

**International Scientific Conference**

**Green Medications – By Green  
Technologies – For Healthy Life**

**27-28 September, 2019**

**Tbilisi State Medical University, Tbilisi, Georgia**

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**The conference is dedicated to the 100<sup>th</sup> anniversary of  
pharmaceutical education in Georgia**



**The conference is held in the frames of the ‘Science and  
Innovation Festival’ organized by the Ministry of  
Education, Science, Culture and Sport of Georgia**

**CONFERENCE ORGANIZERS**

- Tbilisi State Medical University**
- Georgian Pharmacists Association**

# POSTER PRESENTATIONS

## Abstracts

1.	<p>Abuladze N., Gabunia K., Chubinidze N.</p> <p><b>Development and New Studies of an Ointment Containing Phenolic Compounds for the Treatment of Dermatomycosis</b></p> <p>Akaki Tsereteli State University nino.abuladze5@atsu.edu.ge</p> <p><i>The aim</i> of our investigation was Improving method of standardization and conducting preclinical trials on volunteers for approval efficacy of ointment elaborated within FR/281/8-403/13 granted project.</p> <p><i>Materials and methods.</i> The ointment base is W/O type emulsion and contains Castor oil, DMG, Emulsifying wax, Cetyl palmitate, Polysorbate, Purified water, Stearin, Cocoa butter etc. Ointment contains as active pharmaceutical ingredients: Organic acids (milk, boric, benzoic, citric) in various ratios and combinations. As phenolic compounds we used Tannin, Resorcinol, Phenol. Hydrophilic phase contains alcohol or aethylacetat as solvent for some of active ingredients. Efficacy of the composition within grant project was approved by microbiological method. [1,2].</p> <p>There were conducted further studies of elaborated ointment in years 2016-2018 for nine employees of the Department of Dermatology of „Kanveni” National Center of Dermatology and Venerology, Tbilisi, Georgia. They had foot mycosis, in particular in the areas between the toes. The ointment was applied in the morning and evening: twice a day for 15-20 days. Foot hygiene was performed at any frequency. Significant clinical improvement was observed in 6 individuals over 7-10 days of observation. Complete sustained clinical and mycological-laboratory exclusion of the pathogen was observed 20 days after.</p> <p>Finally, we have continued to refine the development of the pharmaceutical standard for ointment. In particular, instead of the previously used permanganometric titration method, a spectrophotometric method for the quantification of phenolic compounds in ointment was developed. [3]</p> <p>2019 Studies continued in Kutaisi, on our relatives and family members. The results were as expected.</p> <p>Conclusion: The ointment is ready for clinical trials and implementation.</p>
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	<p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Abuladze N., Javakhia M., Gabunia K., Iavich P., Gabelashvili M.. Creation of Ointment Compositions Containing of Phenol Compounds for Medical Treatment. Georgian Medical News. N 10 (247):77-81.</li> <li>2. Чубинидзе Н.З., Твалишвили Г.М, Абуладзе Н.Б., Явич П.А. Новый противогрибковый крем для местного применения и результаты его исследования. Юбилейная научно-практическая конференция по микологии и микробиологии. Москва. 11-12 Апреля 2018//Успехи медицинской микологии. Т. XVIII. С. 293.</li> <li>3. K.Gabunia, N.Abuladze. Determining the content of tanning substances in the antimycotic ointment by method of UV spectrophotometry. The European Journal of Biomedical and Life Sciences. № 3. 2018. p.: 140-142.</li> </ol>
2.	<p>Akhmedov B.<sup>1</sup>, Topchieva Sh.<sup>1</sup>, Gorgaslidze N.<sup>2</sup>, Nurieva I.<sup>1</sup>, Madatov R.<sup>1</sup></p> <p><b>•The Influence of insect pests of walnut fruit crops of Azerbaijan on the quality composition of hazelnuts</b></p> <p><sup>1</sup>Institute of Zoology of the National Academy of Sciences of Azerbaijan, Baku  <sup>2</sup>Tbilisi Medical University, Institute of Pharmacochemistry named after Kutateladze  shafiga.topchiyeva@mail.ru</p> <p>In recent decades, there has been a noticeable deterioration in the environmental situation in many regions of Azerbaijan. Environmental degradation has a negative effect on the state of vegetation, including medicinal plants and, in turn, on the yield and quality of nuts.</p> <p>One of the industries in Azerbaijan that brings great profit is walnut growing. This industry is characteristic of some regions of the republic, in particular, northern and north-western. The content of vitamins and minerals in nuts depends on a number of bioecological and abiotic conditions. Most of the exploited zones of nut plantations are located in the zone of active economic activity of man. Ecosystems of these territories have a high level of pollutants. Intensive anthropogenic environmental impacts inevitably manifest themselves in the pollution of medicinal plants, including walnut plantings. Based on the foregoing, the aim of this work was to identify the influence of environmental pollutants and dominant pests of nut crops, to identify their harmfulness, including environmental pollutants (heavy metals) on the quality composition of hazelnuts.</p> <p>To achieve this goal, chromatographic research methods were carried out on hazel collected in the gardens and parks of the outskirts of Baku and Absheron, in the courtyards, gardens and forest areas of Ismayilli, Gabala and Zagatala regions. The</p>

	<p>collection of insects and hazelnuts was carried out during a visual examination of plants.</p> <p>The concentration of heavy metals was determined on an Agilent Technologies 7500 Series ICP-MS instrument (7500cx) using inductively coupled plasma mass spectrometry (ICP-MS, USA).</p> <p>The content of heavy metals in the investigated, infected with pests samples of hazelnuts, hazelnut shells and nuts was experimentally determined. In the samples under study, metal ions Li, Al, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, As, Cd were determined. In the collected samples of hazelnuts, hazelnut shells and nuts, the metal ion concentrations correspond to: Li (0.032), Al (19.146), V (0.032), Cr (19.146), Mn (0.037), Fe (0.3623), Co (0.979), Ni (49.500), Cu (0.052), Zn (8.367), As (16.133), Ag (25.292) Cd (0.019) ppb, Li (-1.035), Al (9.189), V (-0.777), Cr (-0.134), Mn (11.771), Fe (23.072), Co (-0.908), Ni (-0.637), Cu (4.170), Zn (0.288), As (-0.475), Ag (-9.491) Cd (0.462) ppb and Li (-0.869), Al (153.770), V (-0.354), Cr (0.225), Mn (23.528), Fe (168.871), Co (-0.786), Ni (-0.267), Cu (8.286), Zn (5.865), As (-0.384), Ag (-9.183) Cd (0.442) ppb, respectively.</p> <p>Thus, the influence of pests of nut crops on the qualitative composition of hazelnuts and nuts was revealed. The content of metal ions in the studied samples infected with pests is much higher in the fruits themselves than in the shells of hazelnuts and nuts. Measures have been identified and taken to protect the ecology of the environment from the mass spread of pests of nut crops.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Nuriyeva Irada Aqaverdi, Nadirova Gulbaniz Inqilab. Some Bioecological Peculiarities and Predatories of <i>Myzocallis coryli</i> (Goeze, 1778) and <i>Corylobium avellanae</i> (Schrank, 1801) (Hemiptera, Aphididae) in Azerbaijan. American Journal of Entomology 2019; 3(1): 1-5.</li> <li>2. <a href="http://netlekarstvam.com/narodnye-sredstva/lekarstva/produkty_pitaniya/funktsionnyy.html">http://netlekarstvam.com/narodnye-sredstva/lekarstva/produkty_pitaniya/funktsionnyy.html</a></li> </ol>
3.	<p>Aladashvili N., Kunchulia L., Tsiklauri M., Nemsadze E., Ioramashvili H</p> <p><b>•Standardization issues of some samples of Georgian Propolis</b></p> <p>Tbilisi State Medical University Chemistry Department of Pharmaceutical and Toxicological aladashvily@mail.ru</p> <p>Introduction: propolis is an adhesive dark greenish or yellowish brown product having slightly bitter taste and specified honey, waxy, vanilla and pitchy odor. It contains more than 300 individual substances. Propolis and its products have various</p>

pharmacological activities: antimicrobial, antioxidant, anesthetic, antiinflammatory, antitumor and various. Variety of the Georgian flora, specific qualities of the Georgian bees are revealed in the chemical composition of propolis and its pharmacological activity

The aim of the study: Georgian propolis: to study chemical composition of samples from Akhaltsikhe, Sachkhere, Khulo, Sighnagi, Chakvi and Svaneti and determine their antioxidant activity.

Study methods: spectrophotometry in ultraviolet area, fluid chromatography device- Agilent Technologies 6460 Triple quad LC/MS; gas chromatography: GC-MS/MS tandem chromatography method device Agilent Technologies 7000 GC/MS Triple quad. Determination of antioxidant activity by DPPH reagent using spectrophotometry at 517nm.

