi, Georgia



JOHAN GIELIS
(Botanist), University of
Antwerp, Department of
Biosciences Engineering,
Antwerp,
Belgium



PAOLO EMILIO RICCI
(Mathematician), Campus
Bio-Medico University,
Rome, Italy; Honorary
Doctor of Ilia Vekua Institute
of Applied Mathematics of
Tbilisi State University



TOM GERATS
(Plant Genetician), Radboud
University Nijmegen,
Section Plant Genetics,
Institute for Wetland and
Water Research, Faculty of
Science, Nijmegen, the
Netherlands



DIEGO CARATELLI
(Mathematician),
Delft University of
Technology, International
Research Centre for
Telecommunications
and Radar, Delft,
The Netherlands



PIRPAOLO NATALINI
(Mathematician),
University „Roma III”,
Italy



MARIA TRANSIRICO
(Mathematician),
University of Salerno,
Italy;



MAMANTI ROGAVA
(Cardiologist),
"Neoclinic" Tbilisi,
Georgia



VILIJ TARGAMADZE
(Educologia), Vilnius
University, Faculty of
Philosophy,
Lithuania



YOHAN FOUGEROLLE
(Informatician), Université
de Bourgogne, Laboratoire
Le2i UMC CNRS 5158, Le
Creusot, France



CATERINA CASSISA
(Mathematician),
University of Rome
„La Sapienza”,
Italy



SERGIO CAMIZ
(Mathematician),
University of Rome
„La Sapienza”,
Italy



FARMAN MAMEDOV
(Mathematician),
Baku State University,
Azerbaijan



GALINA BABUR
(Coordinator),
Geometry Institute,
Belgium



LEVAN ROINISHVILI
(Mathematician),
St. Andrew the First-Called
Georgian University of the
Patriarchate of Georgia

The results received by a joint international and interdisciplinary group are an important precondition for new understanding of certain tasks raised in practice in the fields of medicine, biology, nanotechnology, antenna design, etc.

INTERFACIAL BIONANOSCIENCE AT TBILISI STATE UNIVERSITY: ACHIEVEMENTS AND PERSPECTIVES FOR GEORGIA



DIMITRI KHOSHTARIYA

Doctor of Science (Dr. Hab.) in Physical Chemistry, Director of the Institute for Biophysics and Bionanoscience at the Department of Physics of the TSU, Principal Investigator of the Department of Biophysics at I. Beritashvili Center of Experimental Biomedicine in Tbilisi. His research interests cover the interdisciplinary topics such as: physical mechanisms of charge transfer in model systems and biomolecules (including interfacial nanostructures), stability and flexibility of proteins in the context of their functioning, and the role of "bound" water in biomolecules. Dimitri Khoshtariya has been awarded several prestigious fellowships and research grants from the Alexander von Humboldt Foundation (Germany), Fulbright Foundation (USA), Ministère de l'Éducation Nationale et de la Recherche (France), The Natural Science Research Council (Sweden), National Research Council (USA), NATO, Cariplo Foundation (Italy), and the Volkswagen Foundation (Germany). As a Visiting Professor, Dimitri Khoshtariya lectured at universities in the USA, Germany and Italy; he published 80 articles and chapters in peer-reviewed scientific journals and renowned books, contributed to ca. 40 international scientific meetings and conferences.

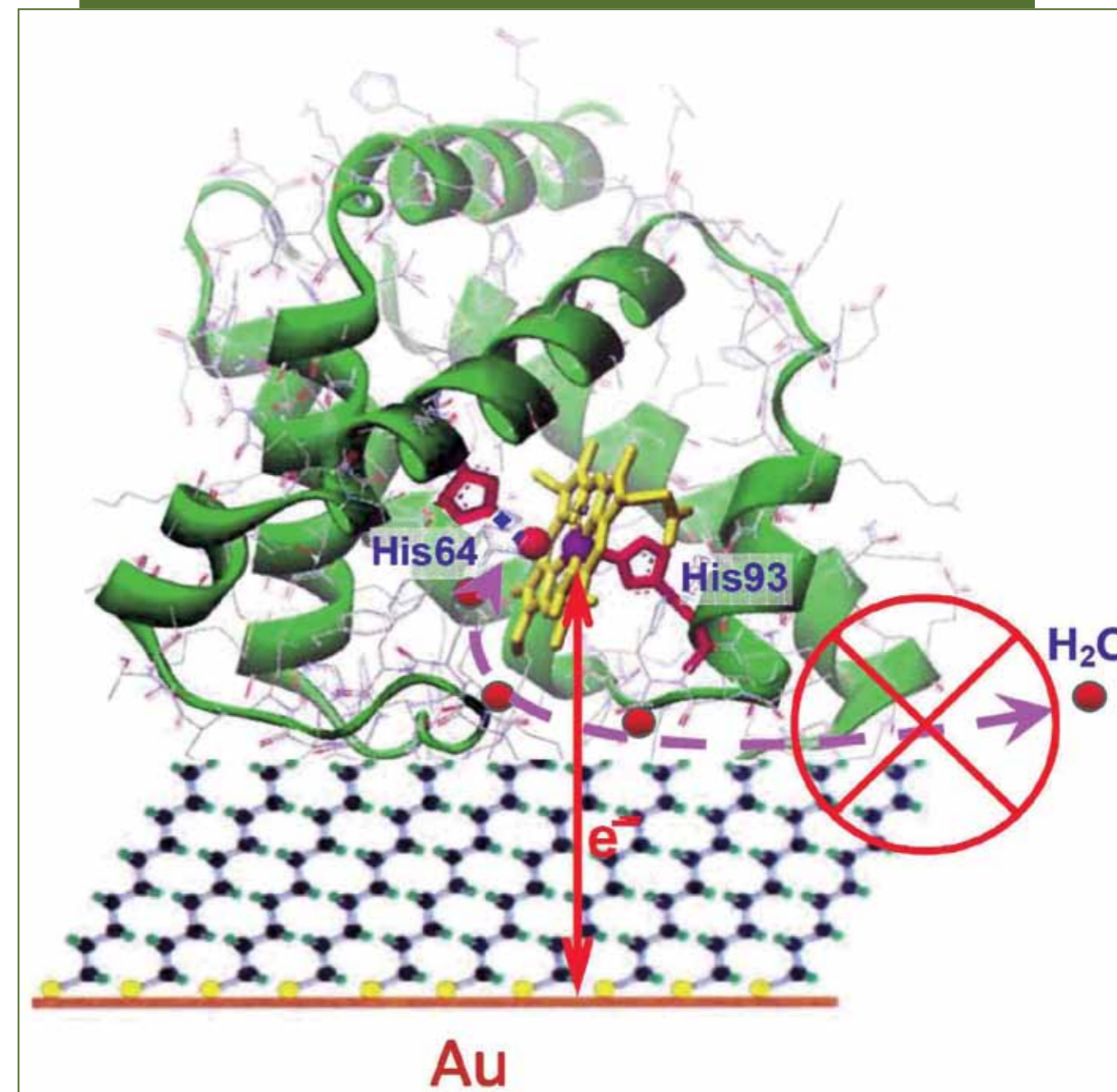
The outstanding and innovative specificity of nano-dimensional research „super-domains“ resides in the range of physical and/or chemical characteristics that may differ significantly on both sides of a “nanoscopic” borderline, even in the case of a homogeneous substance (such as a metallic piece). It should be emphasized that the dimensions of biologically active macromolecules such as DNA, proteins, lipids as well as their constituent, activity-decisive components fall within the nanoscopic dimensional range. Consequently, in some sense biomolecules can be considered as nanoparticles or assemblies of nanoparticles. Even so, today the main objects of contemporary bionanoscience and bionanotechnology are hybrid “supramolecular” assemblies which, along with essential biomolecules or their fragments/components, also include synthetic chemical molecules (commonly, polymers) and possibly nanometer-size conductive (metallic) and/or semiconductive particles. The virtually unlimited capability of creation of these multifunctional super-assemblies provide a solid basis for their current and future bionanotechnological applications.

The diversity of all the realizable studies within the research fields of bionanoscience and bionanotechnology is immeasurable. We focus here only on international research involving the Institute for Biophysics and Biona-

Nanoscience and its component, bionanoscience, are modern interdisciplinary research “super-domains”, compulsory conceptual platforms for the development of the related domains of nanotechnology and bionanotechnology. These fields began to emerge in the 1960s, however they developed as essential constituents of well-funded strategic policies only at the beginning of the 21st c, and especially in highly developed and/or rapidly developing countries such as the USA, EU, Japan, Israel, China and India. The prefix “nano” and the abbreviation “nm” are the shortened variants of the term “nanometer”, indicating one-billionth part of a meter (10^{-9} m). At the beginning of the development of these disciplines the terms “nanoscopic matter” or “mesoscopic matter” were used for categories of matter with dimensions of 100 nm or less. Subsequently, however, it was discovered that the borderline between “nano” and “normal” matter could be calculated much lower at around 10, or even 1 nm!

sciences at the Faculty of Exact and Natural Sciences at I. Javakishvili Tbilisi State University (TSU). These research efforts within the interdisciplinary subfield of Interfacial Bionanoscience were initiated between 2000-2003 by Professor Dimitri Khoshtariya with colleagues from the Universities of Erlangen (Germany) and Pittsburgh (USA). These joint research projects were supported and funded by the Alexander von Humboldt and Volkswagen Foundations (Germany), the National Research Council (NRC) and the Fulbright Foundation (USA). Since 2009, the year that at TSU the faculty Institute for Biophysics and Bionanoscience was founded, projects implemented by this group in collaboration with the Department of Biophysics, the I. Beritashvili Center of Experimental Biomedicine, have also been regularly supported by the Shota Rustaveli National Research Foundation of Georgia.

Interfacial bionanosystems are biologically active hybrid nanometer-sized devices. They have redox-active biomolecules that are typically incorporated at the perfectly tunable border of ordered (solid metallic platform coated by self-organized organic film) and disordered (liquid or semi-liquid) phases. To some extent, these devices mimic the native assemblies working inside the living cells. They have an advantage against their monophase (homogeneous liquid-phase) analogs



Pic. The figure represents a hybrid nanoscale system that has been thoroughly studied very recently with the active involvement of the TSU scientific team. It includes the well-known protein myoglobin as an active component (the upper part), self-assembled organic film (the middle part), and the bearing platform that is a golden electrode (the lower part). The so-called heme group (in yellow) with the iron ion in the center (dark violet) is clearly visible, as are several transient positions and the proposed trajectory for a removable water molecule (red balls and pink broken arrow, respectively). The two-sided vertical solid red arrow depicts the shortest pathway for electron self-exchange.

Source: D.E. Khoshtariya, et al. J. Phys. Chem. B., 2014, v.118, 692-706.

since they can permit electron exchange between the biological object (active center) under study and the metallic carrying platform (the modified electrode). This implies that the biological function of the biomolecule under study is either an outer-sphere transfer of the "free" electron, or that the electron transfer is involved in a more complex process, for example in the well-known enzymatic process of chemical transformation of glucose. The electron exchange (transfer) process with the electrode gives rise to a well-pronounced voltammetric (Faradaic) signal. An adequate analysis of this signal is then provided within the framework of a fast-scan methodology for cyclic voltammetry of up to 1000 volts per second. What is most important for this kind of device is the application of insulating organic films as spacers of changeable thicknesses, placed between the redox protein and metallic electrode, allowing for a smooth variation of the charge (electron) transfer distance with the extremely high accuracy of one Angstrom (i.e., the steps of 0.1 nm: nearly of the carbon atom diameter).

To illustrate, the enclosed figure represents a hybrid nanoscale system that has been thoroughly studied very recently with an active involvement of the TSU scientific team.¹ It includes the well-known protein myoglobin as an active component (the upper part), self-assembled organic film (the middle part), and the bearing platform that is a golden electrode (the lower part). The so-called heme group (in yellow) with the iron ion in the center (dark violet) is clearly visible, as are several transient positions and the proposed trajectory for a removable water molecule (red balls and pink broken arrow, respectively). The two-sided vertical solid red arrow depicts the shortest pathway for electron self-exchange.

In the framework of several international joint research projects, extensively applying the mentioned experimental methodology called "Protein Film Voltammetry", Professor Khostariya's group investigated the intrinsic "elementary" mechanisms of electron exchange with organic film-modified gold electrodes for a number of redox-active proteins. These included cytochrome c (Cyt-c), azurin (Az) and myoglobin (Mb). The thickness of insulating organic films created through the self-assembling routine protocol varied at an accuracy of 0.1 nm. The results of systematic investigations with the combined application of a series of physico-chemical approaches including variations of temperature, pressure and viscosity (latter through the changeable

composition of the solution) convincingly indicated for the first time that the physical nature of biomolecular electron transfer has to be transformed between two limiting regimes through the artificially tunable change of the charge transfer distance over the range of 1-2 Angstroms. This conclusion is having a tremendous impact on the further development of some key fundamental subfields of bionanoscience and its bionanotechnological applications.

■ According to projections by world-renowned scientists, it has become increasingly obvious that future nanotechnologies, including pollution-free utilization of solar energy and the earth's biofuels, the fabrication of bio-sensors and immuno-sensors, etc. will rest on interfacially-inspired bionanoscience, which in turn is based on the profound understanding of quantum-mechanical phenomena of charge (electron and/or proton) translocations.

This research illustrates how TSU's scientific team, together with its partners, is carrying out leading edge investigations within the modern interdisciplinary research field of interfacial bionanoscience. These investigations are a reasonable prerequisite for the initiation and extensive development of the accompanying domain of interfacial bionanotechnology in Georgia. For this to happen, however, official recognition of these innovative developments as a national priority and systematic implementation of respective governmental policy must take place. This has been the case in other technologically developed and steadily developing countries. Why are these developments for Georgia and the whole world so critical? The author's answer rests on the following theses:

(a) According to projections by world-renowned scientists, it has become increasingly obvious that future nanotechnologies, including pollution-free utilization of solar energy and the earth's biofuels, the fabrication of bio-sensors and immuno-sensors etc. will rest on interfacially-inspired bionanoscience, which in turn is based on the profound understanding of quantum-mechanical phenomena of charge (electron and/or proton) translocations.

(b) Trial investigations within the fields of interfacial bionanoscience and bionanotechnology are basically inexpensive and rest mainly on the world's and country's intellectual potential, not their industrial ability; hence with a reasonably minimal support they can be developed steadily with potentially revolutionary results.

(c) Therefore, developments within the fundamental and applied fields and specifically of interfacial bionanoscience and bionanotechnology are probably the best and perhaps the only serious prerequisites for the enhanced economic development of Georgia and for its rapid integration into the EU community.

Materials on research conducted by Dimitri Khoshtariya and his coworkers have been published in well-known scientific journals and as the book chapters, among which should be mentioned the following:

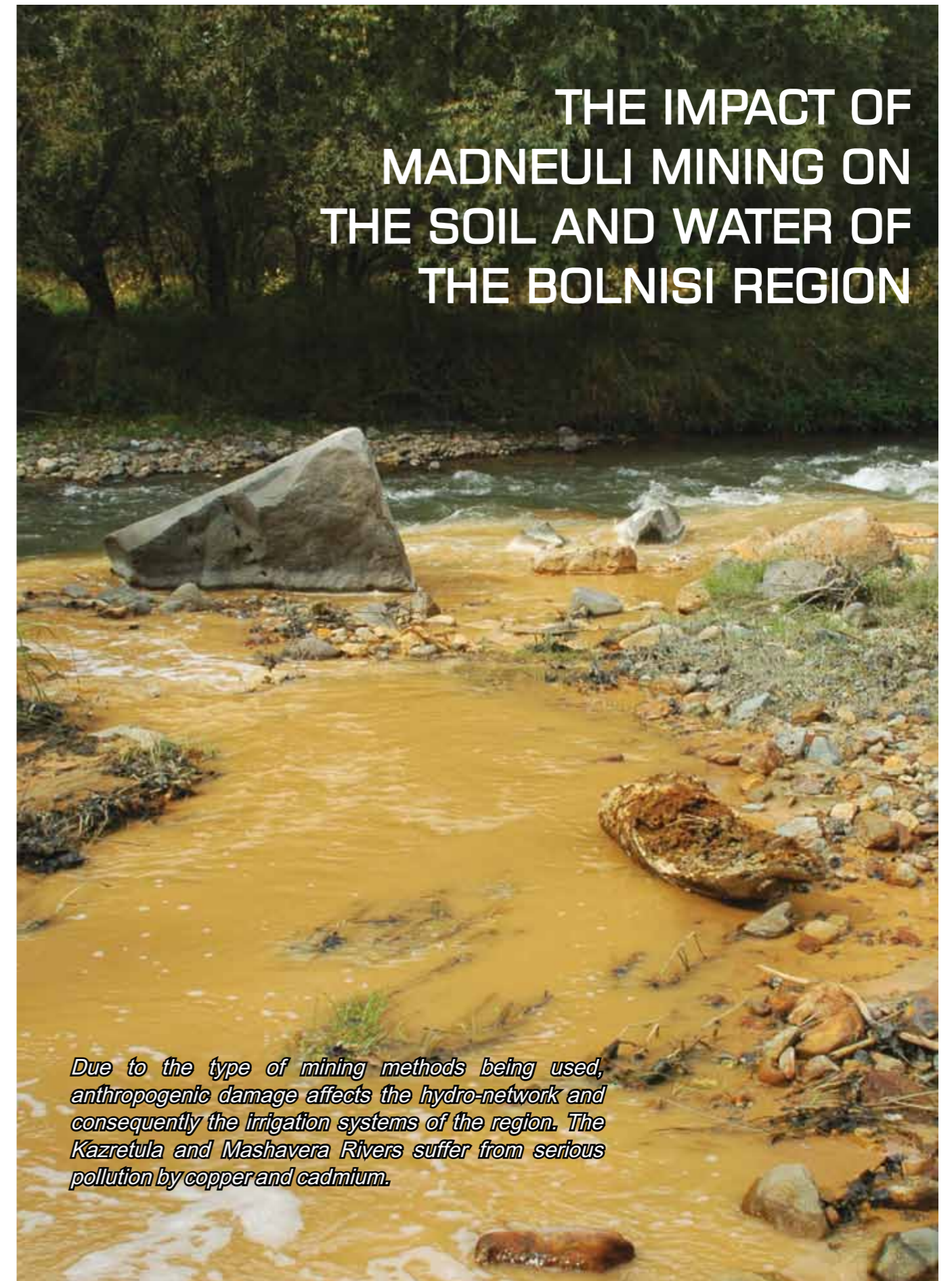
D.E. Khoshtariya, T.D. Dolidze, M. Shushanyan, & R. van Eldik, Long-range electron transfer with myoglobin immobilized at Au/mixed-SAM junctions: Mechanistic impact of the strong protein confinement. *J. Phys. Chem. B. (ACS)*, 2014, v.118, 692-706.

D.H. Waldeck & D.E. Khoshtariya, Fundamental studies of long- and short-range electron exchange mechanisms between electrodes and protein In: *Modern aspects of Electrochemistry. Applications of Electrochemistry and Nanotechnology in Biology and Medicine V.52*, (N. Elias, Ed.) Springer Publishers, 2011, Chapter 2, p.105-238.

D.E. Khoshtariya, T.D. Dolidze, M. Shushanyan, K.L. Davis, D.H. Waldeck & R. van Eldik, Fundamental signatures of short- and long-range electron transfer for azurin functionalized at Au/alkanethiol SAM junctions, *Proc. Natl. Acad. Sci. USA*, 2010, v.107, p.2757-2762.

D.E. Khoshtariya, J. Wei, H. Liu, H. Yue, & D. H. Waldeck, The charge-transfer mechanism for cytochrome c adsorbed on nanometer thick films. Distinguishing frictional control from conformational gating. *J. Am. Chem. Soc.*, 2003, v.125, p.7704-7714.

THE IMPACT OF MADNEULI MINING ON THE SOIL AND WATER OF THE BOLNISI REGION



Due to the type of mining methods being used, anthropogenic damage affects the hydro-network and consequently the irrigation systems of the region. The Kazretula and Mashavera Rivers suffer from serious pollution by copper and cadmium.



BESIK KALANDADZE

Associate Professor at the Department of Geography, Faculty of Exact and Natural Sciences at TSU; member of Georgian Soil Science Society, German Soil Science Society European Union for Geophysical Research; Georgian Greens' Party; participant in international grant projects; participant of many international conferences; author of approx 70 scientific publications. Lecturer in soil geography, technogenic pollution of soils and melioration and soil classification.

Bolnisi is one of the most significant agricultural regions in Georgia. It supplies most of the country with vegetables, thus its ecological condition is of great importance for the entire Georgian population. TSU researchers, working with German colleagues, studied the situation and have raised serious concerns about environmental contamination in the Bolnisi region.

With funding from the Volkswagen Foundation, scientists from the Justus-Liebig-Universität Gießen and Tbilisi State University carried out research on "The Influence of the Madneuli mining and beneficiation complex on the soil and water of the Bolnisi Region". The project studied the impact of Madneuli mining production on irrigated soils. The two stages of the research, carried out in 2000-2003 and in 2009-2012—were coordinated by Dr. Besik Kalandadze, Associate Professor at the TSU Faculty of Exact and Natural Sciences. Other researchers included the project Supervisor, Professor Peter Felix-Henningsen and Professors of Justus-Liebig-Universität Gießen – Sylvia Schnell, Dietrich Steffens, and Thomas Hanauer, as well as TSU Professor Tengiz Urushadze and an MA student, Levan Navrozashvili.

The project was scientifically important

since the climate and fertile soil of the region means that the Bolnisi population harvests crops three times a year. The region has an effective irrigation system supplied by the waters of the Mashavera River near the village of Kianeti. At the same time many mining companies have been operating in the region with JSC Madneuli being one of the largest among them. This mining and beneficiation complex operates out of a copper and barite-polymetallic plant and—like other enterprises of this type—poses an environmental threat to the surrounding area as well as to the ecosystem of the entire region where they operate. The capacity of the Madneuli plant is about 250,000 tons of barite ore and a million tons of copper per year. Recently its capacity has increased to 2,000,000 tons of ore. The ore is produced by opencast method and then processed with flotation technology.

According to the researchers, due to the type of mining methods, the principle anthropogenic damage affects the hydro-network and consequently the irrigation systems of the region. The Kazretula and Mashavera Rivers suffer from serious pollution from copper and cadmium. The project coordinator stated that the total amounts of these elements are several times higher than those allowed and the total content of zinc is also high. Since the well-developed irrigation system of the region takes its source from the lower part of the two rivers at their confluence, the pollution of the hydro-network covers a wide area, contaminating the agricultural soil of a large region with heavy metals.

Research results showed that the Kazretula River flows beneath the water purification plant in the gorge below; the enterprises and other facilities are located above the river on the hill, which causes pollution runoff from ore elements. According to the data, the content of copper, zinc, cadmium and sulfate in the river is much higher than the allowable concentrations for surface waters.

Due to the fact that these elements are highly soluble, they easily migrate through the water system. When watering agricultural lands about 50 liters of water per m² are necessary. This means that each year an irrigated hectare of agricultural land receives at least 12.4 kg of copper, 3.6 kg of zinc and 17 gr of cadmium. These amounts far exceed even the 1998 German soil protection regulations. Since the project was financed by the Volkswagen Foundation and was an international project with the participation of scientists from the University of Giessen it was logical to use clear standards with which to compare the results. The final results were compared with "Dutch Standards" (environmental pollutant reference values). Georgia has not yet developed permanent standards in this field, and is still using either temporary standards or former Soviet standards. The amount of copper is 36 times more, and zinc and cadmium pollution

are three times higher than the allowable amount. Heavy metals can remain on the surface, however after watering they go deep into the soil.

The researchers studied different types of agricultural lands—orchards, vineyards, kitchen gardens and grain crops. This included 29 fields of irrigated crops, 49 kitchen gardens as well as 33 orchards and vineyards. The maximum amount of copper registered in the fields was 450 mg, while it was 1100 mg in kitchen gardens and reached a high of 3000 mg per kilo in vineyard soils. The amounts of copper varied according to the form of cultivation and the frequency that the soil was watered. These agricultural lands are situated mainly near the two rivers, which contribute to their heavy pollution by heavy metals and the resulting pollution of crops. It is especially disturbing considering that some of Georgia's most popular vegetables like spinach, potatoes, carrots, etc. are great absorbents of heavy metals.

The results of the joint research reveal that due to ongoing sorption processes (the process in which one substance takes up another, absorption) the distribution of zinc and copper has surface-accumulative properties. The concentration of these metals is the highest in the humus, the richest part of the soil, while the process of surface-accumulation often causes the formation of a waterproof film on the surface which engenders a cementing process. This process significantly aggravates the agro-physical characteristics of the soil, for example the weight of the soil increases significantly, while porosity, permeability and productive moisture ranges decrease. This process causes the deterioration of agrobiological and agro-ecological conditions. Eventually this process causes a drastic fall in soil fertility and increased pollution, both of which are leading to a serious environmental disaster.

In 2011, the year before the completion of the project, the research team organized regular presentations on the project results in the Georgian National Academy of Sciences, the Ministry of Environment Protection of Georgia, to the Committee on Environment in the Georgian Parliament, and at the Madneuli Company Head office. In 2012-2013, the research results were also submitted to various international agencies and educational centers.

The results of the joint project were also presented at various international scientific forums: the European Congress of Soil Science (2012), Soil Science Congress of Germany (2011), and a number of other international conferences and congresses (2011-2014). The team of researchers has published articles in journals with high impact factor such as *Land and Soil* (2011) and in other highly rated international publications.



Pic. 1. Experimental sites

The researchers studied different types of agricultural lands—orchards, vineyards, kitchen gardens and grain crops. This included 29 fields of irrigated crops, 49 kitchen gardens as well as 33 orchards and vineyards. The maximum amount of copper registered in the fields was 450 mg, while it was 1100 mg in kitchen gardens and reached a high of 3000 mg per kilo in vineyard soils.

Japan Proton Accelerator Research Complex (J-PARC)

The experiment is carried out by COMET (Coherent Muon to Electron Transition) on the basis of this complex in particle physics. The goal of the experiment is to shed light on a longstanding problem of particle physics, which is to understand the interplay between two very similar fundamental particles--electrons and muons.



THE COMET EXPERIMENT AT J-PARC: A STEP TOWARDS SOLVING THE MUON ENIGMA



MERAB ELIASHVILI

Doctor of Sciences in Physics and Mathematics. Professor at I.Javakishvili Tbilisi State University;
Head of the Department of the Theoretical Physics, A.Razmadze Mathematical Institute (TSU), chief scientist;
Member of International Scientific Council of the Joint Institute for Nuclear Research (Dubna);
National Representative of the World Federation of Scientists (Geneva);
Author of scientific publications in the fields of elementary particle physics, quantum field theory, low dimensional physical systems, modern mathematical physics.



MIKHEIL NIORADZE

Director of the High Energy Physics Institute at Tbilisi State University; Doctor of Physics and Math. Sciences, Professor; Winner of the American Physics Society prize, of the Joint Institute for Nuclear Research (Dubna) award and the Georgian National prize; Under his leadership the High Energy Physics Institute collaborates with the Jülich Research Center; Heads projects financed by international and local science foundations; Participant in international and local conferences and symposiums; 130 scientific publications, 65 of which are published in international journals; He was awarded the Order of Honor.



ARSEN KHVEDELIDZE

Dr. Arsen Khvedelidze completed his PhD in Theoretical and Mathematical Physics at the Joint Institute for Nuclear Physics (JINR) in 1989.
Leading Scientific Researcher in Laboratory of Information Technologies at JINR and Scientific Researcher at Tbilisi State University, A.Razmadze Mathematical Institute.
Author of scientific publications in the fields of quantum field theory, gravitation theory, theory of elementary particle physics and mathematical physics.