Results: for propolis standardization it is provided state pharmacopeia article, where polyphenol sum is defined applying spectrophotometry in ultraviolet area at 290nm.

Applying spectrophotometry method, the whole spectrum of absorption of spirit solutions of propolis was taken: 190-400nm, Each of them has 2 maximum:  $\lambda_1$ -290 nm and  $\lambda_2$ -330. Number of polyphenols does not have to be less than 25%. Composition of polyphenols in all samples of Georgian propolis are the following: Akhaltsikhe-48.3%; Svaneti-43.59%; Khulo-27.2%; Sighnagi-26.3%; Chakvi-25.6%, Sachkhere-23.4%.

Antioxidant activity for propolis samples are: Akhaltsikhe-85.2%; Svaneti-83.3%; Khulo-70.3%; Sighnagi-65.2%; Chakvi-60.3%, Sachkhere-52.3%. the reliable correlation is between polyphenols concentration and antioxidant activity.

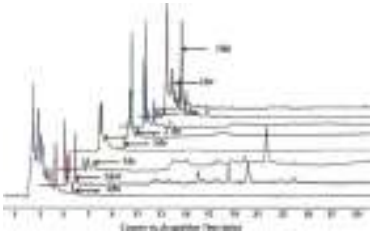
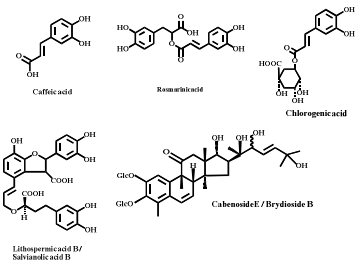
Applying chromatography method biologically active substances have been detected in propolis samples: kvertsetin, galangin, chrisin, pinocebrin, pinostrobin, akacetin, apigenin and others. Complicated ether of caffeine acid was detected in Akhaltsikhe sample, which has anti-tumor effect under literary data.

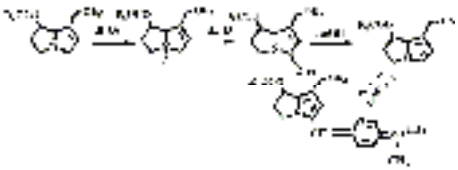
Conclusion: Georgian propolis samples are characterized with high potential of antioxidant activity, that's why they have high biological activity.

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4.	<p>Alania M., Kavtaradze N., Sutiashvili M.  <b>•Biologically active compounds of <i>Astragalus falcatus</i> Lam.</b></p> <p>Tbilisi State Medical University I. Kutateladze Institute of Pharmacochemistry  Department of Phytochemistry, Laboratory of Phenolic compounds  m.alania@tsmu.edu</p> <p>Natural origin substances became more and more popular in medicinal praxis because of their various pharmacological activities and less toxicity. The species of Georgian flora are interesting and actual by the content of biologically active compounds with quite considerable yield. One of them is <i>Astragalus falcatus</i> – the rich source of hypoazotemic flavonoid glycoside robinin [1]. Besides of robinin the plant also contents oxycoumarins, amino acids, cycloartans, and oligosides of kaempferol, quercetin, and isorhamnetin [2]. The study of chemical composition of extractive substances continues in order to elucidate the structures and determine pharmacological activity. Lipophilic and hydrophilic fractions of extract were obtained. The last one seems to be interesting because of its hydrophilic flavonoid oligosides content. The specific activity and toxicological study of dried hydrophilic fraction was carried out for elaboration hypoazotemic supplement. Pharmacological experiments revealed that it has not toxicity by oral administration and shows low toxicity by the intraperitoneal administration. The average statistical toxic doses are in the similar ranges and equals 776 mg/kg and 705 mg/kg in mice and rats respectively.</p> <p>Kaemperol-7-O-<math>\alpha</math>-L-ramnopyranoside, p-hydroxybenzoic acid, daucosterol, canthaxanthin, palmitic, and stearic acids were isolated and identified from the lipophilic fraction [3]. The structures were determined by the modern spectral methods: UV, IR, <math>^1\text{H}</math> and <math>^{13}\text{C}</math> NMR spectroscopy.</p> <p>These compounds are described for the first time from <i>As. falcatus</i>.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. E. Kemertelidze, M. Alania, K. Shalashvili, T. Sagareishvili, N. Kavtaradze. <i>Original remedies from the flavonoid containing plants of Georgia</i>. Georgian National Academy Press, Tbilisi, 2016, 120 p.</li> <li>2. M. D. Alaniya, N. Sh. Kavtaradze, A. V. Skhirtladze, M. G. Sutiashvili. Flavonoid oligosides from Georgian <i>Astragalus falcatus</i>. <i>Chemistry of Natural Compounds</i>, 2011, 47(3), pp. 377-381.</li> <li>3. M. D. Alaniya, M. G. Sutiashvili, N. Sh. Kavtaradze, A. V. Skhirtladze. Chemical</li> </ol>

	<p>Constituents of <i>Astragalus falcatus</i>. <i>Chemistry of Natural Compounds</i>, 2017, 53(6), pp. 1202-1203.</p>
<p>5</p>	<p>Amiranashvili L., Barbakadze V., Gogilashvili L., Merlani M.</p> <p><b>Isolation and analysis of low molecular compounds from <i>SYMPHYTUM</i> (<i>Boraginaceae</i>)</b></p> <p>TSMU I.Kutateladze Institute of Pharmacochimistry, Georgia l.amiranashvili@tsmu.edu</p> <p>The beneficial medical properties of <i>Symphytum</i> (comfrey) are the result of the presence various bioactive compounds in it. Phytochemical studies of species of Boraginaceae family: <i>Symphytum asperum</i> (SA), carried out by us. Low molecular bioactive compounds of the plant has been isolated and investigated. As the first step to isolate the solid-liquid extraction technique with aqueous different organic solvents was chosen.</p> <p>The extracts, which showed the presence of phenolic compounds in UV-spectrum preliminary, were fractionated on Diaion HP 20 and/or Sephadex LH-20 column, eluted by aqueous MeOH or EtOH in a stepwise gradient mode and freeze-dried. Eight water-soluble samples from roots (SAR) and stems (SAS) SAR 2dw, 2dm, 3dw, 3de, 3dsw, 4dw and SAS 1dw, 1dm were obtained. This procedure was followed by the investigation of the composition using UHPLC-Q-TOF/MS method. The molecular masses of the constituents were assigned by matching their molecular ions obtained by ESI-MS/MS methods with theoretical molecular weights from literary data [1-2]. The chromatograms peaks of the samples indicated the presence of variety of phenolic acids: caffeic, rosmarinic, chlorogenic, and salvianolic acids in SAS1 dm while other samples are not so rich in these components. Besides SAS1 dm caffeic and chlorogenic acids are found only in SAR 3de and SAS 1 dw, respectively. The peak of the chromatograms of the samples SAS 1dw, SAR 3de, SAR 3dsw and SAR 4dw identified salvianolic acid and rosmarinic acid in them. Also the study revealed the presence of several compounds (oligomers and low-molecular weight ones) in the samples SAS 1dw, SAS 1dm, SAR 2dw, SAR 3dw and SAR 4dw.</p> <div style="display: flex; justify-content: space-around; align-items: center;">  <div style="text-align: center;">  <p>Caffeic acid      Rosmarinic acid      Chlorogenic acid</p> <p>Lithospermic acid B / Salvianolic acid B      Cubenoid E / Brydioid B</p> </div> </div> <p>Further investigations are in progress in order to determine exact chemical structure</p>