ZVIAD TSAMALAI DZE

PhD in Physical Sciences; Head of scientific sector at the Joint Institute for Nuclear Research (JINR) in Dubna; since 2000 participates in experiments carried out at KEK, JPARC, Japan, coordinating these experiments from Georgia. In 2002-2003 worked at KEK, Japan; 2003-2013 received JSPS grants for six times (invited professor), Japan; 1986-1993 – participated in experiments on ARES equipment at JINR, Dubna, Russia; 1993-2004 – participated in international collaboration PIBETA, PSI, Zurich; 1995-present Head of Georgian group at CMS; Scientific interests: rare decays; new generation radioactive detectors; electromagnetic and Hadron calorimeters; inorganic crystals. Co-authored 310 scientific publications (in peer-reviewed journals).

On September 22-26, 2014 Tbilisi State University (TSU) hosted a workshop with the international group COMET: COherent Muon to Electron Transition, on the particle physics experiment at the Japan Proton Accelerator Research Complex (J-PARC). The Workshop was organized by the TSU High Energy Physics Institute (HEPI) with support from the Shota Rustaveli National Science Foundation. Fifty representatives from eight member countries took part. The experiment sheds light on a longstanding problem of particle physics, which is to understand the interplay between two very similar fundamental particles--electrons and muons. Why are there muons in addition to electrons? "Who ordered that?" exclaimed Nobel Prize laureate, theoretical physicist, I. Rabi, when the muon was identified.

Since 1936 when the muon was discovered in the cosmic-ray particle "showers" by the American physicists C.D. Anderson and S. Neddermeyer, the role of this particle in the family of subatomic blocks of the Universe remains an open problem. The muon appears in two forms. One is a negatively charged particle and the other is a positively charged antiparticle and belongs to a special family of fundamental particles

– the so-called lepton group which includes electrons, muons and neutrinos. The electron, with a mass of 0.511 MeV, is the lightest representative of the charged leptons. The muon is quite similar to the electron but 207 times heavier (105.7 MeV) -- and unlike the electron, which appears to be completely stable, it decays after 2.2 microseconds into an electron, a neutrino, and an antineutrino.

There is third, heavier charged lepton which has been identified called the tau. The tau lepton has a mass of 1,777 MeV and a lifetime of about 10-13 seconds. Like the electron and the muon, the tau has its associated neutrino. These six types of particles--electrons, muons, taus and their corresponding neutrinos are called flavors. Along with their antiparticles they form three generations of leptons: (e, ν_e) , (μ, ν_μ) , (τ, ν_τ) . The members of each generation are assigned leptonic numbers that are assumed to be conserved, i.e., the number of leptons of the same type remains the same while particles interact. However, there is a remarkable quantum mechanical phenomenon that was predicted by Bruno Pontecorvo called "neutrino oscillation". A neutrino created with a specific lepton flavor (electron, muon or tau) can later be measured as having a different flavor, changing according to the Pontecorvo-Maki-Nakagawa-Sakata matrix (PMNS matrix). The Lepton Flavor Violation (LFV) in the neutral leptons sector is an established fact. What about their "charged" partners?

IS THERE CHARGED LEPTON FLAVOR VIOLATION (CLFV)?

The COMET experiment is devoted to this question. More precisely, the experiment is searching for a coherent neutrino-less conversion of muons to electrons in the presence of a nucleus – the so-called $\mu^- \rightarrow e^-$ conversion

$$\mu^- + N(A, Z) \rightarrow e^- + N(A, Z),$$

with a single-event sensitivity (SES) $\sim 10^{-17}$. The conversion has the best sensitivity to new physics, better than the limits expected with the current technology for other CLFV processes, such as $\mu \rightarrow e\gamma$, $\mu \rightarrow eee$ processes.

Muons provide the best laboratory to

study CLFV as they can be produced in substantial numbers and have a sufficiently long lifetime for precise measurements of their decay. Existing accelerators can produce about 1015 muons/year, and it is anticipated that it will be possible to produce 1018-1019 muons/year with a new high intensity source proposed in conjunction with the main J-PARC proton synchrotron ring.

THE ROLE OF CLFV IN PARTICLE PHYSICS

Flavor transitions between the charged leptons have great potential for revealing new phenomena. Until now the Higgs boson has been observed only at the Large Hadron Collider (LHC) but no other new particles expected in physics beyond the Standard Model (SM) have been found. The discovery of CLFV processes opens a door to a new physics beyond the SM. There are several other models, based on super symmetric grand unification, super symmetric seesaws and extra dimensions approaches, all of which require the existence of CLFV.

THE COMET EXPERIMENT WILL GIVE US CONSTRAINTS FOR THOSE MODELS OF $\mu^- \rightarrow e^-$ CONVERSION PHENOMENOLOGY

One can assume that the $\mu^- \rightarrow e^-$ conversion happens as follows: Once a negative muon is stopped by some material, it is trapped by an atom and a muonic atom is formed, then it cascades down to ground state, the muonic atom. The fate of the muon is then to either decay in orbit $\mu^- \rightarrow e^- \nu_\mu \bar{\nu}_e$, or be captured by a nucleus of mass number A and atomic number Z with emission of a neutrino, namely $\mu^- + N(A, Z) \rightarrow \nu_\mu + N(A, Z - 1)$.

However, in the context of physics beyond the SM, the exotic process of neutrino-less muon capture, such as $\mu^- + N(A, Z) \rightarrow e^- + N(A, Z)$, is also expected. This process is called $\mu^- \rightarrow e^-$ conversion to muonic atom.

This process violates the conservation of lepton flavor numbers by one unit, but the total lepton number is conserved. The branching ratio of this process is determined to be the ratio of the rate of $\mu^- \rightarrow e^-$ conversion to that of normal muon capture, namely

$$B(\mu^- N \rightarrow e^- N) \equiv \frac{\Gamma(\mu^- N \rightarrow e^- N)}{\Gamma(\mu^- + N \rightarrow \nu_\mu + N')}.$$

The final state of the nucleus (A, Z) could be either the ground state or one of the excited states. In general, the transition to the ground state, which is called coherent capture, is dominant. The event signature of coherent $\mu^- \rightarrow e^-$ conversion in a muonic atom is the emission of a mono-energetic single electron with an energy $E \approx m_\mu$. This fact makes the $\mu^- \rightarrow e^-$ conversion highly attractive from an experimental point of view. The process can be easily identified because the e-energy of about 105 MeV is far above the end-point energy of the muon decay spectrum (52.8 MeV). Besides this, since the event signature is a mono-energetic electron, no coincidence measurement is required. Potentially this allows the improvement of sensitivity by using a high muon rate without suffering from accidental background events, which would be serious for other processes such as $\mu \rightarrow e\gamma$, $\mu \rightarrow eee$ decays.

COMET AT J-PARC

The COMET experiment is designed to be carried out at the J-PARC accelerator complex. An 8 GeV – a bunched proton beam that is slow-extracted from the J-PARC main ring – will be used. The experimental setup (Fig 1.) consists of a dedicated proton beam line section, a muon beam line section and a detector section.

To achieve the COMET experiment, several important features have been considered, i.e.:

- Highly intense muon source: To achieve a desire sensitivity a total number of muons stopped in the muon-stopping target of 2×10^{18} is needed. To increase the muon beam intensity a high power proton beam will be used as well as a pion capture system.

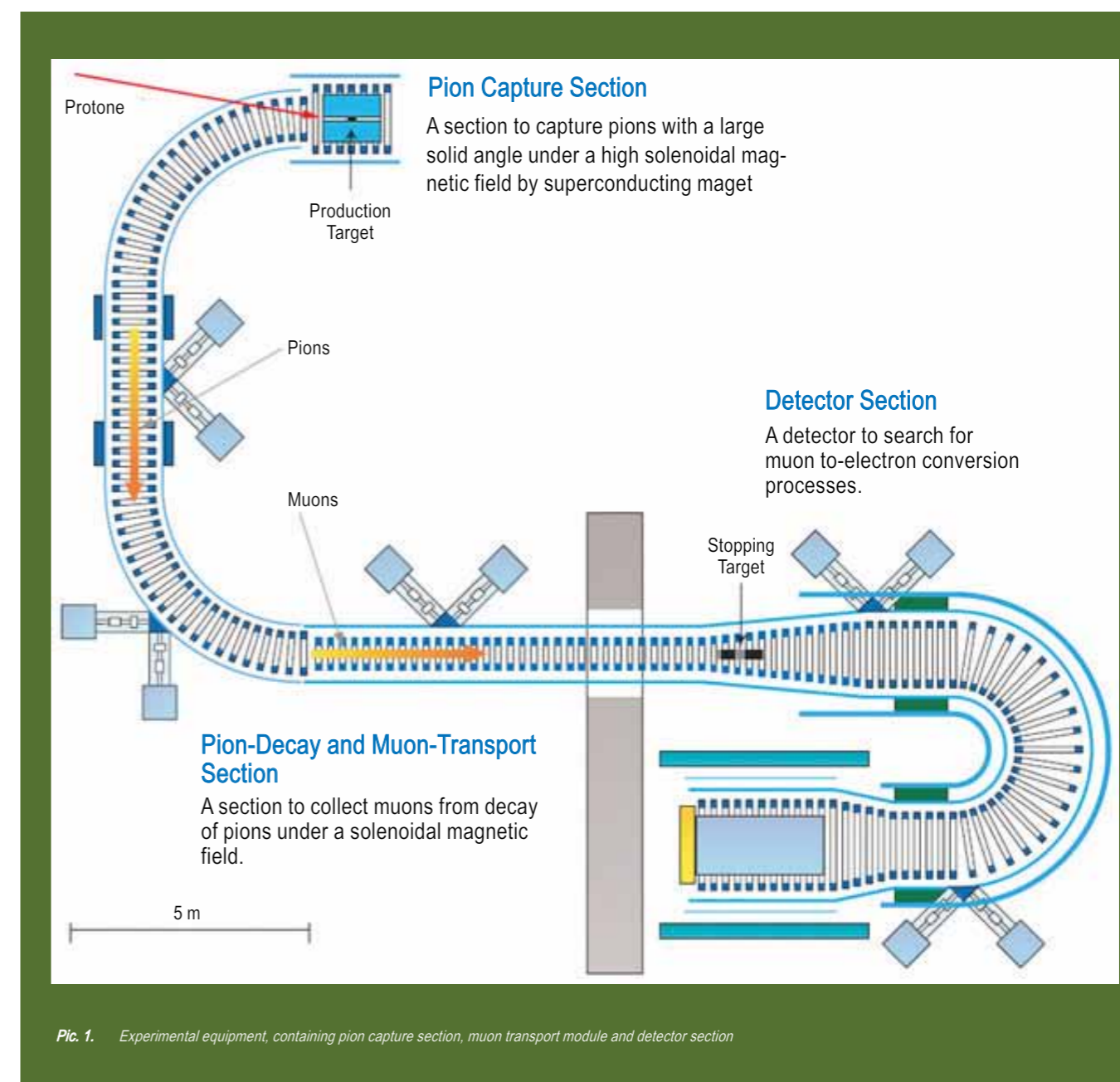


Fig. 1. Experimental equipment, containing pion capture section, muon transport module and detector section

- Pulsed proton beam: To suppress the occurrence of beam-related background events, a pulsed proton beam utilizing "beam pulsing" has been proposed.
- Muon transport system with curved solenoids: The captured pions decay into muons, which are transported with high efficiency through a superconducting solenoid magnet system with straight and curved solenoids eliminating electron background events.

■ *The HEPI at TSU has had many years of experience participating in experiments dedicated to Standard Model verifications. These experiments, including PiBeta and MMbar, were performed in the 1980s at the Synchrotron of the Paul Scherrer Institute (Switzerland). At that time no evidence was found against the validity of the Standard Model. Scientific cooperation between HEPI TSU and COMET began about six years ago, with the participation of the Georgian group in research and development of electromagnetic calorimetry.*

GEORGIAN PARTICIPATION IN COMET

The HEPI at TSU has had many years of experience participating in experiments dedicated to Standard Model verifications. These experiments, including PiBeta and MMbar, were performed in the 1980s at the Synchrotron of the Paul Scherrer Institute (Switzerland). At that time no evidence was found against the validity of the Standard Model. Scientific cooperation between HEPI TSU and COMET began about six years ago,

with the participation of the Georgian group in research and development of electromagnetic calorimetry. This includes the simulation of scintillating and light transmission processes in scintillating crystals. At present participation is planned within the tests and certification of all 2500 crystals of the electromagnetic calorimeter, its assemblage and beam tests, in collaboration with the Joint Institute for Nuclear Research (JINR, Dubna). Participation is also

planned for measurements at the J-PARC beam time experiments, software development for data handling and physics data analysis. This project, as well as other important ones carried out at CERN (Geneva), the Julich Research Center, and in JINR etc., create attractive perspectives for further international scientific cooperation for Georgian elementary particle physicists.



On September 22-26, 2014 Tbilisi State University (TSU) hosted a workshop with the international group COMET: COherent Muon to Electron Transition, on the particle physics experiment at the Japan Proton Accelerator Research Complex (J-PARC). The Workshop was organized by the TSU High Energy Physics Institute (HEPI) with the support of the Shota Rustaveli National Science Foundation. Fifty representatives from eight member countries took part.



THE ECOLOGICAL CONDITION OF THE BLACK SEA – ASSESSMENTS BY TSU SCIENTISTS

Joint research was conducted in 2011-2013 out in Romania and Georgia on pollution in the Black Sea. The Georgian team worked with leading German and Greek environmental scientists within a project entitled „Investigation of Submarine Groundwater Discharge (SGD) for preventing pollution and eutrophication of the coastal Black Sea”, funded by the Shota Rustaveli National Science Foundation and the European Commission.



GIORGI MELIKADZE

The Georgian research team from the Research Center of Hydrogeophysics and Geothermy of TSU's M. Nodia Institute of Geophysics was led by Dr. Giorgi Melikadze, DrSci in Geological-Mineralogical Sciences, and included Mariam Todadze, Zurab Machaidze, Nino Kapanadze and Alexander Chankvetadze. German researchers from the Helmholtz Centre for Environmental Research were headed by Dr. Michael Schubert, and the Greek researchers from the Hellenic Centre for Marine Research were under the leadership of Dr. Christos Tsabaris. Black Sea sites targeted for the research included the eastern coastline

of the Adjara region and the western Romanian lowlands territory adjacent to Constanta.

Pollutants discharged into the sea can cause significant damage to the environmental condition of coastal areas as well. Damage can include coastal eutrophication (pollution from toxins, nitrates and phosphates--or excess nutrients that stimulate excessive plant growth), the pollution of produce from the sea, destruction of coral reefs and harmful "blooming" of seawater. The key goal of the research was to investigate Submarine Groundwater Discharge (SGD) areas using a multi-tracer approach.

Head of the Research Center for Hydrogeophysics and Geothermy at the Mikheil Nodia Institute of Geophysics; Doctor of Geological Mineralogical Sciences; President of Georgian Geothermal Association; Member of International Hydrogeological Association; Head of international grant projects; expert at International Atomic Energy Agency; participant and organizer of international conferences; authored approx 100 scientific works.

Joint research was conducted in 2011-2013 with the participation of leading German, Greek and Georgian scientists to study the problems of pollution of the Black Sea on the territories of Romania and Georgia. Scientists from Tbilisi State University (TSU) were actively involved in the research.

The Adjarian coast line was selected for several reasons. In particular, this region is a surface water discharge area. It concentrates polluted waters from municipal, runoffs, toxic industrial waste and agricultural chemicals in the region.



Photo Kobuleti, Adjara coast, Georgia

Tracers are natural or anthropogenic substances that exist in the environment. Generally, water tracers are used to study submarine groundwater discharge. Unlike artificial tracers the ecological tracers used do not cause chemical environmental pollution. Moreover, natural ecological tracers--because they exist everywhere--are convenient for large scale research. This is an important factor in SGD investigation. Dr. Melikadze pointed out that it was an attempt to localize and count the SGD areas by uniting various water tracers and by substantiating these results using new methods of satellite data-gathering. The Adjara coastline was selected for the fact that this region is a surface water discharge area from the territory of Adjara, and surrounding areas contribute to the concentration of pollution with waters from municipalities and with toxic and agricultural waste from large

industrial facilities and cities.

The region includes the port city of Batumi, the town of Kobuleti, as well as many villages and settlements that cause pollution from runoff into the Black Sea. This is also where the large Baku-Supsa oil pipeline terminal is located, built directly on the coast. The territory was also selected for the study since it is a well-developed agricultural region--tea, maize and citrus crops widely use mineral fertilizers and chemicals. Although the region is part of the Kolkheti Protected Areas system according to a law passed in 1999, for the last 100-150 years endemic plants have been massively supplanted by alien species such as tea, maize, haricot, soya and citrus, resulting in radical changes in the soil's processing capacities. These crops cause soil exhaustion that leads in turn to the use of additional fertilizers. The study should permit

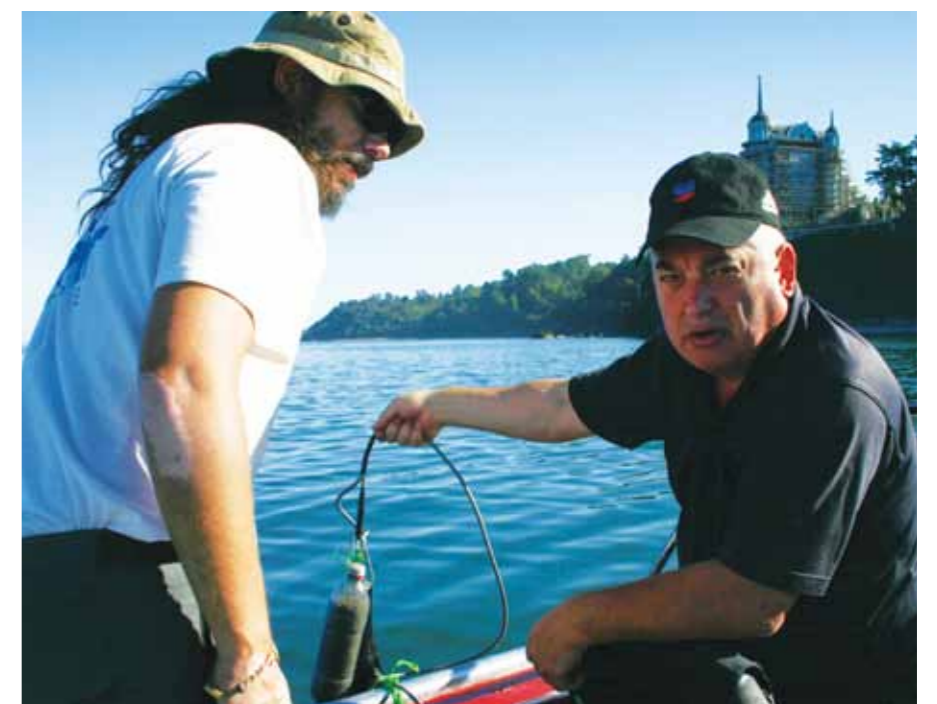
the rehabilitation of traditional crops that need little or no fertilizers.

During the project a new methodology of using ecological tracers was introduced to determine submarine groundwater discharge areas. For the first time satellite data were used to carry out long-term and large-scale assessment of coastal temperatures and to identify key areas of anthropogenic impact.

Groundwater flow and discharge areas were identified along the Adjara coastal area, including their range and surface pollution. This is the first time such a complex study of marine and land pollution, using ecological tracers, has been carried out in Georgia. The study helped determine the intensity of eutrophication in groundwater as well as in the sea. The distribution and intensity of pollutants discharged into the sea were investigated, and forecasts made on the

potential changes. Recommendations include the need for regular monitoring over these areas. For the first time, a marine and land research complex was successfully carried out in Georgia using ecological tracers such as oxygen ^{18}O and hydrogen ^2H stable isotopes, Radon (Rn), Radium-Ra, and others.

Research results were presented in Constanta in September 2012, in Athens in March 2013 and at the M. Nodia Institute of Geophysics at Tbilisi State University in November 2013. The results were reported in the Journal of Georgian Geophysical Society, Issue A. Physics of Solid Earth, vol. 116A 2013 by George Melikadze, Michael Schubert, Christos Tsabaris, Nino Kapanadze, Mariam Todadze, Zurab Machaidze and Alexander Chankvetadze, entitled "Using Environment Tracers for the Investigation of Submarine Groundwater Discharge".



Based on the discoveries by researchers from the Institute of Archaeology at Tbilisi State University, the Grakliani Hill site, located near Igoeti in eastern Georgia, was granted the status of Cultural Monument. At the initiative of the National Agency for Cultural Heritage Preservation of Georgia and TSU, an open-air museum will be created on Grakliani Hill.



VAKHTANG LICHELI

Archaeologist; Professor; Director of the Institute of Archaeology of the Faculty of Humanities, Ivane Javakishvili Tbilisi State University; Doctor of Historical Sciences; invited professor at the University of Innsbruck. Leads Georgian and international archaeological expeditions in Georgia and projects. Author of about 80 scientific works published in Georgia, Azerbaijan, Armenia, Russia, Poland, Greece, Italy, Spain, England, Canada, Holland, Germany, France and Australia.

FOOD AND VEGETATION IN KARTLI IN THE 5th-4th CC BC: FINDINGS ON GRAKLIANI HILL

For several years TSU scientists have been working on the Grakliani Hill--located near the villages of Igoeti, Samtavisi and Gamdlistskaro. Ten cultural layers have been discovered spanning periods from the Stone Age to Roman civilization.

Apart from studying materials created by humans during their development to provide historical interpretations, archaeology contributes to the study of specific eco-environments and the general development of natural milieu. It permits the study of earth magnetism, the evolution of flora and fauna, the palaeo-climate and other domains. Archaeology applies different technical methods according to the subject at hand, including earth remote sensing, geophysics, various chemical, physical, hydro-chemical and geochemical comparative analyses, molecular studies, and statistical-mathematical methods. This is how TSU scientists apply archaeology.

Researchers from the TSU Institute of Archaeology are studying the Grakliani Hill near the villages of Igoeti and Samtavisa, where ten cultural layers have been uncovered, including periods from the Stone Age to the Roman age. This ancient settlement and necropolis contains the inventory of local production over time. The archaeologists have excavated more than 300 graves, and have found items of clay, bronze, silver and gold, as well as items made in the centres of very different civilizations. These include seals made in the 4th-3rd Millennia BC in the ancient urban centre of Uruk in southern Mesopotamia, glass kohl-tubes (for eye makeup) and jewellery-accessories made in Achaemenid Persia and in Greece, as well as Colchian pottery.

This article provides a short description of the results of interdisciplinary investigation made by Prof. Vakhtang Licheli and Prof. Eliso Kvavadze. In 2012 the archaeologists began carrying out palynological analyses on different forms (bowls, pots, jugs, etc) found in graves, to identify specific uses for pottery,

details of ancient dwellers' everyday lives, their diet and burial rituals. (Palynology is a discipline related to botany that studies pollen grains and spores.) That year the team also began collaboration with the Institute of Palaeobotany of the National Museum. The TSU Institute of Archaeology has carried out similar palynological studies in different parts of Georgia. Interestingly, each study has resulted in new findings. Although there were not many materials obtained from the Grakliani Hill site, 32 samples taken from 25 graves offered enough micro-quantities for analysis. The palynological contents of dishes differed between samples.

Professor Vakhtang Licheli, Head of the TSU Institute of Archaeology headed the expeditions. He stated that the excavations yielded rich and interesting materials, especially from certain graves. Excavations revealed 200-450 palynomorphs including walnut and hornbeam dust. There were also pollen grains of oak, pine, beech, linden, oriental hornbeam and wild grape dust in small amounts. As for herbs, there were many types of plants that grew in the yards, as well as trail and rubbish areas--such as chicory, yarrow (achillea), plantain, common cocklebur, artemisia, etc. To some extent, elements of weed vegetation in wheat fields were also detected. The team found pollen grains of wheat, eryngo (eryngium), buckwheat and goosefoot (chenopodium). Pollen samples of pasture weed were rarer. Hundreds of hand mills were discovered, witnessing to the development of a wheat culture in Grakliani Hill. In 5th-4th cc BC three women could grind wheat enough for 30 kg of flour with a small mill in a storeroom. It was incredibly hard work as they ground the wheat on the bottom of the low millstone

(where the wheat was loaded) by sliding the upper millstone back and forth by hand.

The researchers found a bird feather in one of the bowls, but generally poultry meat and pork were not sacrificed in the graves; instead, beef was used as an otherworldly provision. According to the religious tradition pigs were not sacrificed since they could not cross the bridge leading to the other world to reach the deceased.

Professor Eliso Kvavadze headed the palynological studies. From the dishes selected for the analysis, researchers examined the contents of 11 samples, which yielded about 200-400 palynomorphs. The results showed that preservation of pollen grains, by their concentration and composition in pots was much better than in bowls. In one grave they discovered a small pot with a different type of palynological range of contents including pollen grains from buttercups and wheat in abundance; and walnut pollen grains were also found. The palynological range in this grave also included a large amount of pollen grains of honey plants. Bee stingers were found in non-palynological residue. Accordingly, in the small pot there must have been a sweet honey dish, similar to tsandili (cooked wheat mixed with honey), made with wheat and buttercup flowers or leaves, and with walnuts. Buttercup flowers or leaves could have served as flavouring. There was a small amount of pollen in the spectra (data remains) of a jug found in another grave. Textile fibres found in the jug had more flax than cotton. According to the spectra studied, the jug must have been new and unused, and became dirty from the soil of the excavation works.

Grave number 139 contained a jug with a quantity of wood pulp cells--presumably traces of a wooden lid--as well as the pollen of honey plants such as knotweed, cornflower, buckwheat, and others. Zoological materials contained bee stingers. This, along with pollen from honey plants indicates the presence of tapluchi (an alcoholic drink flavoured with honey) in the jug. The use of a wooden cap indicates the jug had been filled with an alcoholic drink. Professors Licheli and Kvavadze stated that this important fact indicates that in the 5th - 4th BC people consumed wine as well as tapluchi. Large wine containers were found in the Grakliani Hill site. Grakliani Hill dwellers placed a jug with water in the grave for the deceased in summer and a jug with tapluchi in winter. This implies that people perceived the other world as a reality, believing the deceased would consume these drinks.

Researchers found a large amount of flax textile fibre in the sample taken from a dark-coloured stain found at the bottom of grave number 217. The stain could be disintegrated flax tissue with the residues of brown dye. Two cotton fibres were found as well, but pol-

■ TSU expeditions have proven that cosmetics were used as far back as the 16th century BC. Wheat, nut, sweetbrier, beech, grape and other products were buried with the deceased, while prepared meals were put in small pots.

len grains other than pine, were not discovered. Although pine forests are not common in these regions today, large amounts of pine dust were found in the 2500-year-old archaeological/ palynological remains. Professor Kvavadze pointed out that the different palynological spectra of dishes showed that bowls were mainly used for medicinal herbs and food. Grave number 217 was that of a woman aged 21-22, and contained silver bangles, Egyptian scarabs, an Achaemenid glass tube for kohl powder (eye makeup) and gold necklaces. According to the researchers, beauty products were used as early as the 16th c BC.

Pots were filled with provisions of wheat, walnuts, hazelnuts, rosehips, beech fruit, grapes and other food for the deceased, and some cooked food was put in smaller pots. Grave 37 is a notable example where there were provisions of walnuts in one pot and a meat dish in a smaller pot. Similarly, in grave number 148, a pot had been filled with wheat and there was a portion of sweetened wheat in a smaller pot.

According to the study of Grakliani Hill, TSU researchers conclude that local populations in the 5th- 4th cc BC used more flax for textiles and only small amounts of cotton. Wool fibres were found only in one grave, however, long-term preservation of wool fibres is always very difficult.