	<p>of yet unknown compounds.</p> <p>Also we suggest sensitive qualitative TLC method that able to determine all the potentially hepatotoxic pyrrolizidine alkaloids (PAs) in different species of Boraginaceae family and phytomedicines from them. The coupling reaction of the double bond of PAs with acidified 4-dimethylaminobenzaldehyde) takes place according to the following scheme:</p>  <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Meijuan Li, Fengqing Wang, Yühong Huang, Feifei Du, Chenchun Zhong, <i>at all</i> (2015) <i>Drug Metab Dispos</i>, 43(5): 679-690</li> <li>2. Anja Watzke , Steven J. O'Malley , Robert G. Bergman , <i>at all</i> (2006) <i>J. Nat. Prod</i> , 69 (8): 1231–1233</li> <li>3. Mattocks A.R. , Jukes R. (1987) <i>Journal of Natural Products</i>, 50(2): p.161-166;</li> </ol>
6.	<p>Bakhtadze N., Bakuridze L., Gokadze S.</p> <p><b>•Formulation and Characterization of Vinpocetine Polymeric Nanoparticles for Intranasal Delivery</b></p> <p><sup>1</sup> Tbilisi State Medical University, Department of Pharmaceutical Technology, Tbilisi, Georgia nanabakhtadzee@gmail.com</p> <p><b>Introduction:</b> Vinpocetine, a derivative of the alkaloid vincamine, has been clinically used in many countries for treatment of cerebrovascular disorders. Due to its low water solubility is characterized by low gastrointestinal absorption. That is why the drug concentration in the brain is low, that limits its application in the clinic. In recent years, systematic drug delivery through nasal route has received a lot of attention, because of its advantages including: avoidance of hepatic first-pass metabolism and the ability for preferential drug delivery to brain via the olfactory region. Most of the drugs in nanoparticulate systems show better CNS targeted drug therapy because of improved penetration of the active pharmaceutical ingredient (API) leading to reduced risk when compared with the conventional formulation.</p> <p><b>Purpose:</b> To prepare and characterize Vinpocetine polymeric nanoparticles.</p> <p><b>Experimental Methods:</b> Vinpocetine loaded polymeric nanoparticles were prepared by a modified solvent evaporation technique. With the different ratio of the polymer and active substance (1:2; 1:4; 1:6; 1:8; 1:10). Nano-sizer was used to determine</p>



	<p>particle size distribution of Vinpocetine loaded nanoparticles. Spectrophotometric method was evaluated and validated to determine total drug content of active substance and encapsulation efficiently (%) of vinpocetine inside nanoparticle. PH meter was used to check pH of vinpocetine nanoparticles loaded suspension. In vitro release of Vinpocetine from the nanoparticles was evaluated by performing in vitro studies using Franz diffusion cells and validated spectrophotometric method for determination of Vinpocetine.</p> <p><b>Results:</b> A spectrophotometric method for the quantitative determination of Vinpocetine in pure forms and in pharmaceutical preparations was developed and validated in the present study.</p> <p>Particle size distribution of vinpocetine loaded nanoparticles was determined by nano-sizer. The nano aerosol composition of Vinpocetine (drug: polymer ration with 1:10) is obtained by following indicators of quality: identification, pH value of prepared nanosuspension, total drug content, the degree of active ingredient (%) incorporated in nanoparticles (entrapment efficiency-EE), and active substance release kinetics.</p> <p><b>Conclusion:</b> Vinpocetine loaded polymeric nanoparticles were prepared by a modified solvent evaporation technique. As the results show it is better to use drug: polymer ration with 1:10 for preparation of Vinpocetine loaded polymeric nanoparticles. The research is yet to come. Further testing and development will continue to take place.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1) Huile Gao, Xiaoling Gao "Brain Targeted Drug Delivery Systems: A Focus on Nanotechnology and Nanoparticulates" Elsevier Science, 2018;</li> <li>2) Yasemin Gürsoy Özdemir, Sibel Bozdog Pehlivan, Emine Sekerdag "Nanotechnology Methods for Neurological Diseases and Brain Tumors: Drug Delivery across the Blood-Brain Barrier" Elsevier Science, 2017</li> <li>3) Yi-shuai Zhang, Jian-dong Li, and Chen Yan Eur J Pharmacol."An update on Vinpocetine: New discoveries and clinical implications" 2019 Jan 15.</li> </ol>
7.	<p>Barbakadze Kh. <sup>1,2</sup>, Lekishvili N<sup>2</sup>., Arziani B<sup>1</sup>., Lekishvili G<sup>1</sup>.</p> <p><b>•Bioactive Additives for Hybrid Composites: from Structural Diversity to Application</b></p> <p><sup>1</sup>Tbilisi State Medical University, Faculty of Pharmacy, Department of Medical Chemistry</p> <p><sup>2</sup>iv. Javakhishvili Tbilisi State University, Faculty of Exact and Natural Sciences, Institute of Inorganic-Organic Hybrid Compounds and Nontraditional Materials g.lekishvili@tsmu.edu</p>

The effects of pathogenic microorganisms constitute global hazards for the humanity and the environment. Some of detrimental effects of microbial pollutants are:

- ✓ Human health;
- ✓ Serious threats to the cultural heritage;
- ✓ Significant economic losses to industry;
- ✓ Environmental pollution /Ecology problems.

Design of the novel classes of hybrid compounds with antimicrobial properties has been carried out.  $\alpha$ -Ferrocenylalkylation products, potential ligands containing poly-functional polycarbocyclic and metallocene structures simultaneously, and bioactive coordination compounds of some biogenic elements based on them have been synthesized.

The structure and composition of obtained compounds have been established by IR, UV, NMR spectral, thermal (TGA, DTA) and elemental analysis. Theoretical bio-screening of obtained compounds has been carried out.  $P_a$  parameters [antibacterial: antiviral (*influenza*, *picornavirus*, *adenovirus*, *poxvirus*); antiparasitic: antiprotozoal (*coccidia*, *histomonas*), antineoplastic, antimycobacterial)] are shown to be in the range of 0.55-0.8.

Laboratory patterns of polymer composites and multifunctional hybrid materials based on functionalized polyperfluoromethacrylates and selected compounds have been elaborated.

It has been shown that targeted modification provides formation of photochemically stable and optically transparent homogenous systems. All tested compositions have demonstrated hydrophobic behavior, high thermal stability and improved tribological characteristics.

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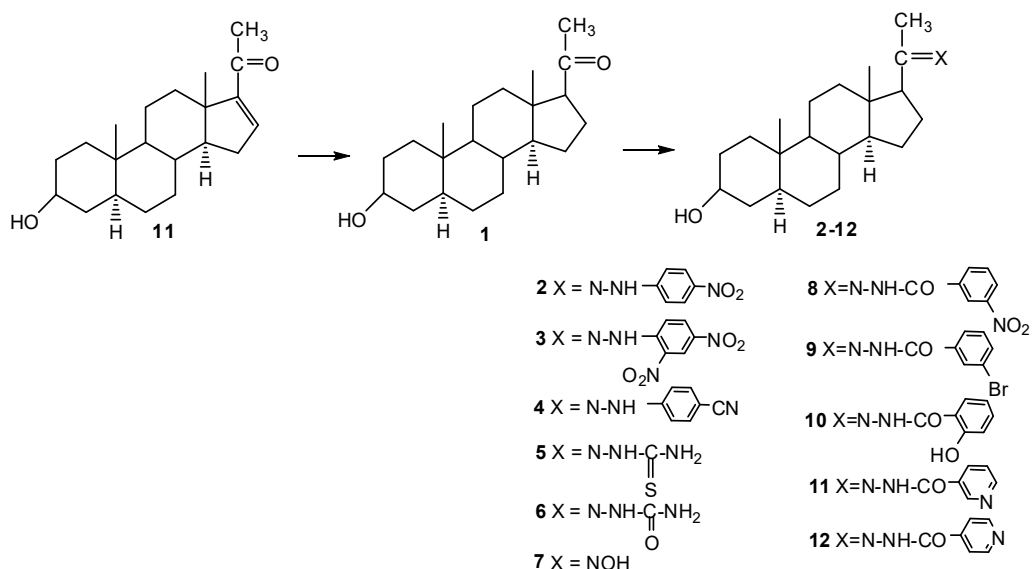
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**•Synthesis of new azasteroids of 5 $\alpha$ -pregnan-3 $\beta$ -ol-20-one**

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Formation of synthetic analogues of new azasteroids, the majority of which are powerful substances, is actual. Among them are compounds such as steroidal oximes, hydrazones, carbazones, pyrazolines. Majority of them reveal high anti-Alzheimer and anti-Parkinsonian, antiviral, antimicrobial, cytotoxic, antiproliferative activities [1-3], which are a prerequisite for creating of new medicines.

In this respect, some 20-hydrazonoderivatives of 5 $\alpha$ -pregnan-3 $\beta$ -ol-20-one **1** are interesting. The synthesis of hydrazones of steroidal ketone **1**, which are characterized with high biological activity, is limited with several examples in the literature [2].



In order to synthesis of new potential bioactive steroidal hydrazones possibility of transformation of 5 $\alpha$ -pregnan-3 $\beta$ -ol-20-one **1** into azasteroids **2-12** were studied. For this purpose condensation reaction of ketone **1** with different reagents in various conditions (solvents, catalyst and temperature) carried out. The starting compound - 5 $\alpha$ -pregnan-3 $\beta$ -ol-20-one **1** was synthesized by catalytic hydrogenation of 5 $\alpha$ -pregn-16-en-3 $\beta$ -ol-20-one **11**.

The structures of synthesized new azasteroids **2-12** were established by IR-, <sup>1</sup>H, <sup>13</sup>C NMR and mas-spectral data.