The researchers have not excavated enough graves to be able to determine exact seasonal mortality statistics, however according to existing data they presume that mortality rates were highest in winter--out of 25 graves, only nine persons died in summer and the others in cold periods.

Several presentations have been made on the findings of the study of the food and vegetation in 5th -4th cc BC Kartli at the Grakliani Hill site; these include Leiden University (The Netherlands) in 2013, The Museum of Natural History in Nürnberg (Germany) in March 2014, and Jena University (Germany) in July 2014.





THE GERMAN WAY OF LIFE IN THE CAUCASUS

Although Germans came to live in Georgia as early as the 19th century, while the contribution of these people to the development of the country has been largely unstudied. A project carried out by a multi-ethnic research team between 2011 and 2013 aimed at analyzing the social memory of Georgians in the areas where Germans previously lived. This is significant for historical studies and for historical studies and for the analysis of stereotypes. One of several multicultural projects, TSU researchers carried out this study within a larger project entitled Caucasus, culture, conflict within the Faculty of Humanities. The Faculty of Humanities worked in collaboration with the Department of Social and Cultural Anthropology of Philipps-Universität Marburg in 2011-2013. The German project supervisors were Dr. Stefan Foel and Professor Ernest Halbmeier and the Georgian supervisor was Dr. Ketevan Khutsishvili, Professor at the TSU Institute of History and Ethnology. Researchers from TSU also included Natia Jalabadze and Lavrenti Janiashvili, both TSU PhDs, as well as Tea Kamushadze and Irakli Pipia and other BA students.

The German Academic Exchange Service (DAAD) supported the implementation of the project. Researchers selected a specific research issue to study each year, as follows: 2011--"Caucasus, conflict, culture: conflict anthropology and prevention in Armenia, Azerbaijan and Georgia"; 2012--"Crossing borders from below: Inter-ethnic contacts in the border villages of the South Caucasus"; and 2013--"Germans in the Caucasus: relations in a multi-ethnic environment".

The third project had scientific as well as educational-practical objectives. Its educational aim was to teach students of German universities and the South Caucasus universities to plan fieldwork jointly, to share knowledge (including the techniques of anthropological research) and make plans for future collaboration. In 2013, eight Georgians (BA, MA and PhD students), three Azerbaijani, six Armenian and six German students were engaged in the project. According to Professor Khutsishvili, another important aim of the project was to provide the possibility for citizens of the South Caucasus countries

to discuss the perspectives of a peaceful Caucasus, based on personal contacts they made during their collaboration. This research was a powerful unifying factor for the students from conflicting parties, and hopefully they will be politically active in the future, as it will create the basis for positive future relations.

The third stage of the project analysed the social memory of the Germans who migrated from the southwest of Germany in the 19th century to Georgia, and those who were deported in 1941. The research was undertaken in Georgia and Azerbaijan through observation and interviews in villages where Germans formerly resided.

People living in ethnically mixed regions of the Caucasus still remember these periods and hold contradictory stereotypes. Professor Khutsishvili points out that the complex impressions left by Germans were at the same time dictated by a respect for their economic and agricultural knowledge, yet on the other hand by cultural differences--the behaviour of the Germans was sometimes strange for local residents; their customs and lifestyles were



KETEVAN KHUTSISHVILI

Doctor of Historical Sciences, Professor, TSU Institute of Ethnology. Dr. Khutsishvili has been affiliated with TSU since 1993. Her specialties include religions, ethnic groups, and intergroup conflicts. Khutsishvili is author of three monographs, more than 60 scientific articles, and co-author of three books and one textbook; participant in more than 50 international conferences and workshops; participant in ethnographic research and fieldwork in the Caucasus, including Turkey. She lectures in Ethnographical Research Methods; Introduction to Ethnology; History of Religions; Anthropology of Religions; Anthropology of Violence; Ethnic Minorities in Georgia; Ethnography of the Caucasian Peoples. She has developed and participated in eight international grant projects.



Today Germans no longer live in these southern Georgian villages and only vestiges of their material culture and memories about them have remained. Their history has been preserved through local sources and narratives. This is one of the rare photos of Germans who had settled in the area.



■ *Newly arrived Germans settled in areas of southern Georgia near Bolnisi and played an important part in the social and cultural life in the region. German structures, objects and photographs can be found, which contribute to the social memory of present-day Georgians, about the lives of Germans who formerly lived in their villages.*

Pic. Houses built by Germans in Bolnisi

very different from those of the Caucasians they lived with. Impressions also included distrust, caused by German official support for the Russian Empire. e. Tsarist Russia considered it beneficial to settle Germans in border regions and financially supported this initiative.

The main target communities for the research project were the German Protestant settlements (mainly Pietists, a Protestant movement) having moved from Swabia in Germany to Georgia and Azerbaijan in the 19th century. The Russian Emperor, Alexander I (1777-1825) was indeed fascinated by Pietist ideology and invited the Swabian minority group from Germany where they suffered from political instability and a high population density in their region. He settled them in the Tbilisi area with the intention of promoting agricultural development. The second wave of Swabians moved into the southeast of Georgia and northern Azerbaijan, near Elizabetpoli, today's Ganja. The new settlers' motivation to live in the Caucasus was driven mainly by religious beliefs—they expected the second advent of Christ in 1836, with the founding of God's Kingdom on Earth, and wanted to be witnesses of the events. They believed that Georgia was located near the site these events would take place.

Scientific and historical literature details Swabian migration. The newly arrived Germans settled in Tbilisi outskirts and played an important part in the social and cultural life of the time. There are still German structures and objects found in the outskirts

of Tbilisi, including houses, agricultural buildings, church ruins and everyday items. The Lutheran Church, German in origin, holds services in Tbilisi. However, the main target of the research was the culture of Germans residing in villages, and especially in the Georgian villages of Katarinenfeld (today's Bolnisi) and Elizabettal (today's Asureti) as well as in Azerbaijan's Helenendorf (today's Göygöl).

The researchers concluded that today there are no Germans living in these villages. There are only the remains of their material culture and memories of local citizens. One woman of German origin lives in Helenendorf. A German has moved into what was known as the "German house" in Asureti, yet has no contact with the earlier Germans. No one of German origin remains in Bolnisi—some were expelled after World War II and some returned to Germany on their own. Today their lives are reflected mainly in the narratives of local citizens. Materials collected in Bolnisi and Asureti reflect German material culture of the epoch—socio-cultural information that includes descriptions of the Germans' daily lives and the influence of this group on today's lifestyle and cultural relationships.

German houses with large, deep basements remain intact in the area today. Georgians who migrated from Imereti and Racha in the 1940s, and the Armenians who migrated from neighbouring villages now live in these homes. Buildings that belonged to the Germans are also used for local businesses, such as restaurants with a German interior,

shops, etc. Locals admit that despite their age, the buildings are still practical and comfortable. There is a new Lutheran house of prayer in Bolnisi, and the parishioners are Armenian and Georgian. Today, there is a sports school in the place of the Germans' old house of prayer. The researchers noted a phenomenon of "religious replacement", as the place of the Swabian German Pietists has been taken by the Georgian-Armenian Lutheran community.

Locals have a largely positive attitude towards Germans who had previously lived in the area. They believe that Germans greatly benefited the region—they built vineyards, used advanced agriculture and brought various technical innovations—for example they had planned a tram line in Asureti. However, locals also mention that Germans had little contact with others in the community—Azerbaijanis, Armenians or Georgians.

Head researcher at the Institute of History and Ethnology, Lavrenti Janiashvili believes that the history of German settlements in Georgia holds practical implications today. They want to get in touch with the descendants of the Germans who left, and perhaps increase their interest in investment and tourism development.

The academic achievements of the project were published as a collection entitled *Caucasus, Conflict, Culture - Anthropological vision of the periods of crisis*, published by Kurupira, Philipps-Universität Marburg, which also includes research on existing conflicts in the South Caucasus.

THE IVIRON MONASTERY DURING THE OTTOMAN EMPIRE



TAMAR ALPENIDZE

Doctor of Philological Sciences; philologist – orientalist; Professor at the Faculty of Humanities of TSU. Researcher on modern Turkish literature (20th -21st centuries) and the history of the Monastery of Iviron at Mount Athos after the Fall of Constantinople (15th – 20th centuries). Translator of Orhan Pamuk's works. Studies Ottoman sources on Georgian monasteries. Postgraduate studies at Istanbul University and the summer school of academic learning in Istanbul; Bilgi University; Harvard-Koç University intensive Ottoman and Turkish summer school; studied under Faculty Development Fellowship (FDF) at the New York University, Near Eastern and Islamic Studies Department (USA).

What was the role and importance of the Georgian monastery after the fall of the Byzantine Empire? A TSU researcher's study, "The Iviron Monastery during the Ottoman Empire" is a successful attempt to answer this question. Assistant Professor Tamar Alpenidze from the TSU Institute of Oriental Studies, Division of Turkish Language and Literature, began her research in 2013. She spent a semester in Istanbul at Koç University's Research Center for Anatolian Civilizations studying Ottoman materials kept in Istanbul archives that are related to the Iviron Monastery.

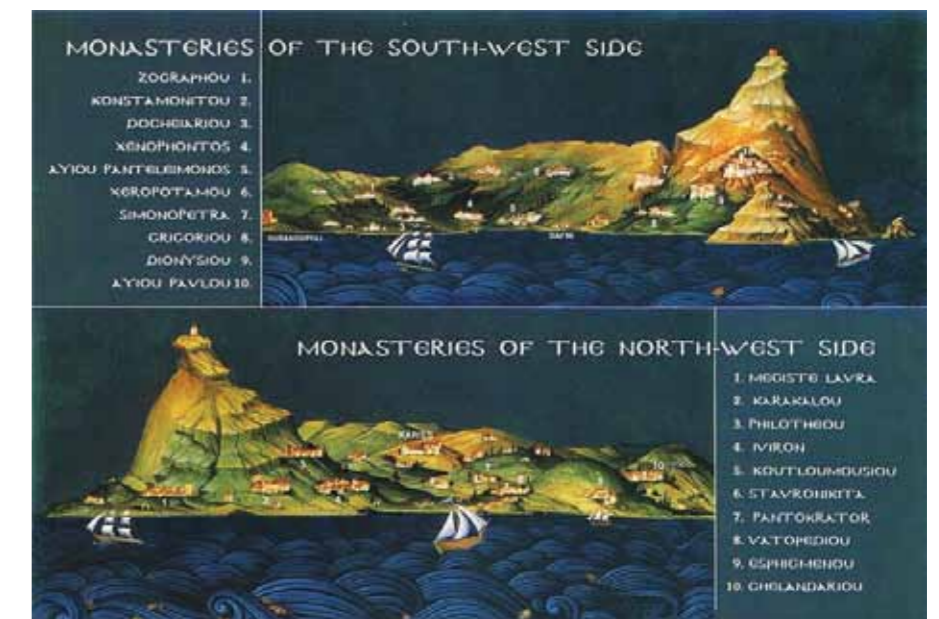
The researcher believes it is very important to assess history in order to find solutions to contemporary problems and define the future. The founding and existence of the Iviron Monastery on Mount Athos is an integral part of Georgian history. Georgians' accomplishments at Mount Sinai, the Black Mount and Mount Athos and our relationships with these three educational centers opens a new direction in the development of Georgian history, as the Iviron Monastery during the period of Ottoman Empire has never been studied in Georgia.

The main achievement of the research is the collection of materials about the monastery from the second half of the 19th and the first half of the 20th cc, which include valuable information about the condition of the monastery at the time. There has been little or no significant research carried out in other countries on the Iviron Monastery during that period. Various types of processed data on the monasteries on Mount Athos, including the Georgian monastery, are scattered within different materials. The author of the study concludes that the third monastery in the hierarchy (Iviron Monastery) on Mount Athos was in very bad condition.

This research project was the first attempt to study the Georgian monastery. The resources are significant for the next study. The author's main target was the Ba bakanlik

Archives (Prime Minister's archive) and the Archives of the Topkapi Palace. The author also had access to Ottoman resources in the Ankar cadastral archives. There are more than 1000 sources, including books, on Mount Athos in the Ba bakanlik archives. Studying these materials will enable us to understand the condition of the monastery and its relations with other monasteries. The materials mainly cover the 19th and 20th centuries, however some include books from the 18th century, which contain detailed information on the possessions of the monasteries. More than 50 sources provide materials for the two hierarchically superior monasteries of Lavra and Vatoped.

Based on 50 books from the archives of the Topkapi Palace, the study revealed what fees monasteries had to pay and it became clear that the Iviron Monastery stood out by its



significance, influence and wealth on Mount Athos in the 19th century. The materials also show that the monastery had kept its third place in the hierarchy since the 12th to 14th centuries. More details about the wealth of the monasteries of Mount Athos were found in the Ankara cadastral archives. More than 500 sources provide information on payments that the Iviron Monastery had to make during the 16th to 20th centuries. The cadastral archives contain books describing the wealth and possessions of each monastery.

While studying the Iviron Monastery during the Ottoman Empire, the researcher became convinced that in order to undertake thorough investigations, it would be necessary to study archives in Greece, Russia, Bulgaria, Serbia, Ukraine, and Moldova. These countries have university libraries containing rich collections of relevant articles, books and maps. A research team should be composed of researchers with a good command of the native languages of these countries as well as of English and Ottoman languages, to be able to work on the Ottoman materials.

Apart from archival materials, Professor Alpenidzeat studied maps and atlases, which revealed that the Iviron Monastery still possessed two properties--Bishops' temporary residence-- in the 20th c on the territory of today's Serbia. The research showed that the Georgian monastery was connected not only with Georgia, Patriarchy of Constantinople and Ottoman Empire but also with Greece, Russia, Ukraine, Moldova, and Bulgaria.

Presentation of the research was held in March 2013 in the Research Center for Anatolian Civilizations, Koç University, entitled "The Georgian Monastery of Iviron after the Fall of the Byzantine Empire".

MONASTERY OF IVIRON AT MOUNT ATHOS

Historical Georgian Monastery located in Greece, eastern Halkidiki peninsula of the mountainous peninsula of Mount Athos, Aegean Sea coast. Founded in 980-983.



LAFFER-KEYNESIAN SYNTHESIS AND MACROECONOMIC EQUILIBRIUM



IURI ANANIASHVILI

Professor at TSU Faculty of Economics and Business; Head of Department of Econometrics; Doctor of Economic Sciences; has published over 80 scientific works on mathematical modeling in economics, macroeconomics and microeconomics; Georgian State Prize Laureate in the fields of science and technology. Received recognition for the best report of the scientific forum at TSU dedicated to the memory of Ivane Javakishvili in 2014.



VLADIMER PAPAVAL

Rector of Ivane Javakishvili Tbilisi State University (TSU); Professor at the Faculty of Economics and Business; Chief Research Fellow at the Paata Gushvili Institute of Economics. In 1994-2000 served as Minister of Economy of Georgia; in 2004-2008 Member of Parliament; in 2005-2006 Fullbright Researcher at the Central Asia – Caucasus Institute, Nietzsche School of Johns Hopkins University (Washington, USA). Authored over 300 publications on economic development, macroeconomics, post-communist economics, geopolitics, as well as theoretical and applied issues of geopolitics. Professor Papava defended his Dissertation in 1982 at the Central Economics and Mathematics Institute of the USSR Academy of Sciences, and PhD dissertation at Tbilisi State University (1989) and Leningrad State University (1990).

In 2014, Nova Science Publishers issued a book entitled Laffer- Keynesian Synthesis and Macroeconomic Equilibrium by Georgian economists and Iuri Ananiashvili, Professor at the TSU Faculty of Economics and Business and Head of the Department of Econometrics and Vladimer Papava, TSU Rector and Professor at the Faculty of Economics and Business. The book, consisting of four chapters, has been highly recommended by famous economists Farrokh K. Langdana, Professor at the Finance and Economics Department at Rutgers Business School; Louis H. Ederington, Professor at the University of Oklahoma, and Evgeny Balatsky, Chief Research Fellow at the Moscow Central Economics and Mathematics Institute. The book will help specialists and readers interested in general macroeconomic patterns to clarify the role of taxes in the process of economic development.

“We, the authors, have a good understanding that under modern conditions, successful research in economics is impossible without using the methods of quantitative analysis. Not only do such methods simplify abstract thinking, but they also provide an opportunity for experimentation. Unfortunately, unlike researchers in other fields such as physics and chemistry, we economists do not have the opportunity to experiment. Therefore, we frequently look to economic-

mathematical models for hypotheses and substantiation of our results. On their basis, we carry out various scenarios by using real or conditionally real data. This approach has played a significant role in obtaining and establishing the results described in the book.”

For decades, economists have been interested in what an acceptable tax burden for the economy should look like as well as what percentage of a created product’s profit should be taken in taxes by the government

and how much should remain for the private sector in order to ensure as much efficient economic functioning as possible. If we look at world practice, we see that in some countries the share of taxes withdrawn by the government attains 50% of the GDP while in other countries, like in Georgia, it is half of this and amounting to 26-27%. Is this parameter desirable for this or that country? Should it be higher or lower? A great many models and works have been created to answer this

■ *For decades economists have been interested in what a tax burden acceptable for economics should look like, what part of a created product, what per cent should be taken by the government in taxes, and how much should remain for the private sector to ensure as much efficient economic functioning as possible. If we look at world practice, we see that in some countries a share of taxes withdrawn by the government attains 50% of GDP, while in other countries it is half, like in Georgia where it amounts to 26-27%. Is this parameter desirable for this or that country? Should it be higher or lower? A lot of models and works have been created to answer this question.*



question. Ananiashvili and Papava initially started their research to create and use original models. As Ananiashvili notes, however, the problem proved to be more difficult, multifaceted and interesting than was supposed by other economists. It became necessary to carry out complex research on the problem. This determined the structure and content of their abovementioned book.

As the authors of the research explain, there are two specific concepts in economic science – supply and demand. In terms of a country’s economy, aggregate supply and aggregate demand determine the behaviour of economic subjects from two different angles. In particular, aggregate supply is the total supply of goods and services produced within an economy at a given overall price level in a given time period. Aggregate demand is the unity of expenses defrayed by households, firms, government and representatives of other countries for purchasing end-products and services produced in the country. The amount of this figure largely determines the level of economic activity – the greater expenses are, the more the country’s economy is encouraged to produce more products, thereby increasing employment and accelerating economic growth.

There are many factors that can influence the amount of aggregate demand, including tax rates. Chapter 1 of the book looks at the correlation between taxes and aggregate demand. In modern macroeconomic theory,

this correlation is studied on the basis of the Keynesian theory and model which unambiguously defines the role of taxes. An increase in the tax burden has a negative effect while a decrease has a positive effect on aggregate demand because the key element defining aggregate expenditures – the amount of consumer household spending – decreases in the first case and increases in the second. However, in the opinion of Ananiashvili and Papava, a discussion of the correlation of taxes and aggregate demand only from this angle over-simplifies the actual situation. They believe that in a certain situation, an increase in taxes leads to increased aggregate demand and a decrease in taxes leads to a decreased aggregate demand. To substantiate this opinion, Georgian researchers, similar to the marginal propensity of households to consume which is well-known to economists, refer to the figure of marginal propensity for government purchases. By this latter reference, they refer to the expenses on the purchase of goods and services defrayed by the government from additional units of net taxes. Ananiashvili notes that unlike the marginal propensity to consume, the marginal propensity for purchase is regulated by the government. Proceeding from the economic situation, the government can either increase or decrease its value but, in any case, the parameter of the marginal propensity for government purchases should be kept within 0 and 1; that is, a natural demand.

He also notes that a zero marginal propensity to purchase does not mean that purchases are impossible because the government can make purchases not only from tax revenues but also by taking a loan or from non-tax revenues.

The authors note that the role of taxes with respect to aggregate demand can be explained differently according to the attitude between a household’s marginal propensity to consume and the marginal propensity for government purchases. In particular, when the marginal propensity to consume exceeds the marginal propensity for government purchases, an increase in the tax burden decreases the joint marginal propensity of households and the government for expenditures and, accordingly, under other equal conditions (*ceteris paribus*) decreases aggregate demand which has negative effects on the economy. In the opposite case, when the marginal propensity for purchases exceeds the marginal propensity to consume, an increase in the tax burden causes an increase in the joint marginal propensity of households and the government which, under other equal conditions, fosters the growth of aggregate demand and, consequently, an equilibrium output. Finally, when these two parameters coincide, a change in the tax burden does not impact the joint marginal propensity for expenditure because the aggregate demand is indifferent to taxes.

This result shows that the effect of an



increase on the average tax rate and on taxes as a whole on aggregate demand is not unequivocally negative as it is customarily presented in canonical form in contemporary Keynesian economic textbooks. The government can purposefully use a tax increase to conduct a stimulating or inhibiting economic policy. When households do not sufficiently expend their disposable incomes, one of the ways to increase aggregate demand means an increase in taxes on the condition that additional incomes received by the government in this form will be used for purchases. Conversely, if households expend more than the government would expend from collected taxes, then it is definitely better to have lower taxes.

"As a rule, the government spends more than a household. It does not mean that an increase in taxes is always expedient for the economy. The question is that the permanent growth of taxes is accompanied by the growth of a share of the state sector in the economy and the transformation of the market structure into a socialist structure which is not desirable at all. Even if it were not so, besides aggregate demand, the economic status is equally determined by aggregate supply which also depends on the amount

of the tax burden and, under certain conditions, it reacts negatively on increasing this burden," Ananiashvili explains.

Chapters 2 and 3 of the book are dedicated to a review and analysis of the American economist, one of the representatives of supply-side economics, Arthur Laffer's theory. This theory basically focuses on the attitude between the tax burden (the average tax rate) and business activity which is finally reflected in aggregate supply. According to the Laffer theory, taxes do not unequivocally affect aggregate supply and business interests. The direction of this effect depends on the ratio of positive and negative effects during changes of tax rates. Positive are those effects that promote economic activity and aggregate output growth at an increasing average tax rate and hampers it at a decreasing tax rate. Accordingly, negative effects reduce economic activity and aggregate output at an increasing average tax rate and, vice versa, increase them at a decreasing average tax rate. Laffer and his followers postulate that the increase in an average tax rate from zero to a definite point causes an increase in aggregate supply and from this point to 1 – causes a decrease in aggregate supply. It is especially important that in the interval

between 0 and 1, representing the range of permissible values of the average tax rate, there are, as a rule, two different values – the fiscal point of the first and second kind. In the case of fiscal points of the first kind, aggregate supply reaches its maximum; or, the aggregate output of the economy is equal to a potential level. The fiscal point of the second kind corresponds to the maximum tax revenues of the budget.

If we consider real the existence of fiscal points of the first and second kind, determining their particular values can largely promote the improvement of the country's economic policy. Therefore, a great part of the publications related to Laffer's theory contain attempts to determine such points for the economies of various countries. In their book, Ananiashvili and Papava make a conclusion based on analysing these publications according to which the multiplicity of models determining Laffer's fiscal points can be divided into two groups – transformation models and behavioural models. The value of the tax burden in transformation models has an impact on the efficiency of the utilisation of economic resources involved in production and decreases or increases it according to how burdensome the tax burden is. In other

■ *The result shows that the effect of an increase in the average tax rate and taxes as a whole on aggregate demand is not unequivocally negative, as it is customarily presented in canonical form in contemporary Keynesian economic textbooks. The government can purposefully use a tax increase to conduct a stimulating or inhibiting economic policy.*

words, the amount of the utilisation of the economic resources provided in transformation models, and under such conditions by defining the fiscal point of the first kind, we try to understand what tax rate is needed to achieve maximum output. Also, by defining the fiscal point of the second kind we try to understand what particular tax rate will ensure maximum tax revenues to the budget. The authors explain that such an approach is close to Laffer's theory but cannot fully answer it. The question is that the Laffer concept more widely discusses the role of the tax burden and supposes that its change, with its subsequent positive and negative stimuli, will affect not only the efficiency of resource utilisation, but also the amount of utilisation. This is a very important aspect and can be taken into consideration only through behavioural models.

The book pays special attention to the issues of the analysis and the practical use of the variant of the original behavioural model developed by the authors who note that two circumstances were taken into account when constructing the model. The first one is that, in any economy, the total output depends on the amount and quality of the existing economic resources (labour, capital, land and production capabilities) and on the level of technology for using these resources. These factors determine the economy's production technology capabilities which, if they are distributed in the best possible way and fully used, the maximum output is achieved which is also called the potential output level. The second circumstance is that no less a role in the economy is played by the institutional

environment whose creation is a function of the government. Depending on how ideal the institutional environment is, in conditions of the same production-technology capabilities, the amount of output will be different for any two economies or for any two periods of time. In the case of the best or ideal institutional environment, the actual and potential outputs are equal to each other. Along with many other moments, the current taxation system also plays an important role in the creation of the institutional environment. "We simplified the situation when constructing the model and allowed that just the taxation system is the key factor for the creation of the institutional environment and only it determines the behaviour of economic subjects. By this, we managed to interconnect potential output and the tax burden value, as a result of which we received the model that is completely in line with the Laffer concept," Ananiashvili notes.

Since there are no comprehensive statistical data available in Georgia to conduct a serious study, the authors turned to the statistical data that exist for the U.S. economy. "It appeared according to our calculations that the actual value of the tax burden in the U.S. economy during the period of 1970-2008 was about 1 percent less than the point under which the actual GDP value would be equal to the potential level. Another interesting circumstance is that it would have been necessary to almost double the existing tax burden to maximise the U.S. state budget's tax revenues which would have led to the reduction of its economy by 20%. This circumstance questions the expedience of such economic policy where the government gives priority to maximising tax revenues rather than encouraging economic activities," Ananiashvili says.

In the authors' opinion, the fourth chapter is the most important part of the book and its title was reflected in the name of the book. Papava stated: "If we analyse the existing literature, we will see that, regrettably, the role of taxes is studied unilaterally in modern economic theories. In particular, the Keynesian models and theory focus mostly on that mechanism by which taxes influence the economy through aggregate demand and the mechanism of influence through aggregate supply is almost neglected. The problem of taxes is also unilaterally discussed in the supply theory which focuses on the influence of tax rate(s) on aggregate supply. Naturally, it is possible to provide a detailed explanation of the role of taxes and overcome the unilateral nature of these theories through their synthesis. In the book, we offer one of the possible options for illustrating such a

synthesis. It is based on the model macro-economic equilibrium consisting of the functions of aggregate demand and aggregate supply. But, unlike the standard model where under other equal conditions the price level is considered as the key determinant of aggregate demand and aggregate supply, in our model the average tax rate represents that determinant. Such an approach enabled us to see the role of the average tax rate from a new angle."

Ananiashvili outlines several important points: "First, analysis has shown that we need to differentiate factual, equilibrium and optimal average tax rates." Equilibrium of the average tax rate ensures an economic equilibrium during which aggregate demand and aggregate supply are equal. During the optimal rate, full employment is created in the economy and the aggregate output is at the potential or maximum level. As a rule, these three values of tax rates rarely coincide with each other.

Second, the value of the average tax rate has a significant effect on the general economic situation but imposing optimal average tax rate by the government cannot increase the level of employment and initiate the transition of potential output to a relevant equilibrium. Under the Laffer-Keynesian synthesis, aggregate demand, along with taxation treatment, plays an important role in achieving full employment and increasing economic activity.

Third, when the government keeps the average tax rate in a stable position, then each new equilibrium price level has its own optimal tax rate and an appropriate change in aggregate demand leads to an approximation of the optimal rate to the equilibrium rate. So, an important conclusion can be made according to which the government should not try to regulate the economy through changing tax rates to any extent. When you "disturb" the economy by making changes to taxes, the results will be bad no matter what you wish might happen.

Finally, another important conclusion based on the Laffer-Keynesian synthesis model is this: The unity of the functions and the curves of aggregate supply and the budget's tax revenues may correspond with each value of the equilibrium tax rate. In other words, fiscal and production options of the Laffer curve do not represent sustainable constructions and can change according to economic situations, especially as a result of price changes which, in turn, are followed by significant changes of Laffer's fiscal points of the first and second kind.

THE STOCK MARKET IN GEORGIA: THE CURRENT REALITY AND AN UNCERTAIN FUTURE



Development, economic growth and raising the standard of living in the country are all linked directly to capital market development. One of the real levers, and the most acceptable and practical forms of investment are to invest in equities through the stock market. It is clear for the developed world how important the organized stock market is. This includes Western Europe, USA, Canada, Japan, China and other countries with powerful stock industries such as the New York Stock Exchange; Euronext; NASDAQ OMX; the London Stock Exchange and many others. The mediation business or brokerage/investment firms include Merrill Lynch; Morgan Stanley; Goldman Sachs; J.P. Morgan; Barclays Capital and many other investment banks. The Georgian Investment Group + (or GIG+) is headed by Davit Aslanishvili, Assistant Professor at the Department of Finance and Banking of the TSU Faculty of Economics and Business. He serves as Chairman of Supervisory Board and has conducted many studies on the Georgian stock market, its development and current situation.

The Georgian Stock Exchange (GSE) was established with the financial support of USAID and Barents Group in 2000. Immediately after its establishment, the Law of Georgia on Securities Market was developed and in 2004-2008 there were 42 brokerage firms in the country. These, under Georgian legislation, are institutions equal to investment banks. However, due to tightened regulations that came into effect after 2008, their number actually dropped dramatically and currently there are only seven members of the GSE left, of which three are independent and four are subsidiaries of commercial banks. Professor Aslanishvili explained that for objective or subjective reasons, in Georgia stock market development was delayed at a certain stage.

Normally the activity of a brokerage firm is directly connected with public trading at a stock exchange, and carried out in an open and transparent environment. This process is related only to market price. In 2000-2007 Georgia faced the problem of "closed bidding." Aslanishvili pointed out that at the initiative of the Georgian Investment Group, the rules of bidding were changed at the stock exchange and the so-called "N parameter" was abolished. However, shortly thereafter the ruling political and economic teams implemented decisive measures against free

price formation in Georgia. Research has ascertained that Georgia failed to achieve results anywhere near those of developed countries, with miserable results caused by problems between the two basic means of attracting monetary resources -- bank loans and the stock market.

In financially successful and developed countries, these two mechanisms--bank loans and the stock market--are designed to attract money and create a mutually beneficial synergy. In Georgia, there is only one mechanism to attract money resources -- the bank loan. In general the Georgian commercial banking system tries its utmost to prevent the use of the second mechanism, the stock market, since it is considered a main competitor.

The analysis of the structure of owners of Georgian Stock Exchange (source: securities registrar JSC Kavkasreestri) shows that as of 2014, 56% of shares of the stock exchange were owned by its competitors -- Georgian commercial banks. In the author's opinion, it means that Georgian commercial banks will not allow the development of their competitor--the stock market--as it threatens their own preferential and successful financial position. According to this analysis, the situation is further complicated by the fact that under the

legislation amended in 2008, both spheres of the monetary market have one mega regulator -- the National Bank of Georgia.

Aslanishvili says that "an essential attribute of the stock market -- the National Securities Commission of Georgia -- was abolished by so-called 'liberal legislative amendments' made in 2007-2008. The powers of the NSC were transferred to the regulator of Georgian commercial banks and lobbyist of their interests, the National Bank of Georgia. Simultaneously, very tough policies were enacted against brokerage firms, and as a result--as of 2014--there are practically no non-banking brokerage firms in Georgia."

According to the study, the statistical results of Georgia's stock industry are as follows: In 2000-2002, the shares of 282 Georgian joint stock companies were admitted to trading on the Georgian Stock Exchange, while 147 joint stock companies were potentially discussing the admission of shares to the stock exchange. This amount actually remained unchanged by 2007.

In 2003 there were 278 joint stock companies admitted to trading at GSE; in 2004 -- 276; in 2005 -- their number was reduced to 253 and in 2006 -- to 242. A small number of companies was included in so-called 'Listing A' and 'Listing B' tiers. The JSC Bank of



DAVID ASLANISHVILI

Davit Aslanishvili is Assistant Professor at the Department of Finances and Banking of the Faculty of Economics and Business (TSU) and the chairman and partner of brokerage company - Ltd "Georgian Investment Group". A graduate of TSU, he studied at Charles University (Prague) and Robinson College of Business (Georgia, USA) and completed Engalitcheff Institute on Comparative Political and Economic Systems (ICPES) at Georgetown University (USA). He has authored 305 works on economics and finances, participated in international scientific conferences and grant projects, training programs. He has been on scientific editorial boards and councils. Professor Aslanishvili has held positions at JSC Rustavi Steel Works, Georgian Carriage Builders Holding, Ltd, Georgian Investment Group, and JSC TBC Bank.

Georgia was trading on two exchanges – the Georgian Stock Exchange and London Stock Exchange. Since 2008, when the restrictive legislative amendments were approved, there has been no "civilized" possibility for equity trading in Georgia, meaning that if there is a willingness to trade, securities admitted to the stock exchange can be transferred by simple inscription on paper, without any auction or trading – it is enough simply to sign the document. What is most important, this method has made the process of monitoring cash transactions absolutely opaque.

As the analysis shows, in parallel with the changes taking place in 2007-2008, the management of joint stock companies gradually lost any interest in equity trading in an open and transparent environment, once the law didn't require it. Thus, in 2006 there were 242 companies in the stock exchange's trading system (without listing), in 2007 their number was reduced to 161 and in 2013 reduced to 129. During the same period, the stock exchange turnover radically decreased in Georgia. In 2006-2007 the turnover of the trading system, including transactions concluded in an open and transparent environment – despite the N parameter obstacle – amounted to GEL 167-169 million. In 2008 it decreased 14-fold (i.e. a 1400% decrease) and continued to decrease in the following years. In 2013, the country's stock exchange turnover amounted to GEL 530,491 or 338-fold less compared to 2007.

The problem of the Georgian stock market has been further aggravated by the global economic crisis. The author of the research stated that during global crises a civilized state tries to support businesses, which did not happen in Georgia. Following the worsening economic, legislative and market situation, the regulator (National Bank of Georgia) increased the authorized capital requirements for brokerage firms, which had already been left without any function or their main sources of income. To make matters worse the NBG abolished three types of licenses and only recognized a General License for which requirements in practice could be met only by commercial banks and their subsidiaries. Today, a brokerage firm is required to have a capital of GEL 360 000, and in 2015 it must have GEL 500 000 to maintain its license. According to this complicated scheme of capital recognition, only money resources are considered as a source of capital replenishment, which--against the background of market failure--does not enable an independent brokerage firm to compete with subsidiaries of commercial banks. Thus, the actual disappearance of the securities market industry as an alternative to a bank loan is now a fact. This is used by the National Bank of Georgia to promote the obedience of the securities market to the

■ *The Georgian Stock Exchange (GSE) was established with the financial support of USAID and Barents Group in 2000. Immediately after its establishment, the Law on the Securities Market was developed and in 2004-2008 there were 42 brokerage firms in the country. These, under Georgian legislation, are institutions equal to investment banks. However, due to tightened regulations that came into effect after 2008, their number dropped dramatically. The Georgian stock exchange has lost its key function as a foundation for price formation in the stock market.*

commercial banking sector (i.e. competitive structure).

As for the number of transactions made outside the stock exchange and any transparent environment, "fixing" amounted to 3453 trades in Georgia in 2008-2014 according to research carried out by GIG+. Their total amount in shares was 5,054,520,669 units, and the total value was GEL 1,233,305,848. This means that the "grey" market exceeded the amount of the open market 24-fold in 2008, 32-fold in 2009, 19-fold in 2010, 8-fold in 2011, 90-fold in 2012 and 100-fold in 2013. According to Professor Aslanishvili, it means that the country's stock market was replaced by a grey, non-transparent, "wild-liberal" market. He argues that at this stage Georgia's stock exchange has lost its key function as a foundation for price formation in the stock market. Therefore, any trading in shares or other securities has become senseless. The researcher suggests legislative amendments as a solution, and he noted that in order to save and develop Georgia's stock exchange, a package of amendments to resolve the situation has been submitted to the Parliamentary Committee on Finance and Budget, however it has yet to be put on the Georgian Parliament's agenda.

THE ROLE OF SOCIAL NETWORKS IN GEORGIAN PARTY POLITICS





KORNELI KAKACHIA

Korneli Kakachia is Professor of Political Science at the Faculty of Social and Political Studies (TSU), and one of the founders and the Director of the Georgian analytical organization "Political Institute". He was invited scholar at John F. Kennedy School of Government at Harvard University (2009 – 2010), The Johns Hopkins University (2000), and Harriman Institute at Columbia University (2011); he is a member of the International Studies Association (ISA), the Board of the Georgian Political Science Association, and the Program of Eurasian studies, PONARS Eurasia. He has authored international publications and heads several international grant projects; lectures on world politics, political parties and comparative political systems, globalization and international organizations.

What is the role Facebook and other social networks play in Georgian political parties? How do political parties' online activities determine their success? Which social networks are most popular with political parties?

Unlike the world's leading countries, these issues started to arise in Georgia only a few years ago. Research on "The Role of Social Networks in Georgian Party Politics" is a social scientific study on the use of social networks in Georgian political processes, conducted in 2011-2013 and financed by the Academic Swiss Caucasus Net (ASCN) with Ivane Javakhishvili Tbilisi State University and Ilia State University as implementing partners. ASCN is a five-year program to develop humanitarian and social sciences in the South Caucasus.

The Project Manager, Korneli Kakachia, stated that for years Georgia's party politics was characterized by the dominance of one political party, where individual citizens, opposition parties and civil society were isolated and had few opportunities to get involved in the country's political life. The present research created a hypothesis to assess whether Internet communication technologies enabled political parties to create a comprehensive platform and present themselves more effectively during the 2012 Parliamentary elections. The influence of modern communication technologies and social media on Georgian party politics was studied and the environment was assessed to see how it enabled political parties to ensure more public involvement in political processes, or not.

This research demonstrates that the intensive use of social networks and modern communication technologies may have a decisive effect on the success of a political party in the electoral process. Research results describe the interdependence between technology and politics in the modern Georgian state, as well as current practices in the use of social networks by political parties and the impact of these practices on election campaigns and outcomes.

The study examined activities of the 11 main Georgian political parties and their policies before the 2012 parliamentary elections and during the election campaign. It showed that despite the entry of Internet technologies into Georgia's political life, their use did not sway electoral processes decisively. Political parties continue to debate the issue of their impact.

Of all social networks, Georgian political parties prefer to use Facebook. However, monitoring results confirmed that political

parties fail to make full use of the potential of social media. They don't use all social networking applications. The main parties, such as Georgian Dream and the United National Movement, use social media more intensively than other parties do, but overall the Georgian political elite is skeptical towards the importance of social media and online networking and towards their potential for gaining voters' support. Some parties believe that television and direct contact at voter meetings are the most effective way to win elections, and that social networks are nothing but a senseless waste of resources and do not help attract voters.

Georgian political parties use social networks to disseminate information but not to dialogue or discuss issues with potential voters. Results showed that intensive involvement in social media platforms and social networks were not an important factor in the results of elections, even though the winning parties had carried out active campaigns via Facebook.

The study concluded that an analysis of the issue of the prison scandal before the October 2012 parliamentary elections showed how social media and social networks can influence the establishment of public opinion in the pre-election period. The release of incriminating videos showing inmates' torture on national television on September 18, 2012 was an effective attack against the ruling party. However, contrary to all expectations, this party—which had been very active in social media—and ruling officials were absolutely unprepared for this eventuality. Thus, the key target of the scandal, the ruling party, completely disappeared from Facebook

Georgian political parties use social networks to disseminate information but not to dialogue or discuss issues with potential voters. Results showed that intensive involvement in social media platforms and social networks were not an important factor in the results of elections, even though the winning parties had carried out active campaigns via Facebook.

between September 19 and September 26 and made no use of social networks to maintain contact with their support base. Although social networks did not play a decisive role in initializing the scandal they did influence the outcomes, for example serving as a venue for debates on prisoners' rights, which was actively

discussed in both traditional media and social networks. This proved decisive for election results.

Research results, and publications prepared on the basis of these results, were submitted to key politicians who will likely find this material important for the activities of their political organizations, especially in terms of planning their pre-election strategies. Georgia-based international organizations such as the National Democratic Institute; the International Republican Institute; the Netherlands Institute for Multiparty Democracy; the Friedrich Ebert and Konrad Adenauer Foundations were also informed about these results and will continue to assist Georgian political parties in developing technologies for social and political use.

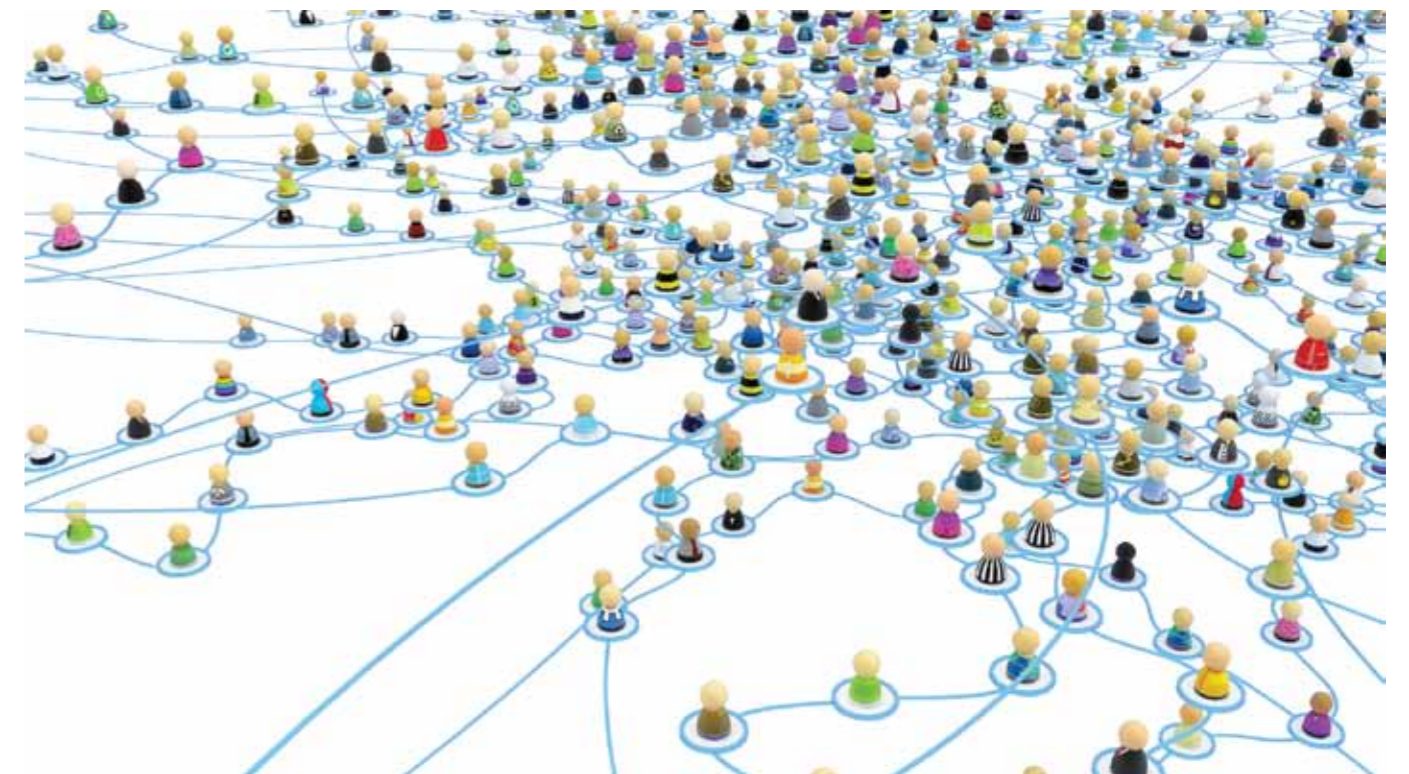
The academic discourse on social media was largely influenced by the researchers' opinions, often based on the experience of European countries and the United States. They recognize that the level of technology in Georgia is far behind western democratic countries. However, due to the exponential growth of Internet and social media in Georgia, similar trends may correlate with political processes here in the future.

The following persons took part in the study: Korneli Kakachia, Project Manager, Professor at the Political Science Direction at

the Faculty of Social and Political Sciences of TSU; Tamar Pataraiia – PhD student at Ilia State University; and young Georgian researchers – Nino Gambashidze, Tamar Iakobidze and Nino Khelaia. Research results were presented at the following conferences: 2nd Annual ASCN Conference "Political Transformation and Social Change in the South Caucasus". Panel: Civil Society, Social Capital and Social Networks; Yerevan, Armenia, 29- 30 June 2012; Social Media and Democratization in Post-Soviet Nations Workshop; Panel 4: Pluralism and Dissent in Old and New Media, George Washington University, USA, September 25, 2013.

A publication including the study was published in the Journal of Post-Soviet Democratization, Vol. 22, No. 2, Spring 2014. K. Kakachia, T. Pataraiia, M. Cecire, "Networked Apathy: Georgian Party Politics and the Role of Social Media". It was also published as a bilingual (English-Georgian) book: K. Kakachia, T. Pataraiia: The Role of Social Networks in Georgian Party Politics, 2013, Tbilisi.

Feedback for the study was provided by researchers from Switzerland at the Universities of St. Gall and of Lausanne, who are working on similar issues. Some of them expressed interest in the Georgian study as prompted by their own research.



MEN AND GENDER RELATIONS IN GEORGIA

INSTITUTE OF SOCIAL STUDIES AND ANALYSIS (ISSA)



IAGO KACHKACHISHVILI

Iago Kachkachishvili, PhD in Social Sciences, is Full Professor at the Faculty of Social and Political Sciences and Head of the Department of Sociology and Social Work at Tbilisi State University, lecturing on modern and postmodern social theories and the methods of social research. He carried out research projects dealing with education, politics, ethnicity, social protection and inclusion, HIV/AIDS, safe sex and the issues of reproductive health, religiousness and others, and has headed more than 50 research and educational projects since 2000. He is actively engaged in the establishment and administrative support of the Social Work Education program at TSU and is Head of the Institute of Social Studies and Analysis; he co-edits an international peer-reviewed journal, *Social Policy and Social Work in Transition* and has authored six books and more than 40 scientific articles.

Although gender balance is a concept often evoked today, in Georgia there is still a strict division of male and female duties and activities. Indeed, 86% of men and 72% of women are happy with their duties according to results of a study "Men and gender relations in Georgia", carried out by the Institute of Social Studies and Analysis (ISSA) with the support of the United Nations Population Fund (UNFPA) in 2013. The Project Supervisor, Professor Iago Kachkachishvili pointed out that the aim of the project was to learn women's and men's attitudes towards gender equality--their experience and engagement in domestic chores and social practices that require coexistence and shared experience with their spouse or partner.

The study used quantitative and qualitative research methods. Qualitative methods included focus group work to determine empirical indicators of gender equality. The general unit of the qualitative study was the Georgian population over 18 years old; 2,408 respondents participated overall. Respondents were also interviewed through direct interviews and questionnaires in eleven regions of Georgia.

MEN'S ENGAGEMENT IN DOMESTIC CHORES AND ACTIVITIES

According to the results, the distribution of domestic chores such as doing the laundry, cleaning the house, cleaning the bathroom/toilet, cooking meals and caring for children are all considered to be women's duties. However, repairing household items is considered to be a man's duty. The study showed that the model for distributing domestic chores is based on behaviour learned during adolescence. During adolescence most girls (85-92%) are taught how to do "female" chores. Activities that boys are encouraged to learn

include observing personal hygiene, agricultural duties, cleaning the yard and taking care of younger siblings. Today men's engagement in domestic activities is consistent with these respondents' attitudes and expectations. These practices were evaluated on the basis of the stories of the respondents, who are married or live with a partner. A significant aspect of the evaluation was the comparison of women's and men's stories.

Men are mostly engaged in the following activities: repairing household items (according to 90% men and 84% women), paying the bills (84% men and 76% women) and buying groceries (30% men and 19% women). According to the respondents, men take part much less in housecleaning (tasks as perceived by 20% of men and 11% of women) and preparing food (as perceived by 30% of men and 19% of women). They take part least of all in cleaning the bathroom/toilet (as perceived by 18% men and 11% of women).

MEN'S INVOLVEMENT IN RAISING CHILDREN

Interviews revealed that men and women do not take a common responsibility for the children. From the very beginning of domestic life, household chores (in Georgia this includes child-rearing) are considered a woman's duty.

Fathers never cook meals, change diapers or bathe their children under six years old in 30-42% of families. Childcare, for fathers, usually entails duties not connected with the bathroom, the kitchen or outside the house. Their activities consist mainly of playing or talking with their children, entertaining them and reading books to them. However, apart from playing or talking to their child, fathers engage in other activities only a few times a month--not on a daily basis. The percentage of men who perform everyday duties for their

Men and women are similar in their attitudes towards birth control, as 70% think that women are responsible for protecting themselves from unwanted pregnancy (69% of men and 71% of women agree with the statement). Most (76%) believe that women and men should decide together on the type of contraception-- 74% of men and 77% of women. Only 28% of the respondents (30% men, 27% women) say that it would be unacceptable for them if their spouse asked them to use condoms.

children under 6--such as preparing meals, changing clothes or diapers, bathing them, taking them to school or kindergarten, entertaining or reading to them--does not exceed 18%.

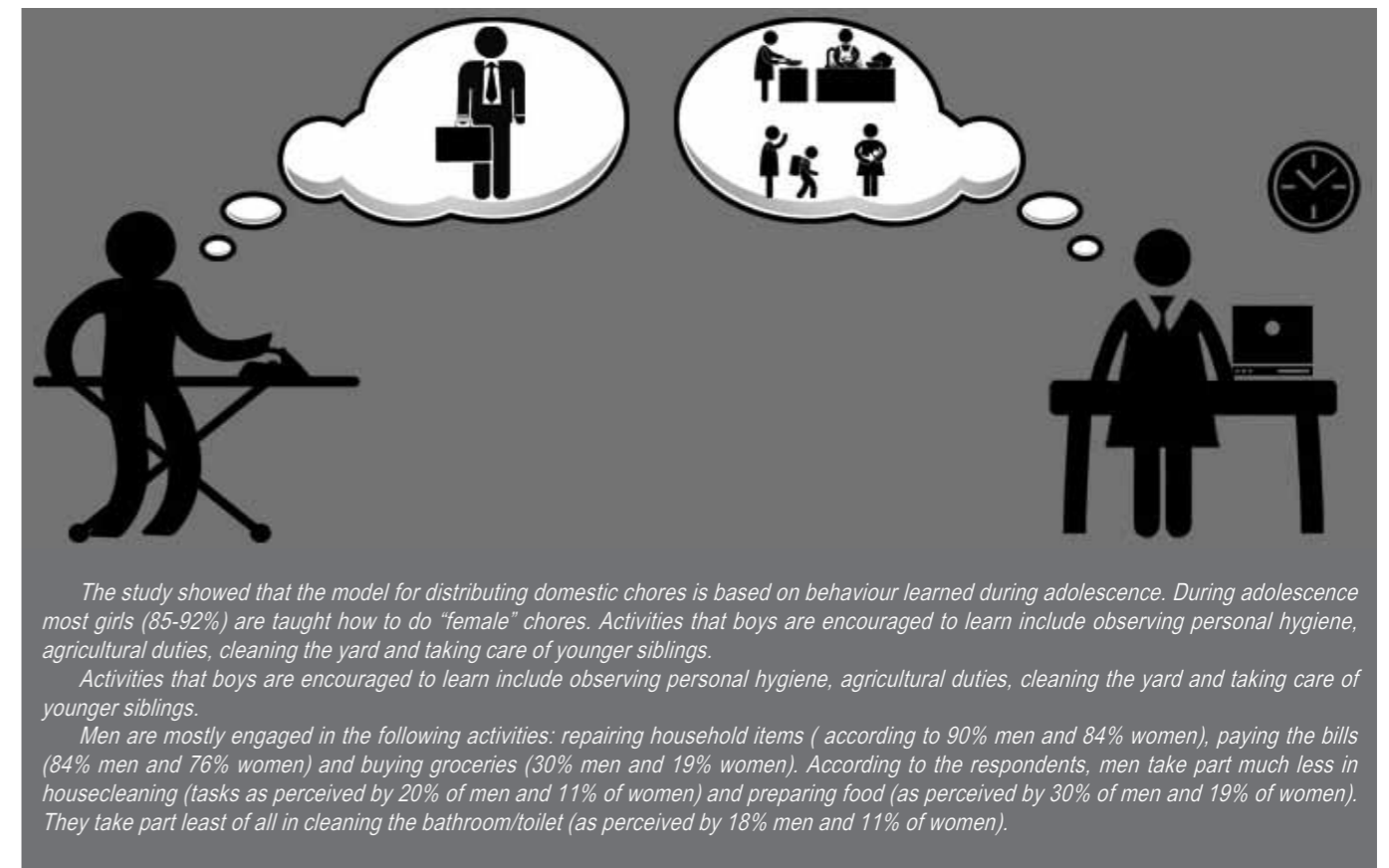
Fathers of children 7 to 12 are more inclined to play with them rather than talk to them only, as was the case for those with children 6 and under. This is the only activity in which the majority of fathers--81%--engage daily. Fathers' everyday involvement does not exceed 7%, however, when it comes to activities like preparing meals, washing clothes and reading books to their children. When it comes to children aged 7 - 12, a maximum of 34% of fathers play with their children, take them to school, help with their homework, prepare meals, wash clothes or communicate with the school teacher -- once a week to several times a month.

Fathers' participation in raising children aged 13-18 is even lower than for other children's age groups. The share of men's everyday involvement in activities like choosing books to read for adolescents, talking to teachers, helping with their homework and washing clothes does not exceed 5%.

ATTITUDES TOWARDS GENDER EQUALITY

The study shows that the divisions of social roles are distinctly marked along gender lines, giving individuals specific duties and responsibilities. More exactly, the existence of gender roles is acceptable for most of the respondents. These include:

- Taking care of the family is considered to be a woman's main duty (89% of men and women agree).
- Taking care of children (changing diapers, bathing and feeding) is a woman's responsibility (77%).
- A man is entitled to the last word in the family (78%--however there is a significant difference between men and women: 70% of women and 88% of men agree).
- A woman's responsibility is to put up with verbal abuse from husband and family members in order to keep peace in the family.



Men and women are similar in their attitudes towards birth control, as 70% think that women are responsible for protecting themselves from unwanted pregnancy (69% of men and 71% of women agree with the statement). Most (76%) believe that women and men should decide together on the type of contraception—74% of men and 77% of women. Only 28% of the respondents (30% men, 27% women) say that it would be unacceptable for them if their spouse asked them to use condoms.

According to 56% of those surveyed (64% men, 49% women), it is shameful for a man not to have an erection while having intercourse and 56% believe that men need sex more than women. This figure was close, however, with 57% of men and 55% of women agreeing with the latter.

Patriarchal stereotypes are strong in attitudes towards sexual roles. Attitudes towards homosexuals—male or female—are strongly negative, and attitudes towards the social representation of sexual minorities are similarly negative—with 73% of the respondents saying they find it uncomfortable to be around a homosexual person. Only 8.3% believe that homosexuality is a normal phenomenon, and only 14.8% think that homosexual men and women should have the right to work with children, while 73% believe they shouldn't. Attitudes towards homosexual men and women's right to adoption is only 11.7% positive, and only 8% agree with the statement that homosexual couples should be allowed to marry. Most (72%) stated that they would be ashamed if their child was a homosexual.