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9.	<p>Beridze M.</p> <p><b>•Bioecology of <i>Helleborus caucasicus</i> and Its Use in Medicine</b></p> <p>Batumi Shota Rustaveli State University  Supervisor: Associate Professor - Natela Varshanidze  medeaberidze89@mail.ru</p> <p>Helleborus is important medicinal species; glycosides, buffadienolides, monocytes, biocides and steroid saponins are found in its roots and rhizomes. Among them 0.1 percent of colerborine P which has an affect similar to stroftine on the heart. Colerborine P is used for circulatory disorders of quality II and III, most often in chronic heart failure. This has a particularly long and fast effect. In folk medicine in Adjara, the decoction of the root and rhizomes of Helleborus is used taking into account the dosage due to its toxic properties (1/2 teaspoon of roots in 0.5 l of water) for the treatment of cancer, hemorrhoids, cough, pleurisy, tuberculosis, purulent wounds, dandruff, diseases of the joints, diabetes, urological diseases, diseases of the liver, nervous system and kidneys; it is also used to lose weight.</p> <p>The aim of the work is to study the distribution areas, GPS coordinates, habitats, ecomorphology, dynamics of populations of relict endemics of the tertiary period, <i>Helleborus caucasicus</i> A.Br. (Helleboraceae) common in the florist region of Adjara, the composition of N, P, K in the soil in some habitats and especially its use in medicine.</p> <p>Field work was carried out in 2016-2019 using the Route Expedition Survey method. the species were identified by plant books and "Georgian flora"; The Serebryakov method was used to study the growth and development of the species studied. The Braun-Blanca method was used to study the frequency and coverage of the population of the studied species. The species were studied in the Gonio Valley, on the hills of Goni-Sarpi, in the villages of Khelvachauri, Erghe, Maho, Ajaristskali, Pirveli Maisi, on the central road slopes in Keda, Shuakhevi, Khulo and nearby villages.</p> <p>According to the data obtained, <i>Helleborus caucasicus</i> is distributed at an altitude of 20 to 728 m above sea level. The results of the phenological study were analyzed in connection with the information provided by meteorological stations, on the basis of which it was found that a snowless winter during the study period affected the flowering and fruiting phases of Helleborus, in particular, it accelerated it by 8-15 days. Populations of species are reduced due to anthropogenic factors, habitats are fragmented, which creates a risk for populations of species. We believe that the</p>

	<p>introduction of Helleborus into the culture is necessary in order to protect natural populations. A soil survey in the area of distribution of the studied species showed that Helleborus caucasicus populations grow well in phosphate-rich soil with a high pH.</p> <p>KEY WORDS: Helleborus caucasicus, medicinal plant, bioecology.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. კორძაზია მ., საქართველოს სსრ კლიმატი. // საქართველოს მეცნიერებათა აკადემიის გამომცემლობა, 1961.</li> <li>2. კრასნოვის ა. ექსპედიცია - აზიის სამხრეთ - აღმოსავლეთ ქვეყნებში; 1894.</li> <li>3. მაყაშვილი ა. ბოტანიკური ლექსიკონი, "მეცნიერება", 1991, 245 გვ.</li> <li>4. ურუშაძე თ. საქართველოს ძირითადი ნიადაგები. თბილისი. 1987.</li> <li>5. ფალავანდიშვილი შ. აჭარის წითელმიწა ნიადაგები და მათი აგროსაწარმოო გამოყენება. ბათუმი. 1987.</li> <li>6. Дмитриева А.А. Определитель растений Аджарии. Тбилиси, „Мецნიереба, т.1, II 1990. 327 стр; т.II, 1990. 278 стр.</li> <li>7. Манджавидзе 1982: Манджавидзе Д., Реликтовые леса Аджарии и их народно - хозяйственное значение, Тбилиси, „Мецნიереба“, 1982.</li> <li>8. Нижарадзе 1961: Нижарадзе Н.И., Советская Аджария (экономико-географическая характеристика). Батуми, гос. издательство, 1961.</li> <li>9. WWF &amp; IUCN Centers of Plant Diversity. A Guide and Strategy for Their Conservation. Vol. 1. Cambridge: IUCN Publications Unit, UK (1994).</li> <li>10. WWF International. 1997. 100 European Forests We Should Protect Now (Map), WCMC.</li> </ol>
10.	<p>Bokuchava N.<sup>1</sup>, Murtazashvili T.<sup>1</sup>, Sivsivadze K.<sup>1</sup>, Tatanashvili M.,<sup>1</sup> Kirvalidze T.<sup>1</sup></p> <p><b>•Selection of Optimal Conditions for Polyphenol Compounds Extraction from Grapevine Shoots</b></p> <p><sup>1</sup> TSMU, Department of Pharmaceutical and Toxicological Chemistry bokuchavanatia.22@gmail.com</p> <p>Grapes are widely known for health benefits due to their antioxidant content. Most study on the extraction of high-priced compounds from vineyard/wine byproducts has traditionally been focused on grape seeds and skins as raw materials. Grapevine shoots are considered as a waste product of viticulture, but they are reach with biologically active compounds, such as polyphenols and can be used as a cheap and additional source of these phytochemicals [1]. Polyphenols are functional groups in plants, which are involved in many bioactive processes [2]. The aim of this study was to select most optimal conditions for polyphenols extraction from grapevine shoots.</p>

	<p>Two Georgian Vitis Varieties from three region and different extracting factors were investigated to establish the most efficient and optimal conditions. Due to the lower toxicity, ethanol was selected as an extraction solvent, as a part of „Green Extraction”, and further study was performed in order to define the solvent concentration, solvent/raw material ratio, time and multiplicity to maximize the extraction results.</p> <p>Based on the received results 10% ethanol solution, 1:5 ratio of solvent and raw material, 30 min double extraction was assumed as the most optimal conditions for polyphenols extraction from grapevine shoots.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. En-Qin Xia, Gui-Fang Deng, Ya-Jun Guo, and Hua-Bin Li, Biological Activities of Polyphenols from Grapes, <i>Int J Mol Sci.</i> 2010; 11(2): 622–646;</li> <li>2. Kanti Bhooshan Pandey and Syed Ibrahim Rizvi, Plant polyphenols as dietary antioxidants in human health and disease, <i>Oxid Med Cell Longev.</i> 2009 Nov-Dec; 2(5): 270–278.</li> </ol>
11.	<p>Bolkvadze G.<sup>1</sup>, Diasamidze I.<sup>2</sup>, Diasamidze I.<sup>3</sup>, Varshanidze D.<sup>4</sup></p> <p><b>•Recreation, open Space and Greening</b></p> <p><sup>1,2</sup> Doctor of Biology, Batumi Shota Rustaveli State University,  <sup>3</sup>Master of Public Health, Ministry of Health and Social Affairs of the Autonomous Republic of Adjara  <sup>4</sup> Master of Biology, Batumi Botanical Garden  giabatumi@yahoo.com</p> <p>INTRODUCTION: The green areas play an important role in improving the environmental quality and climate of the city. However, despite the undoubted importance of these areas, the benefits to public health are still under investigation. Pollution of the environment with toxic chemicals is an environmental problem of the 21st century. Plants play a major role in creating a healthy environment. Urbanization in Adjara is in active phase and it is advisable to arrange new recreational areas. When selecting a variety of plants, their ecological amplitude, bio-ecological and ornamental features must be taken into account.</p> <p>METHODS: The method of research is mainly to record and evaluate the vegetation resources of the city in comparison with modern standards.</p> <p>RESULTS:</p> <p>The Authors perform a review of studies on the relationship between health and green areas and describe the main areas for which evidence on this relationship is currently available. They include: effects on air quality, on social cohesion, on mental</p>