EXPERIENCE OF SEXUAL LIFE

According to 83% of respondents, parents never talked about safe sex before they turned 18. Talking about sex was a taboo subject for both boys and girls. A large majority (85% of women and 81% of men) never had a discussion about safe sex with their parents.

The study shows that the situation has changed somewhat over the last 50 years in terms of teenagers' awareness of safe sex – 91% of men respondents and 90% of women respondents aged 65 and over stated that during adolescence their parents had never provided them with information on safe sex. However, only 67% of boys and 82% of girls aged 18-24 (in this study) today, say that parents never talked with them about the rules of safe sex. Thus some generational progress has been made from the parents' side in terms of sharing information about safe sex, yet the improvement is not significant.

The study shows that men have a "monopoly" in their sex life. This concerns the start of a sex life as well as freedom in their sex life. The number of men and women (69% of men and 16% of women) who have sexual relations before the age of 18 differs greatly. Casual sexual relations are far more seldom for women (95% claim that they have not had a spontaneous partner) than for men (only 49% deny having had casual sexual relations), and 51% of men and 44% of women find that the frequency of sexual relations with their spouse or partner is "normal". Homosexual relations were hardly reported—99.5% claimed they had never had sex with the same gender.

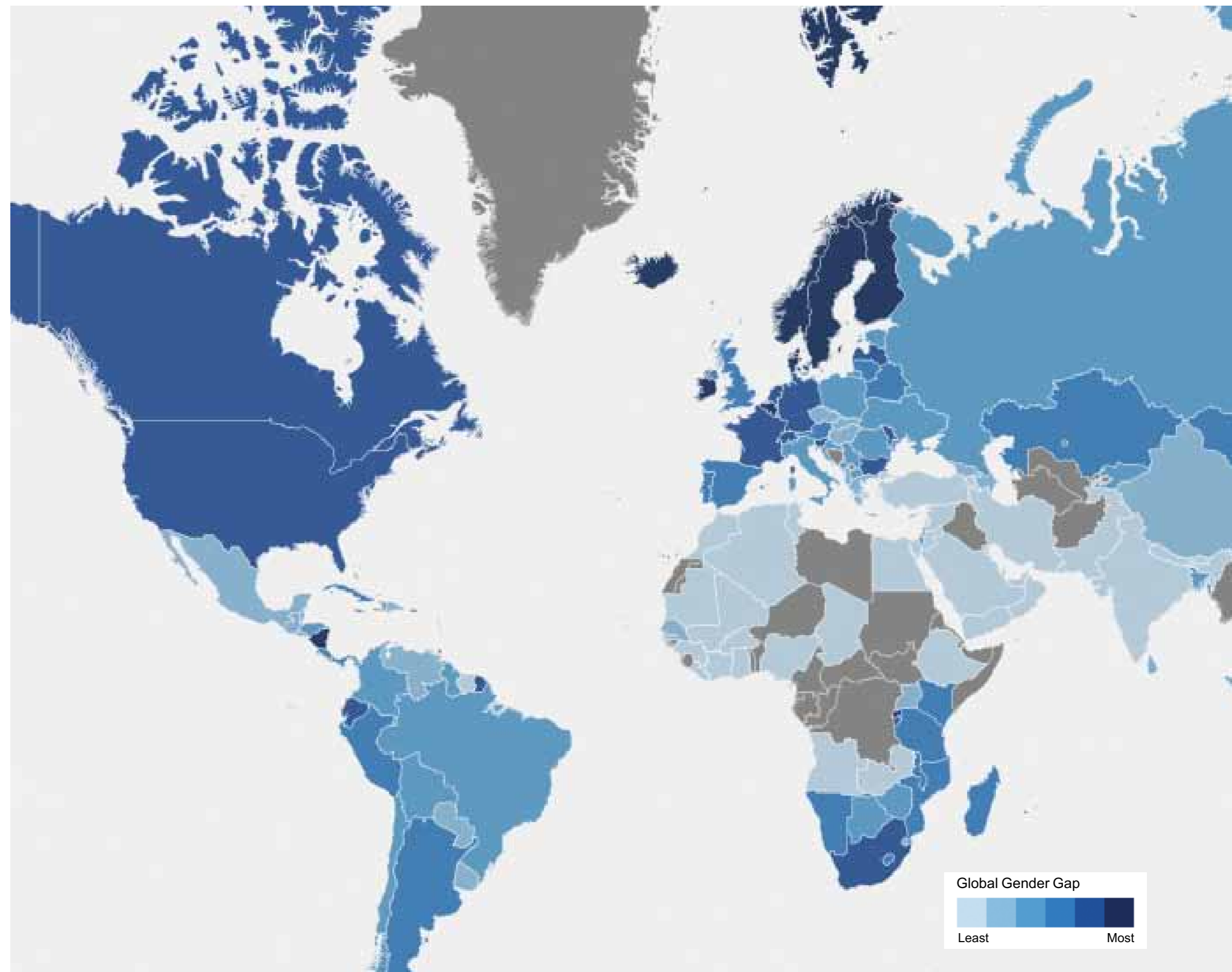
* * *

UNFPA published the results of this study, and it is the first of its kind to be carried out in Georgia. The study is important as it illustrates the model of Georgian patriarchal society and the existence of the traditional scheme of role distribution, which is not compatible with Georgia's intention to be an integral part of European cultural and social society. Furthermore, the patriarchal model is a main contributor to frequent cases of family violence, especially when a family member (usually a woman) shows resistance to this model. Consequently, the research is significant for planning social policy that aims to fight social inequality and gender stereotypes.



GLOBAL GENDER GAP INDEX 2014

This index of the World Economic Forum examines engagement in economics, accessibility to education, health, safety and engagement in politics. Georgia is in the 85th place in the world ranking of 142 countries.



TSU INSTITUTE OF GENDER STUDIES

The Institute of Gender Studies was created in 2012 as a supplementary educational unit of Tbilisi State University. It provides administrative and general support for existing academic programs and research projects on gender issues.

The aims of the Institute of Gender Studies include the development of gender related interdisciplinary research and studies; creating an institutional platform for academic personnel and PhD students working on gender issues; integrating gender-related subjects into the university educational programs and research; and raising public awareness of gender inequalities and how to resolve them, especially targeting university students, professors, administrative personnel and society at large.

According to the Head of the Institute of Gender Studies, Associate Professor Tamar Sabedashvili, Gender Studies developed first in the 1990s in European and American academic institutions and is a relatively new discipline for Georgia. The TSU Institute is still the only one of its kind in the Caucasus countries. This area of studies is especially significant for the analysis of social relations, the study of women's rights and position in society, the study of femininity, masculinity and other gender identities, and for applying gender as an analytical category to analyze the distribution of power and resources.

In the longer term, the Institute will carry out research projects and offer students a number of extra-curricular activities. At this stage, the Institute organizes monthly public lectures and annual research conferences on gender and women's rights. Regular lectures and conferences are essential for the development of academic debates and discussions. The institute closely collaborates with the Centre for Social Sciences (the Institute was founded with the support of the Center for Social Sciences) and its graduates and students are engaged



in a number of research projects implemented by the Center related to violence against women, gender roles and stereotypes, as well as the needs and priorities of women's groups.

The Institute is currently working on small-scale student research projects related to the Institute's curriculum, including the study of masculinity, historical developments of women's rights and others. Soon the Institute will create additional academic positions to ensure program stability and further development of research. This will also ensure the support of a PhD program and increase public awareness of the importance of gender as an academic field.

THE CENTER FOR RESEARCH OF ISSUES ON PERSONS WITH DISABILITIES

In 2014, Tbilisi State University saw the establishment of a new research center – the Center for Research on Issues of Persons with Disabilities. According to Tamar Makharadze, Director of the Center, the creation of the Center echoes those processes which are underway in Georgia and the entire world regarding the protection of rights of disabled people. According to the data of World Health Organization (WHO), from 10-12 % of the population have disabilities. Since the late 20th century and the early 21st century, attention has increased on the need to create an equal environment for persons with disabilities and their social integration. Disability is no longer considered only a health issue, having moved from the medical sphere into one of social and human rights. To support this approach, the UN, the EU and other international organizations and missions drew up important documents calling on the international community to create equal and dignified conditions for persons with disabilities.

In 2009, Georgia signed the UN Convention on the Rights of Persons with Disabilities, CRPD. In December 2014, this document was ratified by the Parliament of Georgia. The UN convention requires that our country create adapted environments for disabled persons, and that their interests and needs in all social spheres are considered--from ensuring access to education tailored to their needs and to employment, to providing support to their social and political activities. To meet this challenge, in January 2014, the government of Georgia approved the 2014-2016 State Action Plan for equal opportunities to persons with disabilities. The Action Plan envisages specific steps to facilitate the social integration of disabled people in various spheres. New social programs and services are planned.

Apart from the lack of needed services another serious problem is the low degree of public awareness on issues of disability which contributes to stigmatizing disabled persons. This impedes the creation of conditions for education, employment and a decent life for persons with disabilities.

According to data from the State Social Service Agency, there are 127,491 disabled persons registered in Georgia, while in reality the actual number is much higher. The program on inclusive education implemented by the Ministry of Education and Science of Georgia has provided some children with disabilities access to public schools. However, many disabled children remain outside public schools. There is little or no data available on the number of disabled youth studying at



*Campaign by the Tree of Life Foundation
According to Social Service Agency, there are 127 491 persons with disabilities registered in Georgia (However, the actual number is much higher.)*

vocational and higher educational institutions. However, one can assert that even without statistics their number is very small. The same is true for the employment of disabled persons – there are only rare cases of persons with disabilities are hired.

By establishing the Center for Research of Issues of Persons with Disabilities, Tbilisi State University aims at shifting the discussion of these issues into the academic space, to contribute to designing correct and consistent steps towards the social integration of disabled persons. The main goal of the Center is to facilitate the development of social programs and services supporting persons with disabilities and to decrease stigma in the society. The activity of the Center will concentrate on the following directions:

Research: Research will be used to help evaluate the efficiency of ongoing programs and plan and develop new services;

Training programs: Developing and conducting training programs will be carried out for various groups such as disabled persons, their families and organizations, government entities and employers, as well as both private and public organizations;

Facilitating international and interdisciplinary cooperation: The activity of the Center will involve students from the Social Work Department of the Faculty of Social and Political Sciences. Their activities in the Center will be a necessary learning practice. Research projects will involve Master's and Doctoral students from relevant specialties (sociology, psychology, social work). Their experience will be reflected in their theses and dissertations. Research projects and training programs will be implemented with the support of local and international donor organizations within the framework of grant projects.



5th annual conference on gender studies, „Gendered identities, attitudes and perceptions“ – Conference held by the Center for Social Sciences and the Institute for Gender Studies at Tbilisi State University.

TSU RESEARCH IN THE DEPARTMENT OF COGNITIVE AND CLINICAL NEURO-PSYCHOLOGY



In 2013 the TSU Department of Cognitive and Clinical Neuropsychology of the Institute of Neurology and Neuropsychology carried out several research studies on neuropsychological issues related to epilepsy, autism and language impairment. Students in the MA and PhD clinical neuropsychology programs participated in the research. Professor Tamar Gagoshidze, TSU Faculty of Social and Political Sciences, headed several of the studies on cognitive and clinical neuropsychology, including "Working memory in people with frontal lobe epilepsy and temporal lobe epilepsy". This research (was) included the participation of 18 people with frontal lobe epilepsy and 18 with temporal lobe epilepsy, as well as 33 persons without disabilities. Age, gender and education were controlled among those without disabilities and a method was developed through which all the three components of working memory could be evaluated through both reasoning and non-reasoning tasks.

Dr. Gagoshidze points out that working memory is a form of short-term memory aimed to receive the flow of information out of long-term memory and use it in the process of action. It is also called "operative memory". Working memory consists of three components:

- The central executive, which acts as a supervisory system and controls the flow of information from long-term memory and the use of necessary information during current behavior;
- The phonological loop that stores verbal content; and
- The visuo-spatial sketchpad that stores nonverbal content.

The research hypothesis stated that besides frontal lobes, temporal lobes also contribute to the functioning of working memory. In particular, the cerebral cortex is responsible for the component of the central executive, while temporal lobes are responsible for operational components –the verbal and nonverbal processing of content. The study ascertained that brain lobes play an important role in the effective functioning of working memory. A methodical novelty of the

research was that all three components were being controlled simultaneously.

The team found that people with both frontal lobe epilepsy and temporal lobe epilepsy appeared to have significantly impaired parameters during the performance of working memory tasks compared to those without impairments. At the same time, the working memory-related systems of people with temporal lobe epilepsy were statistically more impaired. They performed tasks related to the components of phonological loop or visual-spatial sketchpad with difficulty. Thus the hypothesis was confirmed that temporal lobe deficit also causes disorders of working memory and its components. It also appeared that in cases of frontal lobe deficit it is very complicated to memorize or use reasoning materials, which indicates a problem of semantic processing.

Research results have a diagnostic significance as well. During neuropsychological assessment, the results of psychological tests can be used to identify dysfunctions of relevant brain structures. The results permit differential interpretation of neuropsychological data and respectively to make more precise predictions about local dysfunction of the cerebral cortex.

■ *The research hypothesis stated that besides frontal lobes, temporal lobes also contribute to the functioning of working memory. In particular, the cerebral cortex is responsible for the component of the central executive, while temporal lobes are responsible for operational components – the verbal and nonverbal processing of content. The study ascertained that brain lobes play an important role in the effective functioning of working memory. A methodical novelty of the research was that all three components were being controlled simultaneously.*

These results are an important contribution to understanding the neuropsychological model of working memory disorder.

Professor Gagoshidze has also led other research studies, including the neuropsychological characteristics of children with autism and specific language impairments. These addressed egocentric language in children with autism and with specific language impairment, as well as sensory integration problems in children with autism and receptive language disorders. The key goal of the studies was to differentiate neuropsychological signs of children with autism and specific language impairment. She pointed out that autism has dramatically increased worldwide and that Georgia is no exception. Many cases exist where signs of autism and specific language impairment are not manifest, so it is difficult to differentiate receptive language disorders and autism.

The hypotheses of the first study were that "Children aged 3-5 with specific language impairments make significantly more attempts at interaction during free play than children with autism of same age group, and that compared to children with autism, children with specific language impairment have significantly more products of egocentric language during free play". Ten children with

autism spectrum disorders, 11 with specific language impairment and 20 children without impairments all aged 3-7, participated in the research. The researchers created special free play situations for the children and observed them during three 5 minute periods. Their behavior, vocalization, language and interaction with adults were recorded.

Observations revealed that children with autism use egocentric language least of all. Egocentric language performed the function of planning a behavior among children with specific language impairment and children without disabilities, helping them to solve their problems. Vocalization was more frequent among children with autism as a self-stimulatory behavior. They made no attempts at interaction with adults during free play. This research is one of the first of its kind, since studies on egocentric language among children with autism and specific language impairment are extremely rare; thus the results are especially important for diagnosis and therapy for both groups of children.

The second study's hypothesis was that sensory integration of children with autism and receptive language disorders has been disrupted, yet their sensory profiles should differ from each other. Since little research has been carried out on sensory processing and emotional-behavioral reaction patterns of children with language disorders, similar research would be significant for making differential diagnoses in various clinical situations as well as for therapy.

Fifteen children with autism, 15 with receptive language disorders and 15 with expressive language disorders participated in the research. The children's sensory performances were assessed on the basis of a sensory profile questionnaire, and a special test was also conducted to assess their emotional-behavioral reactions. The research revealed that 1.) Children with specific language disorders and with autism resemble each other mostly by their sensory processing and sensory integration, and differ by their behavioral outcomes of the sensory processing; 2.) At the same time, children with language disorders and autism differ on their emotional-behavioral reaction patterns to semantic stimulus and to verbal-nonverbal communicative stimuli; 3.) At the initial stage of autism therapy it is important to start with simple sensory stimuli and gradually move to semantically structured stimuli. This more effectively promotes the stimulation of a child's communication. 4.) We should be guided by qualitative analysis when differentiating autism and specific language disorders, according to more natural instead of learned emotional reactions and social habits.

These research studies, carried out with the financial support of the Institute of Neurology and Neuropsychology, are being prepared for publication.



TAMAR GAGOSHIDZE

Tamar Gagoshidze is Full Professor in cognitive neuropsychology at the Faculty of Social and Political Sciences of Tbilisi State University and Head of Clinical Neuropsychology Service at the Institute of Neurology and Neuropsychology. She has served as a consultant at the Research Department of National Exam Center; Professor at the Department of General Psychology (TSU); Neuropsychologist at P. Sarajishvili Institute of Neurology and Neuropsychology; Lecturer at the Department of General Psychology (TSU); and Senior researcher at D. Uznadze Institute of Psychology. She has been President of Psychometric and Consultation Association since 1996. She has been lectures in the principles of clinical psychology (to BA students) at TSU and is a academic supervisor of MA PhDs students, has taken part in a number of research projects.

EPIZOOTIC ACTIVITY OF NATURAL FOCI OF PLAGUE IN GEORGIA



NATIA CHUBINIDZE

Natia Chubinidze is a Doctor in Public Health; Manager of the Repository of Bacteria and Viruses at the National Center for Disease Control and Public Health; member of Biosafety Association for Central Asia and the Caucasus (BA-CAC); member of Georgian Association of Biosafety. She has participated in international grant projects, has co-authored 16 scientific articles and abstracts, and has undergone international trainings in especially dangerous pathogens in laboratory diagnosis, biosafety, the application of Geographic Information System (GIS).

The Georgian National Center for Disease Control and Public Health studied Epizootic Activity of Natural Foci of Plague on the territory of Georgia between 2005 and 2013. Tbilisi State University (TSU) scientists are based at the center under the direction of Tbilisi State University's healthcare sector. Since the disease is usually preceded by epizootics (outbreak of disease among rodent populations) before it spreads through the human population, a comprehensive study of similar foci is very important for prevention.

Two natural mezzo-foci of plague are registered in Georgia, including the southern Georgian mountainous/plateau regions (Ninotsminda, Akhalkalaki, Dmanisi, Akhaltsikhe and Aspindza districts) and the eastern Georgian plains and foothills (Dedoplistskaro, Signagi and Gardabani districts). In the mountainous foci, the plague's causative agent was isolated in 1979, 1980, 1981, 1982, 1983, 1992 and 1997; in the plains/foothills the focus plague causative agent was detected in 1966, 1968-1971.

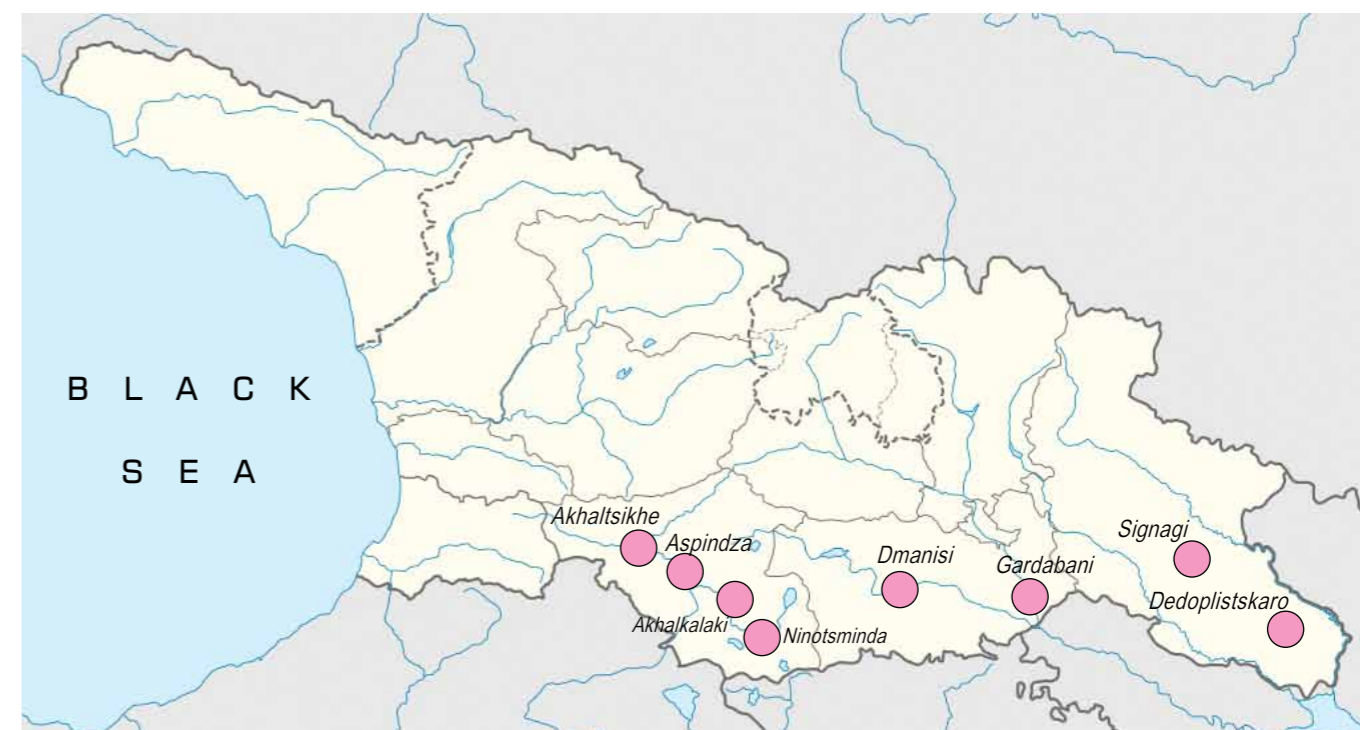
Natia Chubinidze, author of the research, is Academic Doctor of Medicine and an employee of the National Center for Disease Control and Public Healthcare. She notes that the focus surveillance system needs essential improvements and that the prediction system to forecast epizootic events which has been used for decades is not efficient. Epizootic activity still remains the main focus characteristic but more precise and clear definitions of epizootic events must be developed. Epizootics and epidemic alteration theories have not been revised and it is important to develop more specific criteria to determine the degree of epizootic events, because focus activity cannot be determined only by the increased

number of rodents.

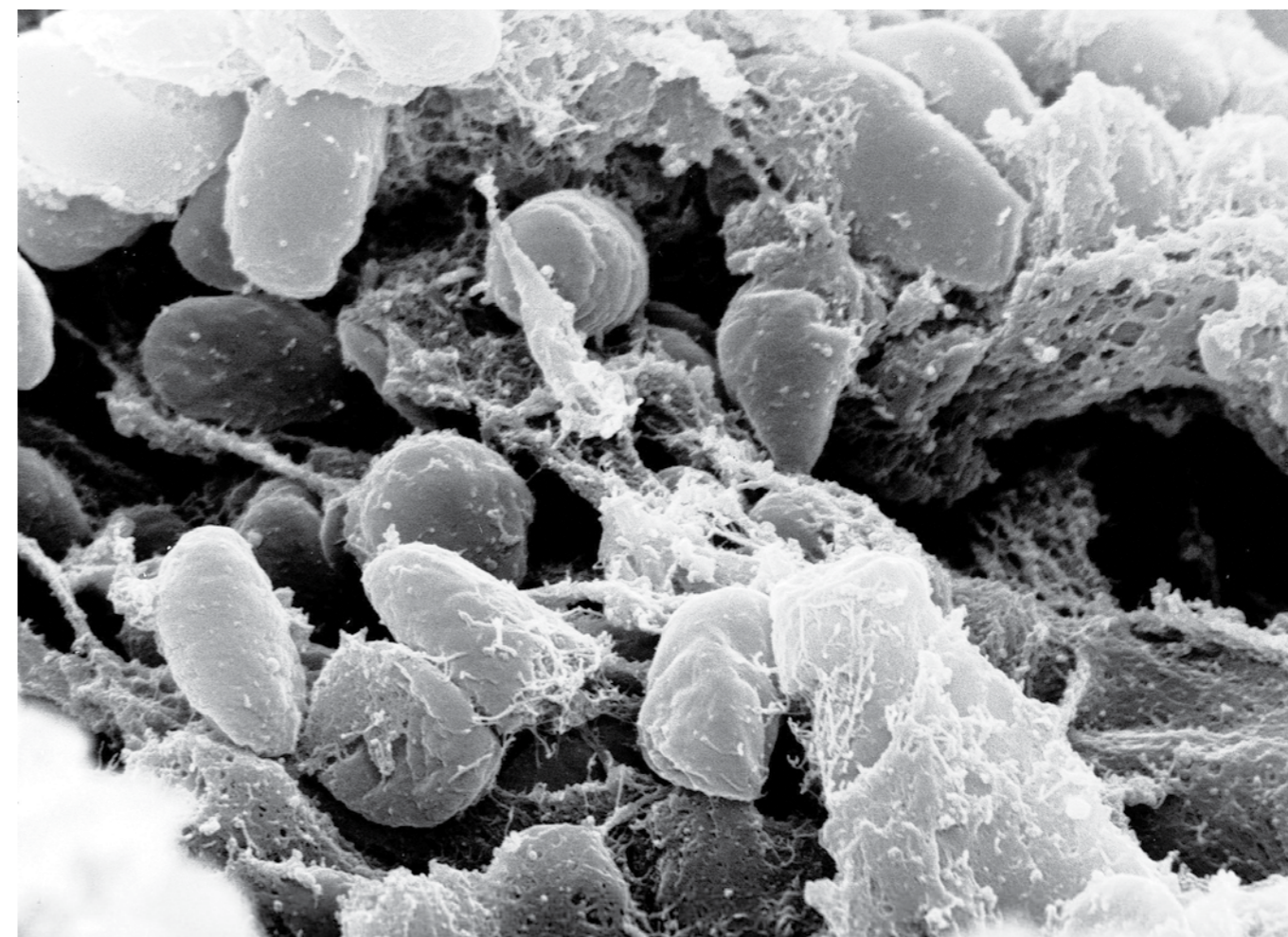
Many other environmental factors should also be taken into consideration. The key factor of plague epizootics is the clear identification of the conditions propitious for the formation of a natural focus, i.e. the investigation of all ecological details of the major components of the classical plague triad (reservoir-rodent, agent-flea, host-living organism). This is especially important to carry out in territories intensively colonized by infection reservoirs and vectors. Without this essential data, it is impossible to provide a reliable prediction of the situation.

To improve focus surveillance, it is important to ensure permanent monitoring of the entire natural focus as a geographical region. This in turn indicates a necessity for monitoring adjacent territory for data exchange. These measures can be carried out only after creating official agreements with the corresponding health agencies of neighboring

■ *The key factor of plague epizootics is the clear identification of the conditions propitious for the formation of a natural focus, i.e. the investigation of all ecological details of the major components of the classical plague triad (reservoir-rodent, agent-flea, host-living organism).*



Two natural mezzo-foci of plague are registered in Georgia, including the southern Georgian mountainous/plateau regions (Ninotsminda, Akhalkalaki, Dmanisi, Akhaltsikhe and Aspindza districts) and the eastern Georgian plains and foothills (Dedoplistskaro, Signagi and Gardabani districts).



Y.pestis (Plague bacterium)

countries. Unfortunately without an official request from the Government (even with TSU scientists' official request), the relevant agencies of Georgia's neighboring countries provided only incomplete data or none at all.

To guarantee quality research it is necessary to identify more convincing criteria indicating the presence of an infectious agent in the focus. A polymerase chain reaction (PCR) should be considered an effective approach to improve the focus surveillance and prediction of epizootic events. Although positive PCR results could not be considered a definite indicator of the presence of a plague agent, it indicates the probability of the need for an intensive study at a particular locus.