	<p>health, with particular reference to the stress, and on physical activity.</p> <p><b>CONCLUSIONS:</b></p> <p>Most of the evidence comes from cross-sectional and descriptive studies and the approaches used to measure the association show themselves to be often unsatisfactory. The Authors conclude the review stressing the need for greater integration between the different professionals involved in urban planning and in health care analysis in order to identify research approaches more appropriate to understand such complex issues, striving toward a planning design of green areas that will satisfy both environmental sustainability and health requirements.</p> <ol style="list-style-type: none"> <li>1. Csizmadiane Czuppon V., Chachava N., Nahrendorf G., Malerba A., Pizzato A., Green for commons: paths of development in Hungary, Germany and Georgia //Proceedings of 5th Fabos Conference on Landscape and Greenway Planning, (2016) 87-95</li> <li>2. Centers for Disease Control and Prevention. Environmental and Policy Approaches to Increase Physical Activity: Creation of or Enhanced Access to Places for Physical Activity Combined with Informational Outreach Activities 2004. <a href="http://www.thecommunityguide.org/pa/environmentalpolicy/improvingaccess.html">http://www.thecommunityguide.org/pa/environmentalpolicy/improvingaccess.html</a> (accessed June 2, 2015)</li> <li>3. Daniela D’Alessandro, Maddalena Buffoli, Lorenzo Capasso, Gaetano Maria Fara, Andrea Rebecchi, Stefano Capolongo, and the Hygiene on Built Environment Working Group on Healthy Buildings of the Italian Society of Hygiene, Preventive Medicine and Public Health (SItI) “Green areas and public health: improving wellbeing and physical activity in the urban context” Epidemiol Prev 2015; 39(4) Suppl 1: 8-13.</li> <li>4. Rydin Y, Bleahu A, Davis M, et al. Shaping cities for health: complexity and the planning of urban environments in the 21st century. Lancet 2012; 379:2079- 108.</li> </ol>
12.	<p>Bolotashvili I.</p> <p><b>•Formulation and Technology of Valerian Oral dispersible and Sage Mucoadhesive Films</b></p> <p>TSMU, Department of Pharmaceutical Technology</p> <p><b>Introduction:</b> Transmucosal films are a relatively new, an innovative dosage form of medication, for drug administrating with mucous membranes of oral cavity. Medical films with physical-chemical nature – this is the solution or suspension of the API in a solid polymer. Their dissolving in the oral cavity may be based on physical process (biosoluble medical films), or by the polymeric base as a result of destruction (biodestructing medical films). They belong to application drug forms with prolonged or rapid therapeutic effect. The oral form of medicine is presented in buccal and</p>

sublingual forms. They are used for both, local and systemic effect. There have a lot of advantages, among them are increased bioavailability, comfortable for use and etc. Formulation and study of transmucosal films has now become a separate independent direction. The researchers are actively ongoing for the use films as the carrier of the API. According to a global study of diseases in 2016, 3.58 billion people worldwide suffer from oral cavity diseases. It should also be noted that 70% of the population takes calmative, sedative drugs. That's why it was selected a sage to prevent inflammatory processes and valerian as a sedative and calmative medical ingredient. By developing of valerian films we can ensure speed of its action, and by increasing the contact time on the inflammation site of sage film, we get an innovative product that is characterized by high bioavailability which allows the reduction of the therapeutic dose.

**The purpose:** The purpose of the research was the formulation and technology of sage mucoadhesive and valerian oral dispersible films.

**Research methods:** Were used in vivo and in vitro methods of analysis, in particular, organoleptic evaluation, microscopy, folding endurance, adhesiveness, disintegration test, moisture content, pH value, thickness measurement, stability studies.

**Conclusions:** Based on the bio-pharmaceutical researches, the base of Valerian oral dispersible and sage mucoadhesive films are composed.

Based on bio-pharmaceutical researches were studied the influence of extract and concentration on the quality of the film. There is selected with the content of liquid extract of Valerian and sage dry extract.

Based on biopharmaceutical researches were given formulation of the sage mucoadhesive films and formulation of the valerian oral dispersible films;

Based on the technological research was developed technology of the sage mucoadhesive and valerian oral dispersible films.

A technological scheme for producing valerian oral dispersible and sage mucoadhesive films is designed;

According to the folding endurance, thickness, organoleptic characteristics, disintegration, pH value, adhesiveness and stability, sage mucoadhesive and valerian oral dispersible films meets the technological requirements.

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13.	<p>Cheishvili T., Goletiani K.</p> <p><b>•Endemic Medicinal Plants of Imereti And Some Ethnobotanical Excursion</b> Akaki Tsereteli State University Tbilisi Medical University</p> <p><b>Introduction.</b> There are 140 endemic plants in Imereti .from there 94 species are Caucasic endemic plant, which is About 67% of the total number. There are 46 Georgian endemic plants and which is 33% of total number. 9 species is Endemic plants of Imereti, which is 5.2 %.</p> <p><b>Aim and goal.</b> The study was aimed at collecting data on traditional use and assessing conservation statuses of some of the Caucasus endemic medicinal plants confined to limestone habitats.</p> <p><b>Methodology.</b> Data on distribution, ecology, population state (rare, scarce, common), threats collected by the author were used for IUCN Red List assessment of the four target species.</p> <p><b>Results.</b> The Imeretians belong to the ethnic group of Western Georgia and they live Imereti areas, near the river Rioni and its gorges. Okriba is rich in fossil-coal, dipolitic and carbon shales, chalcedony, barite, quartz sands, marble, basalt, gischer, refractory and cement clays. Here are balneological healing waters and drinking mineral waters. Fieldwork and ethnobotanical surveys were conducted in some villages in the northern part of Imereti, in the Okribi area, as well as in the southern part of Imereti towards the Meskheta Range, Mephistskaro Mountain and in some areas.</p> <p><b>Conclusion.</b> Since natural resources of these species are limited and their populations experience negative effects of various factors acting as threats, relevant conservation measures are to be elaborated to protect their populations that may occur an important source for obtaining compounds with a potential to be used in medicine.</p> <p><b>References:</b></p>

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14.	<p>Chikviladze T.<sup>1</sup>, Chincharadze D.<sup>1</sup>, Tskhadadze Sh.<sup>2</sup>, Tsopurashvili S.<sup>1</sup>, Otarashvili T.<sup>1</sup></p> <p><b>•Comparison of <i>In Vitro</i> Release of Dexketoprofen Trometamol from "Zum-25" and Its Brand Analogue by High-Performance Liquid Chromatography</b></p> <p><sup>1</sup>TSMU, Department of Pharmaceutical and Toxicological Chemistry;  <sup>2</sup>Laboratory of Management of Quality of Georgian Pharmaceutical Company "GMP", Tbilisi, Georgia  t.chikviladze@tsmu.edu  Tamar_chikviladze@yahoo.com</p> <p>Dexketoprofen, the active enantiomer of the racemic compound ketoprofen, is a nonsteroidal antiinflammatory drug (NSAID) of the arylpropionate family. Dexketoprofen trometamol is the dextrorotary enantiomer of the NSAID ketoprofen formulated as a tromethamol salt [1]. Dexketoprofen trometamol appears as effective as the double dose of the racemic drug [2]. The formulation as tromethamine salt appears beneficial regarding fast onset of analgesia in acute pain conditions. Dexketoprofen or (S)-(+)-ketoprofen is several times more potent than its racemate, ketoprofen. The levorotatory isomer is 100 times less potent as a cyclooxygenase-2 inhibitor than dexketoprofen [3].</p> <p>Purpose of investigation was – comparison of in vitro outlet of 25 mg tablets of "Zum-25" containing, dexketoprofen trometamol produced by the Georgian pharmaceutical company "GMP" and its analogue "Dexalgin"(BERLIN-CHEMIE) using method of high-performance liquid chromatography [3.4].</p> <p>According to the received results average percent quantity outlet of "zum-25" is 99,0 %, "Dexalgin" – 95, 15%," Inclination in comparison with Oflohexal is +1,04 % , (norm ± 5 %). "Zum-25" 25 mg tablets containing dexketoprofen trometamol, produced by the Georgian pharmaceutical company "GMP" are characterized by good outlet quality.</p> <p><b>References:</b></p> <p>[1] Beltrán J<sup>1</sup>, Martín-Mola E, Figueroa M, Granados J, Sanmartí R, Artigas R, Torres F, Forns M, Mauleón D, Comparison of dexketoprofen trometamol and ketoprofen in the treatment of osteoarthritis of the knee. J Clin Pharmacol. 1998</p>

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15.	<p>Chikvatia L., Obgaidze G., Zaqradske D.</p> <p><b>•Modern Approaches in the Treatment of Patella-Femoral Joint</b></p> <p>TSMU, Department of Traumatology and Orthopedics lchikvatia@tsmu.edu</p> <p><b>Background:</b> The following report will be about peculiarities of the anatomy of Patellofemoral Joint, as well as anomalies, acquired and congenital pathologies. Most importantly, modern methods of diagnosis will be discussed that totally changed the concept of dealing with patellofemoral cases. The report includes conservative and operational methods of medical healing, which combines seven different techniques, including Arthroscopy and Open Method. The above-mentioned method is based on the most recent methodological and technological achievements in Traumatology and Orthopedics. Moreover, the report covers preventive measures of kneepan dislocation, which is quite common among adults.</p> <p><b>Purpose:</b> We aim to combine all the existing methods of healing Patellofemoral problems, discuss them, summarize, and customize with the situation in our hospitals and patients to maximize the effectiveness of treatment.</p> <p><b>Methods:</b> We are using standard X ray in minimum of 3 positions, CT scan and MRI, also ultrasound. Method of treatment is chosen in accordance to the patient’s existing problem.</p> <p><b>Results:</b> As a result, we present three different types of operations we use in our hospital. We use Arthroscopy and Open Method as the closed method is not always successful. The report also includes combined methods of operational treatment of patellofemoral joint.</p> <p><b>Conclusions:</b> For today, based on research and best practice, the MPFL through its quadriceps tendon plastics seems to be more appropriate. The correct diagnostics is essential in difficult cases in order to choose the correct method of treatment which will be the most effective for the patient. The second most important part of treatment is timely and relevant rehabilitation. Moreover, we recommend the specialist in rehabilitation to be involved in the multidisciplinary team together with</p>