The question of an "ecological shelter" of the plague agent during epizootic pauses, i.e. determining a biotic (living organism) or abiotic (water, soil, etc.) objects where plague causative agents can hide, still remains unresolved. Among theories discussed in the literature, the hypothesis of "Tulurul plague" is of interest. According to this theory during the periods between epizootics *Y. pestis* (the causative agent of the systemic invasive infectious disease often referred to as the plague) remains in the soil. The TSU researchers adhere to this theory which proposes that this presence is composed of non-cultivable forms of *Y. pestis*, in other words, with a biological modification of the causative agent that rules out its detection through usual methods. However, these proposals lack reliable confirmation through experimental and field investigations.

Dr. Chubinidze believes it would be a valid course of investigation to test the natural plague focus for bacteriophages which may be active against plague, which could initiate studies of potential phage-sensibility of *Y. pestis* strains. Bacteriophages replicate only at the expense of certain bacteria thus the presence of a phage should indicate

the presence of relevant bacteria in a given environment.

Additionally comprehensive information about the degree of virulence of *Y.pestis* strains isolated from natural foci of plague in Georgia, and the sensitivity of major reservoirs of infection to plague, it would be valuable to perform "cross"-experimental investigations of test parameters (virulence and sensitivity). This would mean investigating the virulence of strains in the mountainous focus towards the main causative agent in the plains / foothills, which is the red-tailed gerbil, and simultaneously to test an isolated strain in the plains/ foothills against the main agents of mountainous focus, usually voles. This might partially clarify the issue of the selective virulence of *Y.pestis*. It would be necessary to further identify the detailed measures that should be taken if a plague agent is isolated or if epizootics of different degrees are detected.

Paata Imnadze is Full Professor in the Public Healthcare Department of TSU, is Deputy Director General of the National Center for Disease Control and Public Healthcare and Academic Doctor of Medicine. His approach is that to ensure the efficiency of a mezzo-foci surveillance system, it is important to consider data from similar results and studies when planning fieldwork. It is essential to analyze and exchange results regularly between Georgia, Azerbaijan and Armenia so the assessment of natural foci is comprehensive. When characterizing *Y.pestis* cultures in separate foci, it is important to determine their sensitivity towards bacteriophages as well as the possible presence of causative agents in the environment through phages.

Dr. Guram Katsitadze also participated in the research as a consultant. He is Doctor of Medical Science, Professor, Academician of the Gelati Academy of Sciences and Adviser of the Scientific Board of the National Center for Disease Control and Public Healthcare.

The center has already considered the

data on the peculiarities of epizootic activities when putting programs in place. Materials kept at the archives of the National Center for Disease Control and Public Healthcare were processed during the research and in particular, the results of the work conducted in plague foci during 1960-2008. The biological qualities of *Y.pestis* strains kept at the national repository of bacteria and viruses have been studied.

The research results were presented at the following international conferences and seminars:

A Threat of Spread of Biodanger in Georgia and the Role of the Department of Biosecurity and Threat Reduction of the National Center for Disease Control – Seminar on Implementing UNSC Resolution 1540 in Central Asia and the Caucasus, Almaty, Kazakhstan. 2006

Biosafety/Biosecurity in Georgia - Center for Nonproliferation Studies at the Monterey Institute of International Studies, (September 2007) California, USA.

The Plague in Georgia – Conference organized by the National Center for Disease Control and Public Healthcare, May 22, 2010, Tbilisi.

Publications on this work were made in the Georgian Medical Messenger and the Georgian Medical News.

Other publications include: "Surveillance on Plague in Natural Foci in Georgia, Emerging and Endemic Pathogens. NATO Science for Peace and Security Series-A: Chemistry and Biology.p.21-28 2010

"Characterization of PCP1 Plasmids in isolated *Yersinia pestis* strains from the Former Soviet Union," International Journal of Microbiology, vol. 2010, Article ID 760819, 9 pages, 2010. doi:10.1155/2010/760819.

Genotyping of *Yersinia pestis* and *Yersinia pseudotuberculosis* isolates from the Caucasus region"; Journal : BMC Microbiology.



ELENE GIORGADZE

Professor of the Tbilisi State University Medical Faculty, Head of the Endocrinology department, Head of the National Institute of Endocrinology; Vice-President of „Georgian Association of Endocrinologist“, Vice-President of „Georgian Association for the study of obesity“, Member of „European Association for the Study of Diabetes“, Member of „American Association for the Study of Diabetes“, Reviewer of journal „Endocrinology“, Expert in Endocrinology of Georgian Ministry of Health. Participant in several international conferences and congresses; A author of more than 150 publications and more than 20 monographs; Lectures in Endocrinology at TSU and gives scientific lectures for doctors.

ANDROGEN DEFICIENCY AND INSULIN RESISTANCE IN OBESE MALE PATIENTS

The National Institute of Endocrinology (NIE) is one of the leading endocrinology clinics in Georgia and serves as the base for the Endocrinology Department of the Faculty of Medicine at TSU. In addition to its large team of endocrinologists, the Institute brings together a wide range of specialists including surgeons, cardiologists, ophthalmologists, neuropathologists, andrologists, etc. The Institute offers outpatient, inpatient and surgical services and conducts scientific and clinical studies with TSU Department

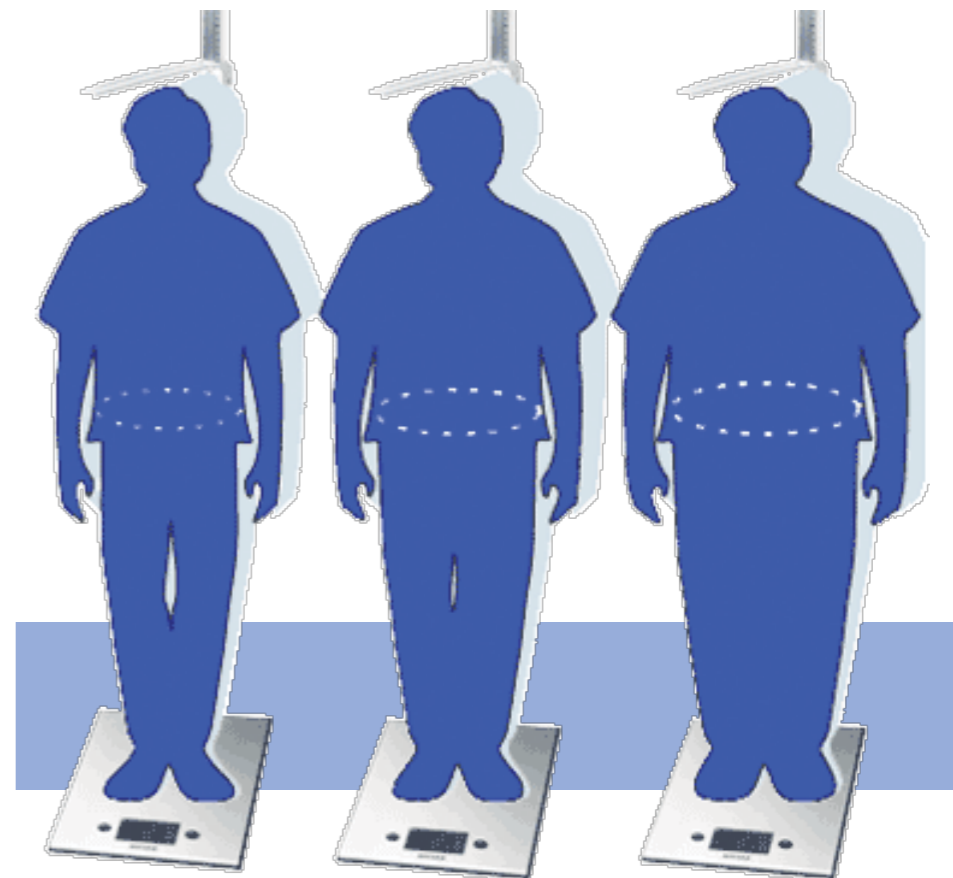
of Endocrinology or through the support of donor organizations. Approximately 20 scientific studies are underway at the Institute today.

Recently completed studies include a research report by Shota Janjgava, an endocrinologist-andrologist at the National Institute, entitled "Androgen Deficiency and Insulin Resistance in Obese Male Patients", which was a three-year program launched in 2010. The key goal of the work was to study the correlation between testosterone,



SHOTA JANJGAVA

PhD student at Tbilisi State University, Head of Andrology Department in the National Institute of Endocrinology, Vice-President of the Georgian Association for the Study of Diabetes and Metabolic Disorders, Board member of Georgian Association for the Study of Obesity, The European Association for the Study of Obesity, Young European Association for the Study the Obesity, Study group for the Insulin Resistance, the European Association for the Study of Diabetes, the American Association for the Clinical Endocrinologist, the European Association of Andrology. Reviewer for journal *Andrology*. Participating and presenting author at several International conferences and author of more than 15 publications. Lectures in Endocrinology and Andrology.



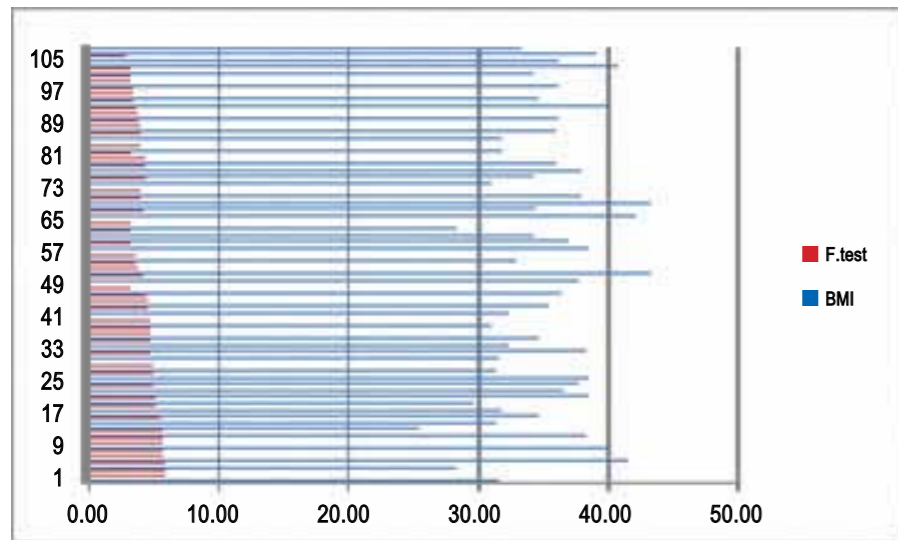
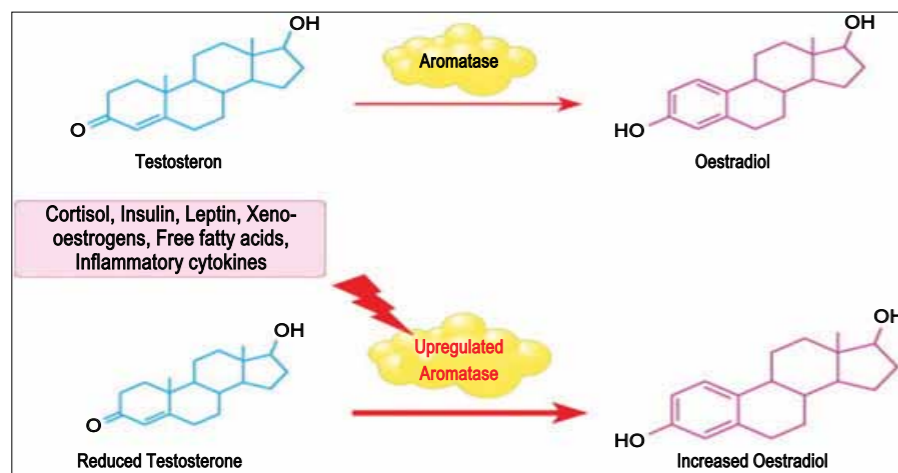


Table 1. The ratio of body mass index and free testosterone (The ratio was $r = -0.10$)



insulin resistance and obesity in male patients and to determine links between testosterone and cardio-metabolic risk factors. The study also examined the influence of testosterone replacement therapy on insulin resistance, obesity and specific cardiometabolic risk factors.

The research affirms that testosterone levels in the blood negatively correlates with metabolic syndrome (a metabolic disorder that ultimately increases the risk of diabetes, heart failure, atherosclerosis, stroke, oncologic diseases) and its components. When the scientists inclu-

ded only the insulin sensitivity index in the analysis, the correlative link with metabolic syndrome disappeared, revealing that the correlation between testosterone and metabolic syndrome is not determined only by insulin resistance. Android fat distribution was observed in 85% of patients (distribution of human adipose tissue mainly in the area of the abdomen, which is more common in males). Abdominal obesity or excessive abdominal fat around the stomach and abdomen—observed in other patients—was mostly associated with an increased

The research affirms that testosterone levels in the blood negatively correlates with metabolic syndrome (a metabolic disorder that ultimately increases the risk of diabetes, heart failure, atherosclerosis, stroke, oncologic diseases) and its components.

risk of cardio-metabolic disorders.

In this research, android obesity was found to have a closer correlation to testosterone levels. The following results were established: testosterone level positively correlated with body mass index (a measure of body fat based on height and weight that applies to adults); plasma testosterone level negatively correlated with the insulin resistance index (which shows insulin sensitivity).

Low testosterone levels are associated with dyslipidemic changes (lipid disorders or high cholesterol and other harmful fats circulating in the blood), and testosterone level negatively correlates with leptin levels. Leptin is a satiety hormone, synthesized in adipose tissue. The level of adipose tissue correlates negatively with testosterone, which is the male sex hormone. Low testosterone levels in males can be a preliminary indicator of the development of metabolic syndrome, which raises the risk for heart disease and other health problems such as atherosclerosis, diabetes mellitus type 2, arterial hypertension, etc.

Testosterone replacement therapy improves the individual's body mass index and insulin sensitivity, and also regulates lipid disorders. The Head of the NIE, Professor Elene Biorgadze, pointed out that determining testosterone concentration in overweight and obese male patients may help in the early diagnosis of metabolic syndrome and permit timely prophylactic measures to reduce complications related to obesity and metabolic syndrome. According to a concept developed in the framework of the research, hypogonadism (the diminished functional activity of the gonads that may result in diminished sex hormone biosynthesis) and erectile dysfunction in obese males is connected with an increased risk of cardio-metabolic disease. These results contributed new information on the current situation of the Georgian population, and will further encourage the beginning of more comprehensive studies of practical importance.

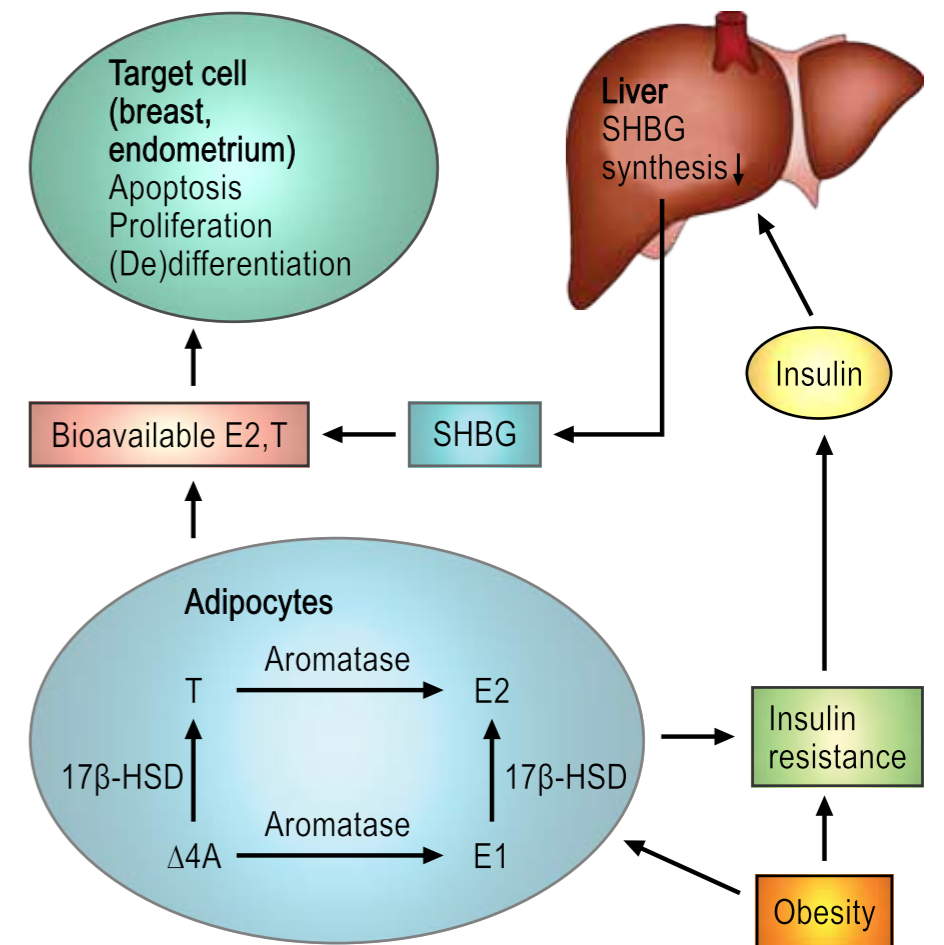
Cardio-metabolic characteristics typically found in Georgia and the correlation of testosterone to these characteristics and their peculiarities were described in the report. Research data will help practicing physicians when managing obesity in male patients. The research has clearly confirmed metabolic changes in the human body associated with obesity, as well as androgen deficiency in men.

Recommendations were made based on this research: obese males need to

Recommendations were made based on this research: obese males need to undergo screening tests to determine their androgen status, or their testosterone levels. Patients with androgen deficiency should correct their androgen balance along with their weight. The research results recommend that to regulate male sex hormones in elderly patients they should undergo testosterone replacement therapy, taking into account the condition of their prostate. To regulate androgen balance in younger men, an aromatase inhibitor should be used for patients with hyper-estrogenism.

undergo screening tests to determine their androgen status, or their testosterone levels. Patients with androgen deficiency should correct their androgen balance along with their weight. The research results recommend that to regulate male sex hormones in elderly patients they should undergo testosterone replacement therapy, taking into account the condition of their prostate. To regulate androgen balance in younger men, an aromatase inhibitor should be used for patients with hyper-estrogenism. Obese males have high levels of aromatase, which causes the transformation of testosterone into the female hormone, estrogen. Therefore, it is recommended for obese males to block this enzyme order to regulate the male sex hormone.

This study and its conclusions are a scientific novelty for Georgian physicians, as it studied males of all age groups who suffered from obesity or overweight. Patients were selected through questionnaires providing the characteristics of male sex hormone



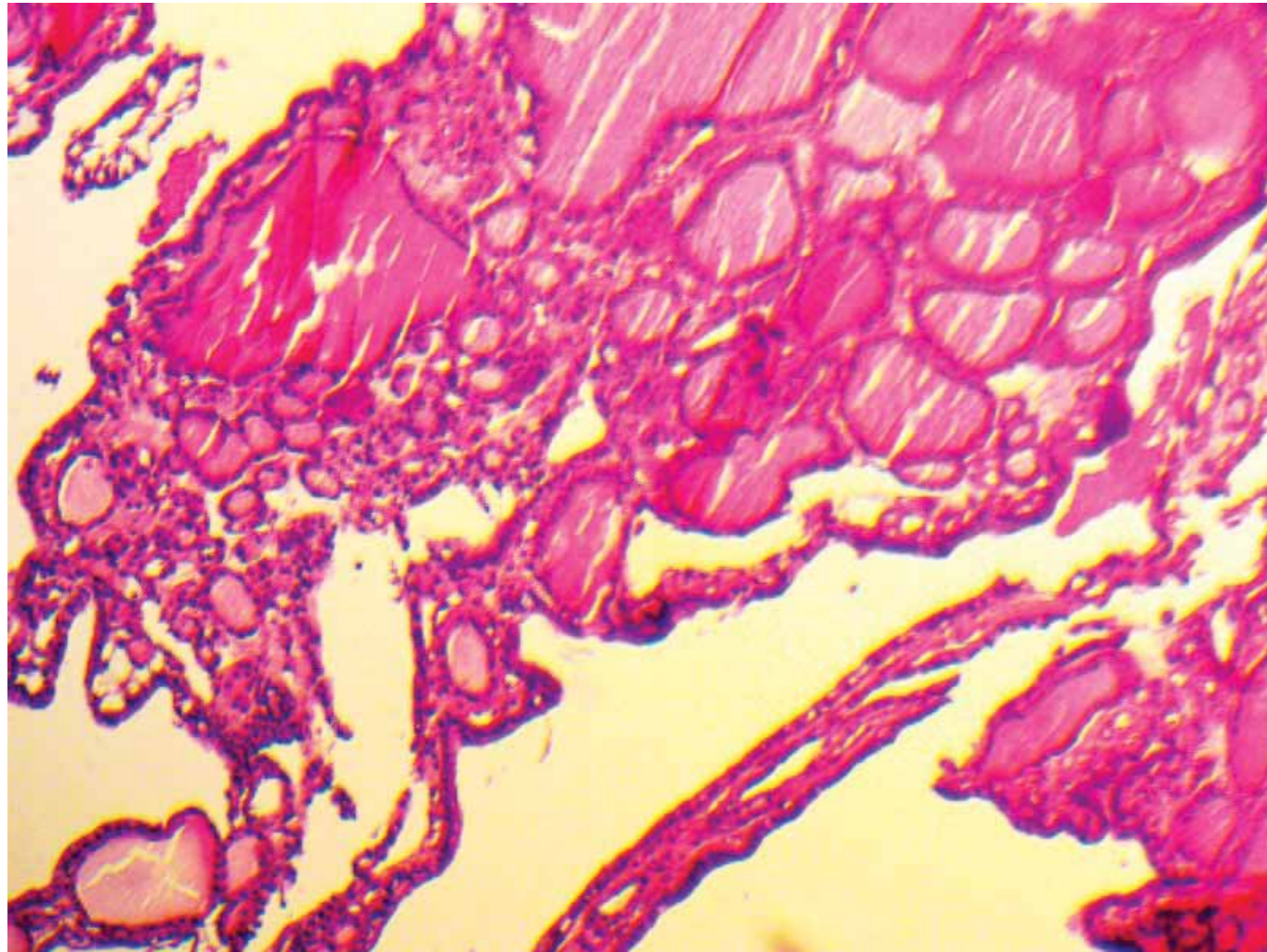
Nature Reviews | Cancer

deficiency. The research has clearly demonstrated male metabolic disorders in the Georgian population and how to address them. The results also suggest that diminished testosterone levels increase the risk of metabolic syndrome, which ultimately leads to the development of a number of insidious diseases, such as atherosclerosis, diabetes mellitus type 2, arterial hypertension, etc. People who participated in the research were genetically inclined to gain weight—and for that reason, the metabolic syndrome may be slightly higher compared to cases of other patients with metabolic changes due to alimentary obesity. Also, since only ethnic Georgians were studied, the results may not be the same as for other ethnic groups in Georgia who have different genetic codes or other diverse factors such as social-economic contexts, food styles and traditions.

The following persons were also involved in the research: endocrinologists from the National Institute of Endocrinology, Ketevan Asatiani, MD;

Marina Lomidze, Assistant Professor at the TSU Faculty of Medicine, MD; Marina Tsagareli, MD; Lasha Uchava, PhD student at TSU; and Tamaz Zerekidze, PhD student at TSU.

In addition to presentations made in Georgia, the research results were presented at the 1st International Diabetes and Obesity Forum, Athens, Greece 2011; the Royan International Twin 13th Congress on Reproductive Biomedicine and 8th Congress on Stem Cell Biology & Technology, Teheran, Iran 2011 (Both oral presentations and plenary lectures were contributed, as the study was considered innovative work in its field); the 2nd Central European Congress on Obesity, Budapest, Hungary, 2009; the 11th and 18th European Congresses of Endocrinology, Istanbul, Turkey, 2009 and 2011; the 19th European Congress on Obesity, Lyon, France, 2012; the European Congress of Andrology, Berlin, Germany, 2013; and the American Association of Clinical Endocrinologists annual meeting, Las Vegas, USA, 2014.



The structure of the impaired thyroid gland

MANY GEORGIANS SUFFER FROM THYROID DISORDERS

According to a group of TSU scientists studying the morpho-epidemiology of thyroid gland diseases, 51.3% of the Georgian population suffers from different types of hypothyroidism. Researchers at the TSU Alexander Natishvili Institute of Morphology conducted a study entitled "Structural and Receptor Identification of Hypothyroidism (thyroid hormone deficiency) based on Surgical Materials from Georgian Regions". The material and technical resources of the Clinical and Experimental Pathology Department of the Institute of Morphology, as well as the clinical and diagnostic laboratory (immune-ferment, densitometry) of the National Institute of Endocrinology were used during the study.

Professor Zurab Tsagareli, Chief of the Cytology Laboratory of the Institute of Morphology, led the research. According to him the study was necessary as there is no statistical data on thyroid cancer in Georgia. Only sporadic data mentions "various tumors" (see statistical directory for years 2007 and 2010 by the Georgian Center for Disease Control), which omits a corresponding database. The lack of fundamental, scientific research on

the issue has led to a low quality of expertise poor capacity for prognoses at all levels. The research team revealed that various types of subclinical hypothyroidism (especially in western Georgia) and toxic nodules have been detected in young and middle-aged adults, both men and women (in eastern Georgia).

A differential profile of thyroid diseases in Georgia's mountainous and lowland areas was drawn up, examining the role of hypothy-

roidism factors that included ecology—such as potable water; construction materials; medical procedures and others. In several Georgian regions changes were observed in terms of the clinico-morphological and molecular biological profiles of thyroid disease. For example hypothyroidism incidence increased as the incidence of diffuse toxic goiter decreased.

Professor Tsagareli points out, "It is important to understand that not only does hypothy-



ZURAB TSAGARELI

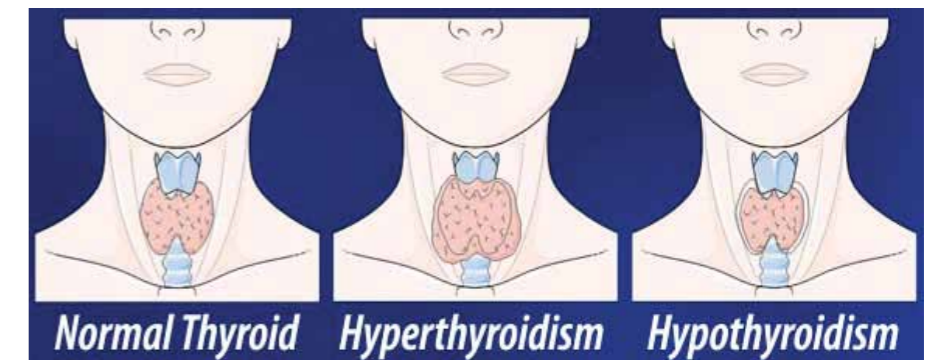
Zurab Tsagareli, MD is a Professor and distinguished scholar, laureate of the State prize. He is Head of the cytology laboratory at A. Natishvili Institute of Morphology at TSU. His research interests are the theory of vascular endothelial pathology and morpho-epidemiological study of thyroid diseases in Georgia. He has authored 8 monographs, 3 textbooks and more than 200 scientific works; serves as a doctoral supervisor at the Faculty of Medicine at TSU; is a member of the Association of Pathological Anatomists of Georgia and on the editorial board of the journal Experimental and Clinical Medicine, is chairman of PhD award council, Faculty of Medicine at TSU; member of the presidium of European Microscopy Society and Association of Pathologists and Cytologists of Georgia. He has supervised international and national scientific grant projects including two financed by the Shota Rustaveli National Science Foundation. He lectures to TSU post-doctoral students and has been awarded the Medal of Honour.



LIANA GOGIASHVILI

DMSC and Professor, Chairperson of the Scientific Board of the A. Natishvili Institute of Morphology, TSU, she is Head of the Department of Clinical and Experimental Pathology at the same institute. Key research priorities include cardiopulmonary syndrome, blood vessel restructuring, ultra structural bases of metabolic syndrome. She is the author of four monographs and over 200 scientific articles, a member of the Georgian Association of Pathologists and Cytopathologists, member of the European Microscopy Society, member of the editorial boards of journals *Georgian Medical News* and *Clinical and Experimental Medicine*. She has been Scientific leader and coordinator of many international and regional grants, regularly delivers lectures at international professional trainings and seminars and delivers special courses for TSU residents and PhD students in embryology and neuroscience. She has been awarded the Order of Honor.

In several Georgian regions changes were observed in terms of the clinico-morphological and molecular biological profiles of thyroid disease. For example hypothyroidism incidence increased as the incidence of diffuse toxic goiter decreased.



roidism increase the risks to reproduction but it can also lead to increased risks for thyroid, breast and cervical cancers. Hypothyroidism is frequently revealed in the form of multinodular goiter disease, which has now been associated with precancerous conditions. Thyroid dysfunction represents a demographic, social and medical-geographic problem for certain Georgian regions."

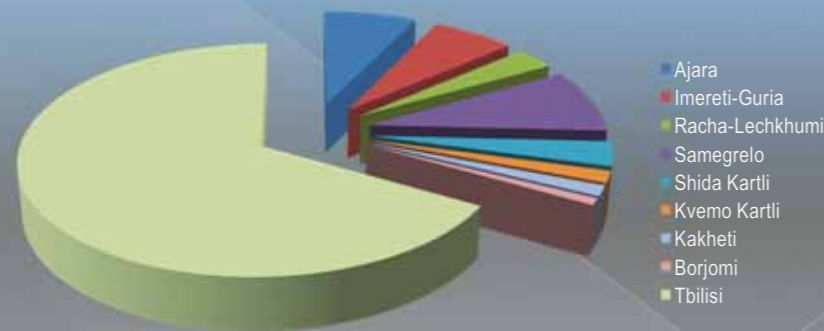
To better illustrate Georgia's medical-geographic anomalies and environmental risk factors, a radiation pollution map of Georgia was developed in 2006 indicating "hotspots".

The researchers also marked the prevalence of thyroid nodules, molecular biological profile and the potential for malignization (acquiring malignant features by cells). Professor Liana Gogiashvili, explained: "The observations made on over 6,000 surgical and over 1,700 fine-needle aspiration biopsy materials showed that hypothyroidism caused multiple organ changes. Among these changes there is a molecular biological atypia in the cervical epithelium (a type of multicellular organism tissue that serves to absorb and protect). This is an important prognostic indicator for evaluat-

ing the biological progress of damage. From our point of view, this phenomenon might be the result of a crosswise combination of two leading endocrine systems."

According to the research data, the incidence of malignization of thyroid nodules in people under 25 with hypothyroidism is as high as 4%. The recommendations developed by scientists from the Institute of Morphology include screening for thyroid disease in women over 35 and monitoring the cervical epithelium of persons with this disease in the state universal healthcare program.

DISTRIBUTION OF THYROID GLAND DISEASES IN GEORGIA BY REGIONS



■ According to the research data, the incidence of malignization of thyroid nodules in people under 25 with hypothyroidism is as high as 4%.

The results, conclusions and recommendations of the morpho-epidemiological research on the thyroid gland can serve as a basis for developing palliative surgical techniques and for earlier diagnosis of "microcarcinoma" in the thyroid nodules before surgery, as it currently does not exceed 10%. Microcarcinoma is the most common type of thyroid cancer and nodules measure less than 1 cm.

Professor Liana Gogiashvili pointed out that this research using modern technology is unique in Georgia. Autoimmune diseases of the thyroid gland are being studied abroad (Italy-Sardinia, Pacific coast of South America, USA, Germany) and today the link between hypothyroidism and precancerous processes is a topical issue. The next step is to study the genetic markers of autoimmune diseases of the thyroid gland in various Georgian population groups. According to Professor Tsagareli,

the data and conclusions are fundamental and many of them have been introduced in specialized clinics.

The results of the research have been presented at a session of Parliament's Healthcare Committee (13.04.2009); the Rustaveli National Science Foundation meeting (17.09.2011); the International Congress Euro Med – 14 (06.05.2014, Hanover, Germany). A number of scientific publications have appeared in Georgian Medical News; Allergology and Immunology; EuroMed – Medicine, 2014. The report on the research delivered at the international conference Euro Med 2014 was awarded a diploma and the Robert Koch Medal.

The following persons were involved in the research at various times: Elene Giorgadze, Professor, Director of the National Institute of Endocrinology; Vasil Chachibaia, Professor, Head of the Endovideo Surgery Department of the National Institute of Endocrinology; Nino Vepkhvadze, Professor, Head of the Department of Preventive Medicine and Environmental Health at Tbilisi State Medical University; Maguli Chkhobadze, Head of the Department of Anatomical Pathology of Kutaisi National Medical Center; also Doctors of Medicine, senior researchers: Elene Nikobadze, Manana Dgebuadze, Tinatin Kvachadze, Ekaterine Melikadze; and Natia Rurua, PhD student at the TSU Faculty of Medicine.



TSU – AT THE EXHIBITION OF GEORGIAN INNOVATIONS AND INVENTIONS

Tbilisi State University presented the innovations and inventions of TSU scientists at the Expo-Georgia Exhibition Hall in July 2014. Georgia's Innovation and Technology Agency (GITA) of the Ministry of Economics and Sustainable Development of Georgia organized the show entitled "Innovations and Inventions for Business Exhibition". The exhibition featured more than 150 innovative projects and inventions targeting various industries. Innovative projects included a cardiological device that maintains the functioning of the heart so that doctors have more time to save the patient; preventive medicine for metal-deficient anaemia; environmentally friendly fertilizers for plant protection; new-generation siderophores (iron carriers) for agriculture; the application of new, environmentally friendly components to produce wood tiles; a biochip for screening bacteria and viruses; an acoustic early-warning telemetric system for mudslides and landslides, and many other inventions.

At the exhibition conference the TSU Rector, Academician Vladimir Papava, spoke on "Georgian Economics: old problems and new challenges". The aim of Georgia's Innovation and Technology Agency is to discover and promote existing applied research results and technologies in Georgia; support innovation and encourage the collaboration of inventors with the business sector; as well as to support new innovative projects and establish start-up companies. During the three-day event, Georgian scientists, innovators and inventors had the possibility to present their ideas to the business sector and the innovation and technology sectors.

LABOR LAW FOR THE IMPROVEMENT OF THEORETICAL KNOWLEDGE AND ACTIVE LEGISLATION



GIORGI AMIRANASHVILI

Giorgi Amiranashvili is a PhD in Private Law at the Faculty of Law at TSU and lectures in the Faculty of Law since 2013. He was previously a Coordinator of the faculty conferences and member of the TSU Society of students and young scientists. He is co-author of two works, and author of 10 articles and two translations; He is on the editorial board of three publications and has participated in a number of local and international scientific conferences including the event dedicated to current issues of Labor Law at Middlesex University London (UK).

In Georgia, the new Labor Code came into force in 2006 after several years of floundering without any theoretical principles. There were no legal bases for employment law nor was any significant education offered in the field. In the beginning, employment law was a compulsory discipline in higher educational institutions for legal studies, yet professors had no educational materials except for the legal code and a few articles.

A first publication appeared only in 2011 by the Law Faculty of Tbilisi State University, entitled Labour Law – A Collection of Articles, and treated the most pressing issues of Georgian employment law. It aimed to fill a vacuum in the field. A second collection appeared in January 2014, and was a logical continuation of the previous publication. Meridiani Publishing, a project partner, defrayed all financial and technical expenses for publishing these collections. Giorgi Amiranashvili, co-author of the collection and PhD student at the TSU Faculty of Law, stated that a decision was made to prepare articles instead of writing a new textbook, as they would be more adapted to the situation, given the instability of employment legislation. MA theses that have been successfully defended at the TSU Faculty of Law are also included in the publication.

Vakhtang Zaalishvili, LLD is the editor of the first edition of Employment Law – A Collection of Articles. Among the authors are professors and young researchers. Issues addressed include freedom of employment; legal consequences of discriminatory questions asked by an employer to candidates before signing an employment contract; compensation of damages for violating pre-contractual liabilities; characteristics of employer's legal status; prohibition of discrimination in labor relations; employee health insurance; peculiarities for termination

of an employment contract; judicial practice in resolving labor disputes, etc. The second collection is composed of eight articles including an analysis of new regulations from a scientific point of view, and establishes a strong basis for existing judicial practice.

One chapter, "Peculiarities of Reviewing Labor Discrimination Disputes" by Zakaria Shvelidze analyzes judgments delivered by the Supreme Court of Georgia in 2010 on discriminatory treatment, which was not typical of previous judicial practice. The article studies the process of dispute development in three instances and outlines the peculiarities of reviewing cases related to discrimination. The author assesses the validity of court discussions on the absence of discrimination.

A chapter by Tatia Kereselidze, "Controlling the Content of Standard Conditions of Contract" treats how employers set conditions when drawing up and concluding an employment contract. In "Peculiarities of Working Time" by Mariam Bajashvili, she compares German norms regulating working time and shows how comprehensively this sphere is regulated in Georgian Labor Code and what particular improvements are needed.

The peculiarities of regulating overtime work, using comparative examples from

■ **The second collection is composed of eight articles including an analysis of new regulations from a scientific point of view, and establishes a strong basis for existing judicial practice.**

Georgian and German laws are analyzed in "Regulation of Overtime" by Salome Kavtaradze, enabling readers to evaluate the positive and negative differences between the two systems.

In "Prohibition of Competition after Completion of Labor Relations" by Tatia Berikelashvili practices from countries with developed legal systems are analyzed to better understand which approach would be more appropriate for Georgia. The work also provides guidelines to assist courts discuss and resolve disputes related to agreements on the prohibition of competition.

Two chapters are dedicated to the employer's liability in case of harm caused by an employee to a third person. These authors, Giorgi Amiranashvili and Tamar Shudra, analyze relations regulated by article 997 of the Civil Code of Georgia and the preconditions for using this norm.

The article "Protection of an Employee in the Contract Concluded with Participation of a Foreign Party" by Salome Pruidze reviews norms protecting employees in employment contracts drawn up according to EU laws, and a comparison of these norms with Georgian law. It also aims to highlight problems and shortcomings existing in Georgian law, to outline ways to resolve these problems, and make recommendations.

The work by Ucha Dzimistarishvili "Labor Relations between Administrative Agency



and Employee" focuses on whether Georgian legislation on public service meets modern requirements or whether it needs systemic changes.

Professor Besarion Zoidze, LLD and editor of the second publication on employment law, explains that "in the collection, young researchers analyze problems by using comparative methods and provide interesting proposals on how to improve current legislation. The key value of the collection is that it addresses major issues that will have an

important impact on the further development of Georgian labour law."

Both volumes are significant and invaluable references for Georgian students of law and their professors, as well as for practicing lawyers or other professionals. Given the topicality of these and other legal issues, the TSU Faculty of Law has begun work on a third volume has been funded by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and will be available in January 2015.



A GENERAL ANALYSIS OF CORPORATE GOVERNANCE



GIORGI MAKHAROBlishVILI

Giorgi Makharoblishvili graduated in law from Tbilisi State University, and began lecturing at the Faculty of Law in 2014; he has authored 10 scientific publications and two translations – „A Review of the action plans of European companies: Introduction“ and „The German dual system: experience, theories, reform“.

The TSU Faculty of Law continuously analyses global theoretical and practical issues, to adapt and apply these analyses to the Georgian economic and legal context. Several research institutes within the faculty collaborate in these efforts, targeting specific legal issues. One that stands out through its research is the Institute of Corporate, Bank and Economic Law, which has recently begun a new study entitled “A General Analysis of Corporate Governance” led by Assistant Professor at the TSU Faculty of Law, Dr. Giorgi Makharoblishvili. The research examines the fundamentals of corporate law and issues of corporate governance. This project was conceived in 2012 when it became obvious that there was a lack of relevant Georgian legal literature. In addition to this, an analysis is essential since corporate governance is highly complex and multidimensional, and of crucial academic significance. Research results have already shown the value of this work and are making a modest contribution to Georgian legal knowledge.

Important aspects of the study include an analysis of the core elements of corporate law that formulate the concept of corporate governance. To ensure sound economic planning and proper long-term management of accumulated property normative legal regulation and the presence of self-regulatory acts are essential, while corporate governance and so-called “soft law” are responsible for ensuring the status of a business. Indeed, a coordinated analysis of corporate governance and “soft law” make up the main strategy of corporate governance.

There can be no unified, universal formula for corporate governance since it varies according to geographic location,

time, the economic-legal environment and the characteristics of each company. Thus recommendations for developing a formula for corporate governance principles and their implementation should be laid out with consideration for the legal realities of different countries and companies. This is why the comparative-legal research includes American, European and Georgian corporate-

legal features. The study does not aim to provide an analysis of all aspects of corporate governance—its objective is to define a general paradigm that includes the functions of all major types of entrepreneurs. The results will allow readers to understand all the phases necessary for the correct operation of economic activities of a commercial society. Furthermore, this work is one of the first

attempts to provide a unified presentation of the main aspects of modern corporate governance.

(One of the main founders of the systemic analysis of corporate governance, Adolph A. Berle, once clarified the function of the conclusions of any research work. In the last chapter of his (co-authored) book *The Modern Corporation and Private Property*, he summarized the main points in the end of the book. According to his own words, he did this for, “Very lazy, busy people, or those without any interest, who are too reluctant, busy or are uninterested in the academic arguments presented in a book”.)

A main theme of the project is to conceptualize corporate governance systematically by classifying its internal and external mechanisms, then making a synthetic analysis of these mechanisms. The project offers further discussion of the mechanisms in terms of internal and external corporate governance then presents them as principles which are then contextually analysed. The conclusions offer an overview of all possible definitions of the complex notion of corporate governance, since there is no unified, universal classification for it. A significant part of the study is dedicated to the differentiation of two subcategories: The system of corporate

governance and the model of corporate governance. These are differently defined and take different directions, however they also have similarities.

The study reveals an appropriate model of corporate governance for Georgian reality, the economic environment and the current legislation on corporate governance that offers unclear classifications of corporate governance patterns. Moreover, the corporate governance codex determining the best norms and recommendations is available only for entrepreneurs in banking. There are no models of recommendations for entrepreneurs working in other fields. The proportion of entrepreneurs in the Georgian banking sector is very small compared to that of other sectors—most entrepreneurs in Georgia require recommendations for non-banking activities.

In order to attract and accumulate capital, the management of a joint stock company should offer attractive, legally protected and economic conditions to their investors. Among these conditions, effective rules and clearly determined strategies are of utmost significance. National legislation and indeed the entire legal system should be responsible for ensuring these conditions for investors.

Effective corporate control implies that

there is an institutionalized, formal process of monitoring and assessing executives’ activities. Tasks should be laid out clearly so that each party knows their place and responsibilities in the process of management control. In any case, all systems of corporate governance have their flaws. Eliminating these would obviously make corporate monitoring more effective. The characteristics of corporate governance were formed from the analysis of the corporate governance codex and the conclusions were made on the basis of the analysis is combined in the form of some theses presented in the concluding part of the study.

“A General Analysis of Corporate Governance” was completed within the framework of the Institute of Corporate, Bank and Economic Law at TSU, and will be published by the Institute. The monograph was written independently by the author; however Dr. Makharoblishvili received important support by the research editor, Professor Irakli Burduli. This work was not funded, but written with the aim of making a modest contribution to the Georgian legal field. After publication it will support any Georgian individual or legal entities in their capitalist investment relations, and can be used by specialists, students and practitioners of corporate governance.





INNOVATIVE RESEARCH IN TRANSNATIONAL CRIMINAL LAW

Today criminal law does not only include national law--in the struggle against international and transnational crime criminal law has become a supranational legal mechanism for crime prevention and human rights. These are the conclusions of research carried out by Dr. Merab Turava, Professor of Law, with support from the Alexander von Humboldt Foundation. In order to conduct research in international and European criminal law, he visited the Scientific Research Institutes of the Faculties of Law at the University of Humboldt in Berlin, the Albertus Magnus University of Cologne and the Friedrich Schiller University of Jena.

This research resulted in a publication in transnational criminal law, important because it is the first book in the field in Georgian, aimed at Law students and PhD students in interdisciplinary studies of international and European criminal law. The publication reviews modern transnational criminal law and the convergence of legal institutions of-- first and foremost-- Anglo-American and Continental-European systems. The practice of international criminal courts was established during the process of the application of international justice, through cooperation and

mutual understanding of judges from various judiciaries. This has provided the opportunity for reaching a compromise between various systems. It illustrates the internationalization of criminal law. The results of a harmonious convergence of legal systems should be taken into consideration with respect to the Georgian national legal system as well, in order to obtain a reasonable balance between extremely different approaches.

On one hand, Georgia has been under the jurisdiction of the international criminal court since 2003 and on the other it joined the Council of Europe in April 1999. Legal relations with the European Union are deepening which has caused a number of amendments to be made to Georgian criminal legislation. These factors largely determine the growth of transnational and supranational effects on the development of Georgian criminal law and its harmonization.

The publication resulting from this research consists of two parts:

The first volume of the publication is dedicated to the issues of international supranational criminal law related to implementation of international criminal justice carried out by temporary criminal tribunals and permanent courts. The essence

of international supranational criminal law is to bring criminal charges against individuals for specific macro-criminal offences. Punishment for those acts stems from the Nuremberg classical list of offences. The work describes important stages in the history of international criminal law, analyzes the contents of separate international crimes and discusses the legal issues of international criminal proceedings and cooperation with international criminal courts.

The second volume analyses key aspects of European criminal law in order to highlight main trends of its development and clarify its influence on Georgian criminal law. European criminal law is developing in two directions – in the framework of the Council of Europe and of the European Union. An important factor of its development is the harmonization of elements of transnational crimes in the field of substantive criminal law, and the bilateral recognition of decisions in the field of criminal procedure law.

As a result of developments since the 1990s the entire discipline of transnational criminal law is undergoing a renaissance, while it simultaneously remains in the Golden Age of its development. The harmonious convergence

of two major legal systems of the world is in place. The author concludes that presently transnational criminal law is not simply a theoretical university discipline, but an effective factor contributing to deepening mutual cooperation between states. Since the 1990s, criminal law has turned into an effective super-state mechanism to punish international criminals, based on the creation of temporary tribunals, then on permanent courts. It has promoted the institutionalization of international criminal justice that will largely end the lacunae in bringing criminals to justice and sentencing for the gravest violations of human rights worldwide. The transnational cooperation of states has deepened through European criminal law, and the significance of European standards for national legal systems has increased.

In May and June 2014, the Council of the Faculty of Law and the Representative Council of TSU – decided to set up an Institute of Comparative and Transnational Criminal Law at the Faculty of Law. This Institute will help intensify work on research conducted by Professor Turava, which is still underway. On October 28, 2014 the author delivered a report on his work at the international conference "Human Rights and Transitional Justice in Georgia" where the Director of the Max Planck Institute (Freiburg), Ulrich Sieber, also participated. A scientific article was published in the collection Human Rights and Implementation of Legal Reforms in Georgia (Professor Konstantine Korkelia, Editor).



MERAB TURAVA

Merab Turava is a Doctor of Law and Professor at the Faculty of Law, TSU; he is Director of the Institute of Comparative and Transnational Criminal Law. He graduated from the Faculty of the State and Law at Friedrich Schiller University Jena (FSU) and has a PhD in Law from Humboldt University of Berlin. From 2001-2013, he was a board member of the Georgian Training Center of Justice and Head of the Department of Criminal Law; he is a member of the State Commission of Criminal Law Reform of Georgia; expert of the project – TACIS-EU; Head of the working group of the State Commission on Drafting the Georgian Code of Criminal Process; an expert for the International Committee of the Red Cross; and is an expert and the Head of the Chamber of Criminal Cases of the Supreme Court of Georgia. Today he is Associate professor at the Faculty of Law at Tbilisi State University; was the supervisor of the research project of the Shota Rustaveli National Science Foundation – „For the Development of European Criminal Law in Georgia“. He is Professor at the TSU Law School, the head of the Department of Criminal Law of the TSU Law School; scholar at the faculties of law of Friedrich Schiller University Jena, Humboldt University of Berlin and the University of Cologne. He has received a stipend from the Foundation of Humboldt University of Berlin; is member of the interagency implementation council on Criminal Justice Reform; and Director of the Institute of Comparative and Transnational Criminal Law.





TSU INTERNATIONAL CONFERENCES 2014

THE SIXTH GEORGIAN-GERMAN SCHOOL AND WORKSHOP IN FUNDAMENTAL SCIENCES

On July 7-12, 2014 Tbilisi State University hosted the sixth Georgian-German school and workshop in fundamental sciences, "The Georgian-German scientific bridge is 10 years old", organized by TSU Faculty of Exact and Natural Sciences, Georgian Technical University, Iliia State University, and Forschungszentrum Jülich (Jülich Research Center). Topics included elementary particle physics, condensed matter physics, atmospheric sciences, medical physics, engineering sciences and computer sciences.

Along with Georgian scientists, directors and leading scientists of the Forschungszentrum Jülich universities took part in the school-seminar and professors from the universities of Bonn, Munster, Cologne, Aachen, and Dusseldorf participated. Several agreements on developing joint Georgian-German MA programs were signed at the conference according to which Georgian students will be included in the scholarship programs at Forschungszentrum Jülich, climate centre, and the Institute of Neutron.

The first conference in 2004 was dedicated to hadron physics, organized by TSU and the High Energy Physics Institute, the Institute of Nuclear Physics of Forschungszentrum Jülich and the International School of Mathematics

and Physics of UNESCO. The conference was very successful and has become a tradition, held every two years, except for 2008 when it was interrupted by war.

In 2010, Georgian Technical University joined the conference. Simultaneously, the participants thought of an idea of establishing Georgian-German scientific bridge (Georgian-German Science bridge connecting people and knowledge). The conference topics of 2014 extended more and covered important elements of fundamental and applied research. Iliia State University is also taking part in this year's conference.

The Shota Rustaveli National Science Foundation of the Ministry of Education and Science of Georgia makes significant contributions to support the conference. With this support there has been noticeable progress in Georgian students' participation in research projects with Forschungszentrum Jülich. In the framework of international collaborations, Georgian students undertake their MA and PhD studies in the institutes of Forschungszentrum Jülich. The TSU faculty plans joint PhD programs with German universities, which will allow Georgian students the opportunity to obtain a double diploma.

THE 10TH INTERNATIONAL MASS SPECTROMETRY CONFERENCE „PETROMASS – 2014“



On September 1-4, 2014, the first building of Tbilisi State University held the 10th international mass spectrometry conference PETROMASS – 2014 on oil chemistry and environmental issues organized by TSU, the Russian Society for Mass Spectrometry, the Petre Melikishvili Institute of Physics and Organic Chemistry, and the Georgian Association of Petro-chemists. The conference was financed by MS Analytica (USA), official distributor of Thermo Fisher Scientific analytical instruments for chromatography and mass spectrometry. During the conference, MS Analytica also organized online trainings on its own training base.

The chairmen of the conference were: Albert Lebedev, President of the Russian Society for Mass Spectrometry and Vladimer Tsitsishvili, Director of the Petre Melikishvili Institute of Physics and Organic Chemistry. Along with scholars of the Georgian National Academy of Sciences, prominent scientists from the USA, Russia, Brazil, England, Germany, Italy, Israel, Sweden and Georgia participated. Three plenary meetings were held, on the basic principles of oil chemistry, oil mass spectrometry, and environmental mass spectrometry.

The Petromass conferences have celebrated almost 100 years of mass spectrometry. Today this unique physical-chemical method is considered a powerful instrument for fundamental research. The influence of mass spectrometry is evident in many fields,

from atmospheric chemistry to oil chemistry. The first mass-spectra of simple hydrocarbons were developed in the beginning of the 1930s and since then there have been further developments largely thanks to the increasing interest in ecological chemistry, oil chemistry and biological sciences. Besides the significance of mass spectrometry in other fields of chemistry, the achievements of this

discipline are particularly noteworthy in the qualitative and quantitative analysis of all types of molecules, including simple organic compounds and the most complex biological macro-molecules. Due to unique technology developed in the 1980s, mass spectrometry permitted the emergence of new directions in molecular biology such as genomics, proteomics, metabolomics, glicomics, etc.

THE 8TH INTERNATIONAL CONFERENCE ON THE CHEMISTRY OF HETEROCYCLIC COMPOUNDS

The 8th Eurasian conference on the chemistry of heterocyclic compounds (EAM-HC 2014) was held on September 20-14 in Tbilisi organized by the Agricultural University of Georgia and the Association of Professional Chemists of Georgia. The chairman of the organizing committee was Shota Samsonia, Academician and Professor at TSU. In addition to researchers from Georgia, participating scholars attended from New Zealand, Azerbaijan, Algeria, Belgium, Belarus, Germany, Egypt, Spain, Iraq, Turkey, Italy,

Iran, Japan, England, India, Cyprus, Colombia, Lithuania, Latvia, Portugal, Poland, Pakistan, Russia, Slovenia, Greece, Armenia, France, Serbia, Taiwan, Sweden and the Czech Republic. The conference is hosted every two years by one of the Eurasian states. Before Istanbul in 2012, the previous conferences took place in Suzdal (Russia 2000), Novgorod (Russia 2002), Novosibirsk (Russia 2004), Thessaloniki (Greece 2006), Kuwait City (Kuwait 2008) and Alicante (Spain 2010).

THE 3RD INTERNATIONAL CONFERENCE ON ORGANIC CHEMISTRY - „ORGANIC SYNTHESIS - DRIVING FORCE OF LIFE DEVELOPMENT“

On September 24-28, 2014, Tbilisi State University organized the third international conference of organic chemistry (ICOC 2014), "Organic Synthesis - Driving Force of Life Development". A parallel session to the 8th International Conference on the Chemistry of Heterocyclic Compounds was held on September 26 headed by the Co-chairman of the organizing committee, Dr. Shota Samsonia,

Academician and supported by a grant from the Shota Rustaveli National Science Foundation. Scholars participated from Austria, Azerbaijan, USA, Bulgaria, Belarus, Germany, Iraq, Egypt, Turkey, Japan, Israel, India, Iran, Lithuania, Latvia, Nigeria, Poland, Russia, Greece, France, South Africa, Armenia, Ukraine, Kazakhstan, Sweden, and Georgia.



CONFERENCE „NATIONAL LITERATURE AND CROSS-CULTURAL COMMUNICATIONS“

The Institute of Ukrainian Studies of the Faculty of Humanities at the Tbilisi State University organized a conference "National Literature and Cross-Cultural Communications" on March 20, 2014. The conference was dedicated to the 200th anniversary of Taras Shevchenko's birth.

Among the keynote speakers were professors and researchers from Turkey, Georgia and Ukraine. They included Prof. Otar Bakanidze; Prof. Mariam Miresashvili; Petro Koronenko, Academician at the National Academy of Sciences of Ukraine, Director of the Institute of Ukrainian Studies, Herder prize winner and Honorary Doctor of the Tbilisi State University; Oksana Slipushko, Professor at Taras Shevchenko National University of Kiev; Head of the educational laboratory of T. Shevchenko studies; Prof. Lyudmila Gritsik, Taras Shevchenko National University of Kiev; Chairperson of the Department of Literary Theory and Comparative Studies, Ukrainian Kartvelologist, TSU Honorary Doctor and others.

INTERNATIONAL CONFERENCE ON HUMANE PEDAGOGY



The 13th International Conference on Humane Pedagogy was held at Tbilisi State University on March 21-23 with the support of President Giorgi Margvelashvili and the Ministry of Education and Science. Similar conferences have been held worldwide annually since 2002. This is the first year this conference was held in Georgia and about 500 representatives from 17 countries participated.