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16.	<p>Chubinidze N., Abuladze N., Iavich P.</p> <p><b>•The Use of Some Plants and Mineral Resources of Georgia for Producing Cosmetic and Medicinal Remedies</b></p> <p>Akaki Tsereteli State University Natia.chubinidze@atsu.edu.ge</p> <p><i>Introduction.</i> The use of Georgia's rich natural resources for producing medicinal products is not new for the country. Its origins are said to be rooted in the founding of the I. Kutateladze Institute of Pharmacochemistry. Since the 1930s, different generations of researchers have contributed to this treasure.</p> <p>Since the beginning of the second decade of the 21st century, the pharmacist-researchers N. Abulade, M. Javakhia, K. Gabunia, and N. Alavidze have conducted research at Akaki Tsereteli State University on some of Georgia's plant and mineral raw materials/mineral waters with a view to developing first topical preparations for the treatment of mycoses, and currently, for developing the therapeutic-cosmetic remedies for treating acne (N. Chubinidze, I. Kikvidze, N. Abuladze, P. Iavich). In 2014, a grant was received from Shota Rustaveli National Science Foundation within the 2013 Fundamental Research Competition (Project Winner: FR/281/ 8-403/13) [1-4].</p> <p><i>The purpose of our research</i> is to develop therapeutic-cosmetic remedies for the prevention and treatment of external symptoms of Acne from Georgia's natural and other resources. Work began in the spring of 2017. To date, the therapeutic-preventive powder for treating has been developed.</p> <p><i>Research results.</i> Looking back at our work we have done to date, we should note that in the developed composition of powder there are used dry extracts of Chamomile and Calendula flowers, Eucalyptus essential oil, Grape-seed oil, Ascan bentonite etc. [5]</p> <p>Presentation on the progress of powder development during the research was made</p>

	<p>at the International Conference held by the Department of Cosmetology and Aromology at the National University of Pharmacy in Kharkov (Ukraine), within the framework of the plenary report [6].</p> <p><i>Conclusion.</i> For the first time, a new formula is proposed for acne treating powders containing both plant and mineral components of Georgian origin, determining both the structural features of powder and those features that are involved in certain processes that help to increase the pharmacological effect.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Abuladze N., Javakhia M., Gabunia K., Iavich P., Gabelashvili M.. Creation of Ointment Compositions Containing of Phenol Compounds for Medical Treatment. Georgian Medical News. N 10 (247):77-81.</li> <li>2. Чубинидзе Н.З., Твалиашвили Г.М, Абуладзе Н.Б., Явич П.А. Новый противогрибковый крем для местного применения и результаты его исследования. Юбилейная научно-практическая конференция по микологии и микробиологии. Москва. 11-12 Апреля 2018//Успехи медицинской микологии. Т. XVIII. С. 293.</li> <li>3. I.Kikvidze, N. Abuladze, P.Yavich. Mineralwaters. Their Use in Cosmetics and Cosmeceutics. Proceedings of „The 1<sup>st</sup> International Scientific-Practical Internet Conference MODERN PHARMACY: SCIENCE AND PRACTICE. KUTAISI 05.12-20.12 2017. 91-97.</li> <li>4. Abuladze Nino Bejhan, Chubinidze Natia Zauri, Iavich Pavel Abram. Developing the formula of a potential medicinal agent for treating candidiasis. Journal of Pharmacy Research. Vol. 12. Issue 6. 2018: 866-870.</li> <li>5. Chubinidze N., Abuladze N., Yavich P. Development of the Powder formulas for Acne Treatment. Georgian Medical News. N 5 (290). 2019. 140-144.</li> <li>6. Чубинидзе Н.З., Абуладзе Н.Б., Алавидзе Н.Дж., Явич П.А. Обработка рецептуры: пудра для лечения акне. ЗБІРНИК НАУКОВИХ ПРАЦЬ МІЖДИСЦИПЛІНАРНИЙ ПІДХІД В РІШЕННІ ЕСТЕТИЧНИХ ПРОБЛЕМ В ПРАКТИЦІ КОСМЕТОЛОГА 175-179.</li> </ol>
17.	<p>Chunikhina D., Bachelor of Natural science; Akhmetova S. B., PhD microbiology</p> <p><b>•Survival of <i>Bacillus Subtilis</i> Bacteria on Organic Carriers with Crude Oil Pollution <i>In Vitro</i></b></p> <p>Department of Immunology and Microbiology Karaganda Medical University</p> <p><b>Relevance</b></p>

Currently, the sustainable development of the economy of any country in the world, including Kazakhstan, depends on the resource and, above all, oil potential. Kazakhstan occupies a leading position in terms of oil among the CIS countries. One of the most pressing environmental challenges in the world is the fight against oil pollution and bottling. Oil spills spread out with thin films over the surface of the water, infiltrating huge areas of fertile soil, thereby preventing the normal functioning of ecological communities and poisoning and disabling huge areas of fertile land and water sources. [1]

Nowadays the most promising methods of bioremediation (restoration) of polluted environmental objects are using biological preparations based on microorganisms that can use organic pollutants, including oil, as a carbon source. Through a series of reactions catalyzed by enzymes, the by-products of organic pollutants are included in the main metabolism of microbial cells. [2]

The work of recent decades has shown that increasing the efficiency of biological products can be achieved through the use of cells of destructor microorganisms immobilized on various carriers. [3] Attaching cells to carriers provides a high concentration of microbial cells in their area of action, prevents their leaching, protects against the action of high concentrations of the toxic components of the crude oil, and creates an opportunity to increase the specific destructive activity of the microflora. To obtain preparations of immobilized biodestructors, various methods and carriers are used, among which the simplest and relatively cheap is the adsorption of microbial cells on various carriers that are insoluble in water. [4]

The **goal** of this work is to assess the ability to survive and change the morphological and cultural properties of bacteria of the species *Bacillus subtilis* in vitro with oil from the Tengiz oil and gas field.

To achieve the goal, the following **objectives** were set:

1. Assess the ability of *Bacillus subtilis* to survive in artificially contaminated mediums.
2. Assess whether the morphological and cultural features of the bacteria of the museum strain *Bacillus subtilis* are affected by oil pollution.
3. Study the growth dynamics of microorganisms under various conditions of cultivation.
4. Choose the optimal organic carriers for immobilized strains of possible biodestructors of oil and oil products.

**Materials:**

*Microorganisms.* In this work, the strain of *Bacillus subtilis* bacteria of the Department of Microbiology of the Karaganda Medical University has been used.

*Growth mediums.* The following mediums were used for the experiments:

- meat peptone agar
- meat peptone broth

*Chemical substances.* Tengiz oil is low-sulphurous, viscous, resinous, mild and paraffinic. Asphaltene-resin-paraffin deposits contain 6-10% paraffin, 10-16% tar, 52-55% asphaltenes and oils, mechanical impurities - 20-28%. Date of delivery of oil: 01/09/2018

### **Methods**

Determination of the number of microorganisms in liquid mediums contaminated with Tengiz oil. On meat-peptone agar and meat-peptone broth grown colonies has been counted daily during 14 days. The number of cells was expressed in the number of colony-forming units (CFU) or cells per gramm of air-dry sample.

Tengiz oil in an amount of 0.1% was used as the sole source of carbon and energy. 1 ml of inoculum (1 daily culture) in a standard concentration of  $1 \cdot 10^5$  CFU/ml of *Bacillus subtilis* bacteria was added to the bulbs with 9 ml of sterile medium and 1 mg of 0.1% oil, emulsified with Eagle medium containing the emulsifier TWIN-80.

Sawdust (GOST 18110-72), *Lemna minor* and *Najas guadelupensis* taken in RSE "National Center for Biotechnology" of the Science Committee of the Ministry of Education and Science of the Republic of Kazakhstan has been used as organic carriers. Incubation was carried out in a thermostat at  $t=+37^{\circ}\text{C}$  and by the method of deep cultivation at  $t=+20^{\circ}\text{C}$  on a magnetic stirrer MM-5 (200 rpm). The duration of the experiment is 14 days. Daily monitoring of the survival of bacteria and changes in their morphological and cultural features have been held using microbiological methods, in particular, immersion microscopy and gram-staining, methylene blue and Aueschka (Ozheshko). Daily replanting on a dense nutrient medium (meat-peptone agar) to assess the culture and growth features, as well as the number of microorganisms using a binocular microscope MBS-10, developing a curve to monitor the dynamics.

Qualitative changes were assessed by changing the color of the oil, the degree and nature of the destruction of the oil film and the turbidity of the medium. The growth rate was estimated on a five-point scale.

### **Results and discussions**

Studying the effect of crude oil pollution on the museum strain of *Bacillus subtilis*, have been identified that microorganisms show good growth properties on media with the addition of *Najas guadelupensis*, *Lemna minor* in comparison with the control.

According to the growth on dense nutrient mediums, the content of *Bacillus subtilis* bacteria in samples No.3 and No.4 is higher than in other samples and controls.

Mainly there were colonies from white to light yellow, shiny, smooth, raised, with a solid edge, 1-3 mm in diameter. As a result of Gram stain, it was found that bacteria acquired a sign of gramvariability depending on the composition of the medium and organic carriers. According to the results of the Aueshka staining, it is clear that the



	<p>bacteria's spore haven't been lost.</p> <p><b>Conclusions (conclusion)</b></p> <p>As a result of this work, it was found that the addition of algae (especially the <i>Najas guadelupensis</i>) represents the optimal conditions for the life of <i>Bacillus subtilis</i> as oil pollution destructive microorganisms.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Alimbetova A.V., Sadanov A.K. Growth characteristics of isolated microorganisms from their oil-contaminated soils at various concentrations of polycyclic aromatic hydrocarbons. X International Scientific and Practical Conference "Scientific Progress at the Turn of the Millennium - 2014". - Prague, 2014. - №6. - p. 35-39.</li> <li>2. Mikolasch A., Reinhard A., Alimbetova A7 et al. From oil spills to barley growth - oil-degradating bacteria isolated from contaminated soils. Journal of basic microbiology. -2016. - Vol.56 (11). - P. 1139-1315.</li> <li>3. Sing S. N., Kumari B., Mishra S. Microbial degradation of alkanes, In: Singh S. N. (Ed.). Microbial degradation of xenobiotics, environmental science and engineering. Springer-Verlag, Berlin Heidelberg, 2012. - P. 439-469.</li> <li>4. Al-Wasify, R. S., &amp; Hamed, S. R. (2014). Bacterial Biodegradation of Crude Oil Using Local Isolates. International journal of bacteriology, 2014, 863272. doi:10.1155/2014/863272 (Retraction published International Journal Of Bacteriology. Int J Bacteriol. 2016; 2016:6013871).</li> </ol>
18.	<p>Ebralidze L., Tsertsvadze A., Berashvili D., Bakuridze K.</p> <p><b>•Formulation of Biodegradable Polymeric Nanoparticles Containing Cytotoxic Substance of Plant Origin</b></p> <p>TSMU, Department of Pharmaceutical Technology, lamziraebiralidze@gmail.com</p> <p>The use of chemotherapeutics remains one of the main approaches to anti-tumor therapy. Most of the chemotherapeutic agents used in chemotherapy are water insoluble and therefore are not characterized by good distribution. In addition, anti-tumor drugs are characterized by toxic, adverse effects.</p> <p>Formulation of novel drug delivery system is one of the approaches for reduction of severe side effects of anti tumor drugs. This implies encapsulation of the API and deliver and release to the targeted area.</p> <p>Recently, polymeric NPs have gained significant research interest due to their unique properties, such as controlled release of the active substance, its protection from the protective mechanisms of the organism, and targeted delivery to the targeted site.</p> <p>Objective of the research was formulation of biodegradable polymeric nanoparticles</p>

	<p>composing cytotoxic substance of plant origin.</p> <p>Research materials: biodegradable polyesteramide (PEA), alkaloids from plants <i>Chelidonium majus</i>, surfactants (Tween 80, polyvinyl pirolidone, polyvinyl alcohol, Poloxamer 188).</p> <p>Influence of the various factors such as organic solvents, surfactants, as well as various parameters like a polymer concentration in the organic phase, surfactant concentration in the aqueous phase, the organic/water phase ratio, the rate of adding (dropping) of the organic phase to the water phase on the NPs fabrication was studied.</p> <p>Results: Based on the studies optimal composition and preparation conditions of PEA NPs was determined, increase concentration of the surfactant (polyvinyl alcohol) avoids agglomeration of the polymer. Increase concentration of the surfactant (polyvinyl alcohol) from 0.1 % to 0.5% decrease average particle size from <math>276.1 \pm 3.547</math> to <math>167.7 \pm 1.662</math> respectively. The NPs were characterized by size (Mean Particle Diameter, MPD) and size distribution (Polydispersity Index, PDI), and zeta-potential (ZP), which were assessed by dynamic light scattering (DLS) using a particle size analyzer (Zetasizer Nano ZS, Malvern Instruments, Malvern, UK) at 25 °C. PEA NPs was generated with sizes ranging 160 nm to 300 nm and low polydispersity.</p> <p>Direct method was used for determination of entrapment efficiency of active ingredient into the PEA NPs and it was obtained to be around 50%.</p> <p>API: Polymer ratio 1:20 increased %EE comparing to 1:10 (API: Polymer). In formulation with 0.5% surfactant %EE was higher in both cases API: Polymer ration is 1:10 and 1:20.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Werengowska-Ciećwierz K, Wiśniewski M, Terzyk AP, Furmaniak S. The chemistry of bioconjugation in nanoparticles-based drug delivery system. <i>Advances in Condensed Matter Physics</i>. 2015.</li> <li>2. Sah E, Sah H. Recent Trends in Preparation of Poly(lactide- co -glycolide) Nanoparticles by Mixing Polymeric Organic Solution with Antisolvent . <i>J Nanomater</i>. 2015;2015:1–22.</li> <li>3. Mallakpour S, Behranvand V. Polymeric nanoparticles: Recent development in synthesis and application. <i>Express Polym Lett</i>. 2016;10(11):895–913.</li> <li>4. Errico C, Bartoli C, Chiellini F, Chiellini E, Mahalingam M, Krishnamoorthy K, et al. Different techniques for preparation of polymeric nanoparticles. <i>Adv Pharm Bull</i>. 2015;5(1):57–67.</li> </ol>
19.	<p>Gabunia K. <sup>1</sup>, Jikia N.<sup>2</sup></p> <p><b>•Stevia: Some Issues of Application in Pharmaceutics</b></p>

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The number of carbohydrates in the human diet has increased over the last millennium, leading to the increase in the incidence of various chronic diseases.. In order to prevent disease and reduce carbohydrate consumption, the world's leading countries produce artificial sweeteners, which are mostly of synthetic origin. Scientific studies have shown that artificial sweeteners pose a threat to human health (1). This has resulted in great interest on the part of scientists in producing natural and less toxic compounds from plant raw materials.

One of these plants is stevia (*Stevia rebaudiana* belonging to the family Asteraceae), whose birthplace is north-west Paraguay, and today this plant is also growing in Europe and Asia (2). Interest in stevia has increased since the mid-20th century, when there has been a surge in the number of patients with diabetes and obesity. Unlike other medicinal plants, the advantage of stevia is linked to its ability to control the body mass and blood sugar level. Stevia is under studied plant, and it was introduced in Georgia in the 1980s, and it is growing in the subtropical zone.

Our goal was to gather and process information on scientific research on stevia, as well as to study and select standardization methods for its further use in pharmaceutical studies.

The antioxidant activity of stevia aqueous extract was studied by Il-Suk Kim et al., and physical-chemical properties of stevia leaf were studied by Roberto Lemus-Mondaca and others (3,). The dose-dependent hyperglycemic activity of stevia extract was determined through in vitro testing on rats by Keri Lestari et al. (4). In Georgia, stevia is being studied as a biologically active supplement.

We got interested in stevia and started research. It turned out that stevia is also growing in Orpiri Village (Tkibuli district). Studies have shown that this plant is rich in primary and secondary biosynthesis compounds that results in great interest in it. We have chosen the method of phytochemical analysis of stevia, which will be used in further research. Based on data from literature, we believe that studies of *Stevia rebaudiana* are necessary for its further use in the pharmaceutical industry.