6th INTERNATIONAL CONFERENCE OF STUDENT ARCHAEOLOGISTS IN VARDZIA

The Faculty of Humanities of the Tbilisi State University and the Educational Scientific Institute of Archaeology organized the 6th International Conference of Student Archaeologists dedicated to Julian Pitt-Rivers in Vardzia on April 11-14. Among the keynote speakers there were: Professor Vakhtang Licheli (Tbilisi, conference founder and organizer); Professor Michael Vickers (Oxford University, permanent chairman of the conference); Professor Eberhard Sauer (Edinburgh, head of joint Georgian-Scottish expedition); Professor Walter Kuntner of Innsbruck University (head of joint Georgian-Austrian expedition). Participants from the universities of Oxford, Innsbruck, Edinburgh, Warsaw, Łódź, Torun, Ankara, Tehran, Durham, Leiden, Melbourne and Jena, as well as from Tbilisi State University, and the Institute of Archaeology and Ethnology of the Polish Academy of Sciences participated in the conference.



INTERNATIONAL CONFERENCE: „GENDER AND SCANDINAVIAN STUDIES: LANGUAGE, LITERATURE, SOCIAL RELATIONS“

The Center for Scandinavian Studies of the TSU Faculty of Humanities organized an international conference “Gender and Scandinavian Studies: Language, Literature, Social Relations” on April 30-May 2, a joint project of the University of Oslo and the TSU Faculty of Humanities. Among the keynote speakers were: Jostein Bortnes (Professor Emeritus at the University of Bergen); Erika Svedberg (Malmö University); Elisabet Rogg (University of Oslo); Tone Irene Brekke (University of Oslo); Frode Hermundsgård (University of Oslo); Ugnius Mikučionis (lecturer at Kaunas University); Professor Ståle Dingstad (Oslo); Even Arntzen (Associate Professor at the University of Tromsø); Professor Kakhaber Loria (TSU); Professor Torill Steinfeld (Oslo) and others. Researchers in gender issues and Scandinavian studies from Norway, Sweden, Lithuania and Georgia participated in the conference. The project was financed by the Norwegian Centre for International Cooperation in Education (SIU).

INTERNATIONAL CONFERENCE „SHAKESPEARE 450“

The conference “Shakespeare 450” was held at the Tbilisi State University and the Rustaveli Theatre on May 1-3, 2014 organized by the Center for Shakespeare Studies of the TSU Faculty of Humanities.

Among keynote speakers of the conference were: Maia Kiasashvili, Manana Gelashvili, John P. Burke, Rosemary Wales, Tinatin Margalidatze, Innes Merabishvili, Irakli Tskhvediani, Konstantine Bregadze, Davit Maziashvili and Martin Nichols.



The conference was dedicated to Shakespeare's heritage in the international context. The participants presented subjects about Shakespeare's influence on literature, painting and music. Books, stage designs and theatrical costumes were exhibited in the framework of the conference. The history of Shakespeare's plays staged in Georgia and of Shakespeare's studies were presented. During the closing ceremony the students Tamar Kakhniashvili and Sopho Totibadze, winners of the competition “Shakespeare in Georgia”-- organized by the Center for Shakespeare Studies and the British Council--presented their research papers.

INTERNATIONAL CONFERENCE „U.S. FOREIGN POLICY IN EASTERN EUROPE“



An international conference “U.S. Foreign Policy in Eastern Europe” was held at Tbilisi State University on May 15-17 organized by the Institute of American Studies of the TSU Faculty of Humanities. Speakers included Bridget Brink, U.S. Embassy to Georgia; Fusco Gianna, the University of Naples; Shota Vashakidze, Rutgers University; Manana Anasashvili, University of Michigan, as well as Temur Kobakhidze, Elene Medzmariashvili, Rusudan Daushvili, Ia Iashvili, Irakli Brachuli, Mamuka Dolidze, Anastasia Zakariadze, Vasil Kacharava, Ketevan Rostiashvili, Valerian Ramishvili, Ketevan Gochitashvili, Merab Kalandadze, Rusudan Nishnianidze, Elene Gabunia, Leila Khubashvili, Demur Jalagonia,

Davit Chichua, Tinatin Chigogidze, Zurab Kiknadze, Nanuli Tevzadze, Avtandil Digmelashvili, Medea Melkadze, etc.

The reports delivered at the conference covered issues of U.S, Latin American and Canadian history, politics, economy, law, science, culture, education, religion, Georgian-American relations, and Georgian immigration to the United States. The conference aimed to present the learning outcomes of American Studies and to share this knowledge among academic and broader circles of Georgian society. It also aimed to coordinate the activities of Georgian specialists in American studies and deepen their contacts with foreign colleagues.

CONFERENCE „FROM INFORMAL TO INSURGENT GOVERNANCE: MODES AND TRANSFORMATION OF SOCIAL CAPITAL IN THE CAUCASUS (AND BEYOND)“

The international conference “From Informal to Insurgent Governance: Modes and Transformation of Social Capital in the Caucasus (and beyond)” was held on June 7-9 organized by the Institute of Ethnology of the Faculty of Humanities, Tbilisi State University (TSU). Forty-five participants attended from TSU, University of Tallinn (Estonia), University of Birmingham (Great Britain), University of Fribourg (Switzerland), University of Latvia (Latvia), Guangdong University (China), Higher School of Economics of the National Research University (Russia), Renmin University of China, Free University of Amsterdam (Netherlands), etc.

The conference was supported by the FP7 Marie Curie grant project “Imagining Development: A multidisciplinary and multilevel analysis of development policies and their effect in the post-socialist world”. The EU-funded research projects aim at promoting the approximation of non-member states with the European Union, the formation of common scientific space and the active involvement of leading regional universities. Special attention was paid to encourage interdisciplinary research. Participation in the project involved conducting joint research studies, sharing research results, participation in international forums and supporting young researchers. The conference was interdisciplinary with a diverse institutional spectrum of participants.

INTERNATIONAL CONFERENCE „EUROPEAN VALUES AND IDENTITY“

An international conference European Values and Identity was held at the Ivane Javakishvili Tbilisi State University on June 16-18, organized by the Tbilisi State University, the Agence Universitaire de la Francophonie (Francophone University Agency), the EU, Association Georgia Proeuropa and the Georgian Community in France.



Among the speakers there were the organizers of the event: TSU Professor Nana Guntsadze; President of the Georgian Community in France, Otar Zurabishvili; as well as famous foreign and Georgian sci-

entists and political figures, including: Zaal Andronikashvili, Center for Literary and Cultural Research (Berlin, Germany); Professor Zurab Guruli, Mississippi University (USA); Gaston Buachidze, translator, Professor Emeritus, University of Nantes (Nantes, France); Cécile Vaissie (France); Eka Tkeshelashvili, Georgian Institute for Strategic Studies; Professor Bruno Naarden (France); and Professor Gerard Dessons, Sorbonne University (France).

INTERNATIONAL CONFERENCE “BYRON, ORIGINAL AND TRANSLATED”



The 40th international conference ‘Byron, Original and Translated’ was held at Tbilisi State University (TSU) on June 23 organized by the International Byron Society and the Georgian Byron Society. Among the key speakers were Professor Bernard Beatty (Great Britain); Professor John Clubbe (USA); Professor Naji Queijan (Lebanon); Professor Innes Merabishvili (Georgia); Shobhana Bhattacharji (India) and others. Along with TSU students and academic staff, 100 delegates from 20 countries also participated in the conference. The delegates included some of Byron's direct descendants



Despite our special interest towards the phenomenon of Byron, the poet's attitude toward Georgia remains unknown. The Georgian Byron Society's involvement in international research helped to reveal Byron's attitude toward Georgia, as it enabled Georgian scientists to make an important discovery—a previously unknown episode of Byron's life was revealed when he met a Georgian slave, a woman. This perhaps became the basis for one of his famous characters. It is reflected in the

book "Encounter with Lord Byron" by Innes Merabishvili published with support from the Ministry of Culture. A presentation of the book "Innes Merabishvili, Meeting with Lord Byron" by the author of the book was held in the framework of the conference.

INTERNATIONAL CONFERENCE „THE JEWS OF GEORGIA, THE CAUCASUS AND CENTRAL ASIA“

An international conference "The Jews of Georgia, the Caucasus and Central Asia" was held at the Tbilisi State University September 8-10 organized by Bar-Ilan University (Israel), Dahan Center (Israel), Embassy of Israel to Georgia, Ministry of Religion of Israel, Ashkelon Academic College (Israel) and the Institute of Oriental Studies of TSU. Key speakers included Professors Mariam Chachibaia (TSU); Guram Lortkipanidze (TSU); Shlomo Ianetz (Bar-Ilan University); Hananel Mack (Bar-Ilan University); Reuven Enoch (Ariel University) and others.



The conference was dedicated to the anniversary of 26 centuries of Jewish-Georgian friendship. Members of Jewish communities from Armenia, Bukhara, Uzbekistan, Azerbaijan, Tajikistan, Kyrgyzstan, Kazakhstan and Turkmenistan submitted research papers. Topics included religious life; traditional and modern education; Hebrew language and literature; legal and political status of the Jews; the community and its institutions; relations with the surrounding society; economics; art, music and culture; social aspects; relations with the Jewish world; Zionist activity and repatriation of the Jews to the land of Israel (Eretz Yisrael); absorption in the State of Israel, etc.

SCIENTIFIC CONFERENCE „A MEETING PLACE FOR NATIONS AND LITERATURES“

The scientific conference "A Meeting Place for Nations and Literatures" was held at Tbilisi State University on September 18-19 organized by the TSU Faculty of Humanities and it was dedicated to the 100th anniversary of Professor Givi Gachechiladze, translator, poet and theoretician of literary translation. Georgian and foreign scientists addressed the conference on socio-cultural, ethno-linguistic and psycholinguistic aspects of translation; intercultural communication and dialogue of cultures; the problem of equivalence in translation and bilingual lexicography; literary translation in modern world and prospects of its development; tradition and theory of translation, etc. During the event a photo exhibition was organized at the TSU Museum, where photos depicted Givi Gachechiladze's life, his documents, manuscripts, translations, memorabilia. An anniversary event was held at the TSU Conference Hall, where the film "Shelter – Poetic Translation" was shown, dedicated to Givi Gachechiladze's 100th anniversary.



INTERNATIONAL CONFERENCE ON TOPICAL ISSUES OF ANTIQUE CULTURE AND ITS HERITAGE

A joint scientific conference of the Friedrich Schiller University of Jena and Tbilisi State University on Topical Issues of Antique Culture and Its Heritage was held at Tbilisi State University on September 23-26 through the cooperation of the Institute of Classical, Byzantine and Modern Greek Studies and the Friedrich Schiller University of Jena. In 2014 specialists in ancient studies from the two universities restored an excellent tradition of multi-year cooperation to hold joint international conferences. This tradition started in 1966 after the two universities signed a historical agreement on mutual cooperation. These conferences gained popularity in scientific circles and turned into one of the most important scientific forums in the field of ancient studies. Nine conferences have been held in Jena and Tbilisi since 1969. After a 20-year pause, the 10th conference was held in Tbilisi this year. Over 100 researchers from Georgia, Germany, Greece, France, USA, Great Britain, Italy, Poland, Bulgaria, Croatia, Iran and Russia delivered their reports during the three-day conference.



The following famous scientists participated in the conference: Timo Stickler (Jena); Alexander Markus Schilling (Jena); Adolf Martin Ritter (Heidelberg); Tassilo Schmitt (Bremen); Christoph Auffarth (Bremen); Hans Christian Günther (Freiburg); Lorenzo Perrone (Bologna); Jean

François Cottier (Paris); Krastu Banev (Durham); Mary Childs (Washington); Nuccio Ordine (Calabria); Mikhail Bibikov (Moscow); Fatima Eloyeva (St. Petersburg). A presentation of hundreds of books sent by German professors to the Institute of Classical, Byzantine and Modern Greek Studies was held at the Institute's special library on September 23



Participants of the conference also held a field session to visit the monuments of antique and post-antique epoch, including Grakliani Hill, Samtavisi, Dzalisi, Mtskheta. A guide "The Culture of Grakliani" was specially printed for this day in Georgian and English languages. Professor Vakhtang Licheli and Dr. Annegret Plontke Lünig led the session. By unanimous decision of the eight-member delegation from the University of Jena, the next conference will be held in Jena in 2017. Thus, the tradition of holding one of the most important Eastern European scientific forums in the field of ancient studies will continue.

INTERNATIONAL SYMPOSIUM „NATIONAL LITERATURES AND THE PROCESS OF CULTURAL GLOBALIZATION“

The 8th International Symposium "National Literatures and the Process of Cultural Globalization" was held at Tbilisi State University on September 24-27, 2014 organized by TSU and the Shota Rustaveli Institute of Georgian Literature. Keynote speakers attended from the USA, Slovenia, Bulgaria, Italy, Hungary, Poland, Macedonia, Romania, Turkey, Iran, Lithuania, Latvia, Ukraine, Belgium, Russian Federation, Belarus, Armenia, Azerbaijan, Kyrgyzstan, Kazakhstan and other countries.

The following topics were discussed during the symposium: Globalization and the Problem of Cultural Integration; National Literary Canons and the Mechanisms of Cultural Globalization; Weltliteratur and the Issue of National Literatures; Literature without Borders? – Pro et Contra. A roundtable discussion on a topic "Communicative Function of Translation in the Process of Cultural Globalization", as well as a dialogue on "Literary Censorship – A Black Hole in the Global Space". The event was hosted by Azerbaijani Comparative Literature Association. In the framework of the symposium David Damrosch, Ernest Bernbaum Professor of Literature, from the Department of Comparative Literature, Harvard University and Founder and Director of the Institute for World Literature, delivered a public lecture on the problems of translation of world literature into the national languages.

Since the first symposium, the geographical areas of this scientific forum have significantly expanded, and 139 scientists from 19 countries participated, including USA, Hungary, Romania, Bulgaria, Poland, Germany, Lithuania, Latvia, Ukraine, Belarus, Russia, Azerbaijan, Armenia, Macedonia, Slovenia, Iran, Turkey, Qatar, Kazakhstan. Representatives of different Georgian universities and research centers attended from Tbilisi, Kutaisi, Batumi and Telavo.

INTERNATIONAL ECONOMIC AND POLITICAL FORUM, TBILISI BALKONI



The Department of Economic Policy and its affiliate, the Georgian-German Institute for Economic Policy and Economic Education, in the TSU Faculty of Economics and Business, organized the third international forum called Tbilisi Balkoni on May 27-28, 2014. The forum addressed start-up entrepreneurship and its development.

The guests and main participants in the forum were:

- Günter Faltin, Professor at Free University, Berlin founder of the famous «Teekampagne»;
- Norbert Kunz, Laureate of German national and European awards, founder and head of social entrepreneurship agency Iq Consult;
- Dr. Wolfgang Weng, Professor of the German Technical University, Co-director of the Georgian-German Institute for Economic Policy and Economic Education,;
- Monica Prshibish, Chief of the Southern Caucasus Bureau of the German Academic Exchange Service (DAAD)

Tbilisi State University Publishing organized a presentation of the Georgian edition of «Mind Defeats Capital» by Günter Faltin on May 27. The head of the DAAD Information Centre Tbilisi, Elizabeth Phenor attended the event.

INTERNATIONAL RESEARCH AND PRACTICE CONFERENCE «MODERN BUSINESS: NEWS, PROBLEMS»

The International Research and Practice Conference «Modern business: news, problems» held on October 3-5 was dedicated to the 80th anniversary of the TSU Department of Accounting and Auditing. To mark the anniversary, the Department of Accounting and Auditing received several gifts and awards, including the Mikheil Lomonosov Medal.

Professor Elene Kharabadze, Head of the Department of Accounting and Auditing, chaired the organizing committee of the conference attended by numerous international and local scholars. Guests from other universities in the world also attended. Welcoming speeches were given by Professor Elene Kharabadze - Chairman of the organizing committee; Academician Vladimer Papava – Rector of Tbilisi State University; Professor Teimuraz Beridze – Dean of the Faculty of Economics and Business; Davit Narmania – Professor at Tbilisi State University and Mayor of Tbilisi; Giorgi Tabuashvili - Professor at Tbilisi State University; and Vladimer Chaia - Professor at Lomonosov Moscow State University.

In addition to scientific presentations, three sessions were organized within the conference:



Session I: International standards of financial reporting – challenges and problems; problems and perspectives of accounting in the state sector (moderated by Nadejda Kvatashidze – PhD, Associate Professor);

Session II: Economic analysis and management decisions (moderated by Merab Jikia – PhD in Economics, Associate Professor);

Session III: Taxation, issues of business taxation, problems of modern auditing (moderated by Mikheil Chikviladze – PhD in Economics, Associate Professor).

SEMINARS: CAPACITY BUILDING FOR CONFLICT RESOLUTION AND THE MEDIATION AND MANAGEMENT OF CRISIS

On October 6 -10, the TSU Faculty of Economics and Business (Faculty Dean – Teimuraz Beridze) hosted one-week international seminars, Capacity building for conflict resolutions and the mediation and management of crisis organized by the Department of Economic Policy and its affiliate, Georgian-German Institute for Economic Policy and Economic Education (Director – Professor Revaz Gvelesiani) and the University of Potsdam.

Seminars at the Institute of Tourism Development (Director – Professor Maya Margvelashvili) were held under the auspices of DAAD within the framework of the program, “Conflict prevention in the South Caucasus, Central Asia and Moldova regions”.

German Professor, Angela Miklei, oversaw the creation of an interdisciplinary team of international experts in conflictology. The thirty members of the team include Georgian, Armenian, Moldavian and Italian experts from different specialities and social spheres. The team also comprised private business, state sectors, and university representatives.

Participants addressed issues such as conflict analysis and management, as well as practical and theoretical approaches to mediation and negotiation. They studied various conflict situations, analysed authentic conflict cases from their private and work lives and worked out alternative ways to solve conflicts. With the knowledge and skills acquired, participants will be able to work as contact persons and initiators in processes of crisis prevention, peace-building and conflict resolution. Such seminars help to form international networks where participants’ regular sharing of communication and information contributes significantly to their competencies in conflict management.

A similar seminar was organized in Tbilisi in 2011, and given the significance and effectiveness of the project it will also be held in the future.

INTERNATIONAL RESEARCH CONFERENCE “GLOBALIZATION AND STATISTICS”

On October 23-24, 2014 Tbilisi State University held an international research conference «Globalization and Statistics» dedicated to the 70th

anniversary of the Department of Statistics at TSU, hosted by the Faculty of Economics and Business. The following foreign scholars participated in the conference: Professor Stefan Mittnik (Ludwig-Maximilians-Universität München); Professor Henning Klodt (Kiel Institute for the World Economy); Professor Lyon Shweres (EU Danube Region Strategy, Hungary); Professor Oleg Karasev (Lomonosov Moscow State University); Professor Oksana Kuchmaeva (National Research University Higher School of Economics, Moscow); Professor Sheulov Denis (Riga State Technical University); Professor Grajina Karmovska (West Pomeranian University of Technology); Professor Natik Gurbanov (Azerbaijan State University of Economics); Professor Khankish Khankishiev (Azerbaijan State University of Economics); Allan Henryson (Statistics Services of Sweden).

Presentations at the conference included: «The evolution of statistics in Georgia» (Samson Gelashvili, TSU); «On modern statistics in modern Georgia» (Executive Directors of Sakstat – Mary Daushvili); «Aggregation of financial risks» (Head of the Department of Statistics at Ludwig-Maximilians-Universität München, Stefan Mittnik); «Teaching statistics, teaching challenges and applied strategies at the Department of Economic and Social Statistics at TSU» (Ketevan Marshava, TSU). There were six thematic sessions held at the Faculty of Economics and Business, including the theory of statics and methodology; econometrics; macro and microeconomics; labour market and demographics, modern global and regional economics; management; finances; accounting and banking.

SCIENTIFIC CONFERENCE „SPACE, SOCIETY, POLITICS”



The 2nd International scientific conference on “Space, Society, Politics” was held at TSU on June 25, organized by the TSU Faculty of Social and Political Sciences. The topic of the 2014 conference was “The Sea in an Interdisciplinary Context”, and aimed at promoting the role of the world’s ocean and coastline spaces against a background of the global integration of states, peoples and cultures. The conference was dedicated to the 90th anniversary of foundation of the Department of Economic Geography by Professor Giorgi Gekhtman.

Sessions included:

- Globalization and Regional Research;
- Economics; Port Systems, Transport and Regional Development;
- Human Geography, International Relations and Political Sciences;
- Sociology, Semiotics, Psychology and Journalism and Mass Communications.

2nd INTERNATIONAL CONFERENCE “MEDIA RULE 2014 – GEORGIAN-EUROPEAN PERSPECTIVES”

The 2nd international conference “Media Rule 2014 – Georgian-European Perspectives” was held on October 8-9, 2014 jointly organized by Deutsche Welle Akademie and Tbilisi State University with the participation of Georgian and German professors, students, experts and journalists.

The conference focused the transfer of knowledge and experience in the field of media law as well as on developing a joint vision and strategy for the development of the media landscape in the South Caucasus. The participants discussed a broad range of issues, including the function of media in free and democratic societies; the protection of journalists under

Article 10 of the European Convention on Human Rights; challenges facing the law departments of media organizations; and advertising and sponsorship in private broadcasting, among other subjects.

The well-known German professor, Dr. Karl-Eberhard Hain, Director of the Institute for Media and Communications Law at the University of Cologne was involved in the event. He is known for proving in Germany that the agreement between the German public television ZDF and the government was unconstitutional, while politicians tried to maintain the opportunity to influence the activities of this channel. Through the efforts of Professor Hain, and after a five-year struggle, this agreement was revised.

Dr. Peter Niepalla, Head of Deutsche Welle Law Department, and representatives from the Institute for Media and Communications Law, University of Cologne, also participated in the conference, and led discussions on pressing issues related to Georgian media.

INTERNATIONAL SCIENTIFIC SYMPOSIUM “TRANSPLANTATION OF THE LIVER AND PANCREAS/ISLETS OF LANGERHANS – ORGANIZATIONAL, LEGAL, CLINICAL AND SCIENTIFIC ASPECTS”

On October 16, 2014 Tbilisi State University hosted an international scientific symposium “Transplantation of the liver and pancreas/islets of Langerhans – organizational, legal, clinical and scientific aspects” was organized with support from the Shota Rustaveli National Science Foundation. The main aim of the symposium was to provide up-to date information on the transplantation of the liver and pancreas/islets of Langerhans and establish a framework for the implementation of these operations. Participants included specialists from Germany, Switzerland, the USA and Turkey. German scientists represented the Clinic of the Technische Universität München, which has a collaborative agreement with TSU.

The transplantation of liver and pancreas/islets of Langerhans (including the transplantation of half of the liver from a living donor) is practically a routine operation in the western countries. The simplicity

of this operation is the result of undertaking operations with modern high-tech devices and equipment, establishing high standards for the selection of donors, and achievements in immunology. In consequence, the number of the patients with liver and pancreas transplants and the frequency of successful operations has increased by 75-80%. At present, the transplantation of the liver and pancreas/islets of Langerhans is only in the experimental stages, but fortunately, the new generation of Georgian surgeons are showing an increased interest in the practical implementation of such operations.

The affiliated team of Georgian and foreign surgeons of the TSU Faculty of Medicine aims to carry out a transplantation of the liver and pancreas/islets of Langerhans in the near future. In this light, the professional discussions on the problems of the operation were very topical and of great importance.



DEVELOPMENT OF HUMAN RESOURCES IN LOCAL SELF-GOVERNMENT

A regional conference on Human Resource Development in Local Self-Government was held at the Ivane Javakishvili Tbilisi State University on November 3-4, 2014, organized by the TSU Institute of Administrative Sciences with support from the German Federal Enterprise for International Cooperation (GIZ). German experts, Armenian and Azerbaijani guests, representatives of academic circles from TSU and other Georgian universities, as well as members of several regional self-governments attended the conference.



LEGISLATIVE AMENDMENTS AND TRENDS TOWARDS MODERN DEVELOPMENT OF GEORGIAN CRIMINAL LAW



An international conference, "Legislative Amendments and Trends Towards Modern Developments of Georgian Criminal Law (Criminal and Criminological Aspects)" was held at Tbilisi State University July 18-19, 2014, organized by the Institute of Comparative and Transnational Criminal Law and the Institute of Criminology. It was supported by the EU-funded project "Support to the Reform of the Criminal Justice System in Georgia".

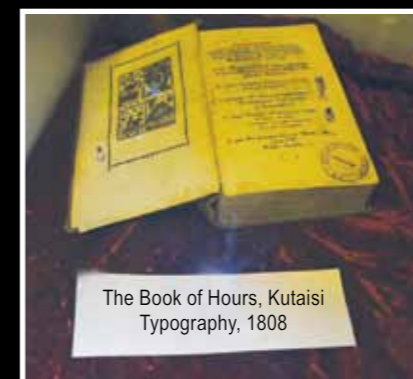
TSU INTERNATIONAL CONFERENCES 2014



Exhibition of rare books from the TSU library



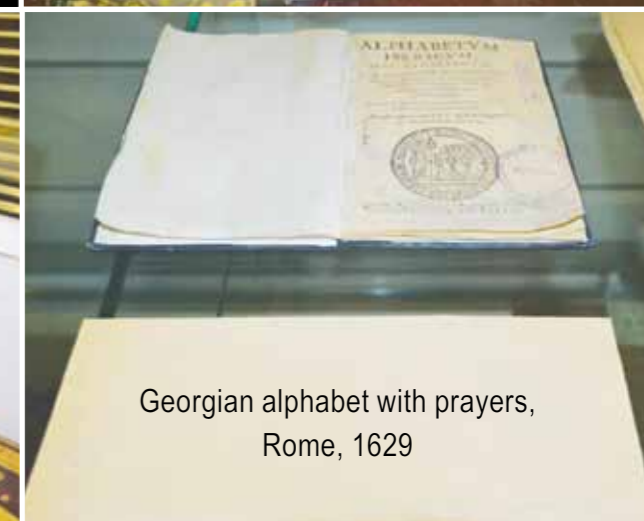
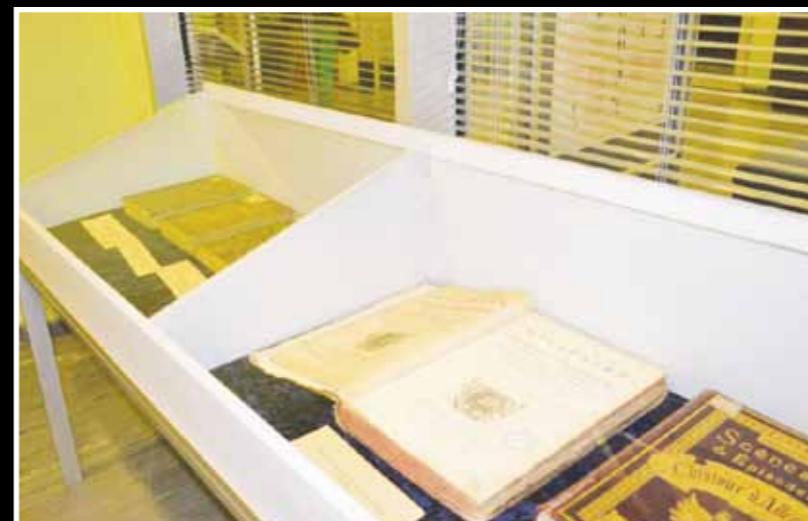
Erasmus of Rotterdam,
Talks in Amsterdam, 1526



The Book of Hours, Kutaisi
Typography, 1808



Gospel, Moscow Synod
Typography, 1828



Georgian alphabet with prayers,
Rome, 1629



www.tsu.edu.ge

ISSN 2233-3657

9 772233 365003