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	<p>comprehensive review on the biochemical, nutritional and functional aspects. Food Chemistry 132 (2012) 1121–1132</p> <p>3. Il-Suk Kim, Mira Yang, Ok-Hwan Lee ,Suk-Nam Kang. The antioxidant activity and the bioactive compound content of Stevia rebaudiana water extracts. LWT - Food Science and Technology 44 (2011) 1328e1332</p> <p>4. Keri Lestari, Abdurahman Ridho, Nuning Nurcayani , Zelika Mega Ramadhania , Melisa Intan Barliana. Stevia rebaudiana Bertoni Leaves Extract as a Nutraceutical with Hypoglycemic Activity in Diabetic Rats. The Indonesian Biomedical Journal, Vol.11, No.2, August 2019, p.182-7.</p>
20.	<p>Gaprindashvili A., Mikaia G., Antelava N., Gotsiridze R., Okujava M.</p> <p><b>•Study of clays spread in Adjara region for their medicinal usage</b></p> <p>Tbilisi State Medical University ana.gaprindashvili@hotmail.com</p> <p>In our century, dramatically increases treatment and cosmetics nomenclature, which is related to huge consumption of the raw materials. The report of the Environment Protection World Foundation as of 2006 says that in 50s of 21st century the amount of the natural resources consumed by the population of the planet will increase twice compared to the reproduction capability of the planet earth. Among the resources presented on the planet earth, no one has such wide, significant and versatile use as clays. They are extensively used in medicine and cosmetology, in native as well as processed form, in particular: in balneology and resort therapy for the treatment of rheumatics and musculoskeletal system, gastrointestinal tract, various skin diseases, and besides, it is rather significant to use the clays as the auxiliary substance in formation of soft and solid medicines.</p> <p>From the point of view of the clay distribution, Adjara is one of rich region, where the clay deposits are encountered at the seaside as well as in highlands. This mineral resource has been known to the local population from ancient times and therefore being used for treatment of musculoskeletal system diseases, as well as in rehabilitation and restorative treatment process. At the same time, some of the clays have been used for therapy of wounds and skin diseases. Even today local population and tourists arbitrarily use the clay, despite that their chemical composition and therapeutic effect have not been studied yet and are still on the traditional medicine level. The purpose of usage clays as acting and auxiliary substances is preconditioned by the following: composition complexity, natural characteristics, wide spectrum of action, administration routes, availability.</p> <p>We investigated the clays, spread in Adjara, verification the opportunity of their usage</p>

	<p>as auxiliary substance in soft medicines, elaboration the anti-burn and anti-inflammatory gel on its bases. Was investigated some of clays spread in Adjara: Beshumi, Keda, Chirukhi, their physical and technological characteristics: fractional contents, bulk, real and relative densities, flowability, angle of repose, moisture content, pH, plasticity, greasiness, swelling properties and amphiphilic nature. High content of the essential macro and microelements (magnesium, potassium, calcium, aluminum, silicium, sulphur, ferrum) were established in Beshumi and Chirukhi clays. As the result of petrographic study and X-ray diffraction analysis, it was found out that Ca-montmorillonite is encountered in the tested clays, which assign them to the bentonite clays group. On the basis of biopharmaceutical researches, it was proposed the composition of Beshumi clay combined gel. According to the quality specifications: homogeneity, water extract pH, colloidal, thermal stabilities, and viscosity, Beshumi clay combined gel satisfy the state Pharmacopeia requirements on the soft drug formulations. As the result of the fulfilled research experiments, it was established that Beshumi clay possess antibacterial action towards the <i>Escherichia coli</i> and <i>staphylococcus aureus</i>. According to the pharmacological studies it has been demonstrated that Beshumi clay combined gel possess anti-burn and wound healing action.</p>
21.	<p>Getia M., Korinteli T., Vachnadze N.</p> <p><b>•Study of Alkaloids of <i>Senecio Vernalis</i> Grown in Georgia</b></p> <p>TSMU Iovel Kutateladze Institute of Pharmacochimistry m.getia@tsmu.edu</p> <p>Genus <i>Senecio</i> L. includes several species, among of them 23 members are grown in Georgia.</p> <p>The species of gen. <i>Senecio</i> L. are used for the treatment of respiratory and urinary tract disease, coughing, diarrhea and cholecystitis.</p> <p><i>Senecio vernalis</i> Waldst. Et Kit. Is wide spread in Georgian flora and contains biologically active alkaloids. In homeopathy <i>S. vernalis</i> is used against of bleeding. The roots of the plant is used in cosmetology /1-9/.</p> <p>Total alkaloids were obtained by extraction of powdered plant material with H<sub>2</sub>SO<sub>4</sub> under continuous stirring, after centrifugation the supernatant was alkalized with NH<sub>4</sub>OH.</p> <p>Method of Gas chromatography (Agilent 7890B, mass spectrometer 5977 AMS, column: HP-5ms Ullra Inetret 30m x 250um x 0,255 um) was used for qualitative and quantitative definition of the following alkaloids: seneciphylline, senecionine, triangularine and platyphylline.</p>

	<p>Finally, major alkaloids were identified in the upperground part of <i>Senecio vernalis</i>; also it was developed optimal conditions for separation of alkaloids.</p> <p>Researches are ongoing for determination the chemical constituent and biological activity of <i>Senecio vernalis</i> Waldst. Et Kit. grown in Georgia.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Gagnidze R. Vascular plants of Georgia, a nomenclatural checking. Tbilisi; 2005. 247 pp.</li> <li>2. Dreger, M.; Stanisławska, M.; Krajewska-Patan, A.; Mielcarek, S.; Mikołajczak, P.Ł.; Buchwald, W. Pyrrolizidine alkaloids. Chemistry, biosynthesis, pathway, toxicity, safety and perspectives of medicinal usage. <i>Herba Pol.</i> 2009, 55, 127–147.</li> <li>3. Hartmann, T.; Witte, L. Chemistry, biology and chemoecology of the pyrrolizidine alkaloids. In <i>Alkaloids: Chemical and Biological Perspectives</i>; Pelletier, S.W., Ed.; Pergamon: Oxford, UK, 1995; Volume 9, pp. 155–233. ISBN 978-0-08-042089-9.</li> <li>4. Wiedenfeld, H.; Edgar, J. Toxicity of pyrrolizidine alkaloids to humans and ruminants. <i>Phytochem. Rev.</i> 2011, 10, 137–151.</li> <li>5. <i>Senecio vulgaris</i> L. <i>Can. J. Plant Sci.</i> 2003, 83, 629–644.</li> <li>6. Wiedenfeld, H. Plants containing pyrrolizidine alkaloids. Toxicity and problems. <i>Food Addit. Contam. Part A</i> 2011, 28, 282–292.</li> <li>7. Stegelmeier, B.L. Pyrrolizidine alkaloid-containing toxic plants (<i>Senecio</i>, <i>Crotalaria</i>, <i>Cynoglossum</i>, <i>Amsinckia</i>, <i>Heliotropium</i>, and <i>Echium</i> spp.). <i>Vet. Clin. N. Am. Food Anim. Pract.</i> 2011, 27, 419–428.</li> <li>8. Chen, P.; Wang, Y.; Chen, L.; Jiang, W.; Niu, Y.; Shao, Q.; Gao, L.; Zhao, Q.; Yan, L.; Wang, S. Comparison of the anti-inflammatory active constituents and hepatotoxic pyrrolizidine alkaloids in two <i>Senecio</i> plants and their preparations by LC-UV and LC-MS. <i>J. Pharm. Biomed. Anal.</i> 2015, 115, 260–271.</li> <li>9. El-Shazly, A. Pyrrolizidine alkaloid profiles of some <i>Senecio</i> species from Egypt. <i>Z. Naturforsch. C</i> 2002, 57, 429–433.</li> </ol>
22.	<p>Ghvineria I., Javakhadze R., Zhuruli M., Oniani T., Ghvaberidze O.</p> <p><b>•Risk of Effects of Pesticides on the Human Health</b></p> <p>N. Makhviladze Scientific Research Institute of Labor Medicine and Ecology ingagvineria@yahoo.com</p> <p>In the structure of chemical pollutants in the environment, which can adversely affect the health of the population, pesticides have a special place. This is due to their resilience to environmental objects (soil, water, air), their biological activity, ability to migrate, and circulation in natural biocenosis.</p>

	<p>In Georgia, as an agrarian country, a leading position has place various groups of pesticide, combined preparations or chemical mixtures in the integrated plant protection system.</p> <p>This paper aims to establishing the categories of actively used pesticides in the, Kvemo Kartli region, ensuring their compliance with the State Registration data, analyzing statistical data on the spread of diseases (Marneuli, Bolnisi 2015) that may be related to the harmful effects of pesticides in order to assess the possible risk of pesticide exposure to the human health.</p> <p>According to the study, 21 types of pesticide preparations of different categories were mainly used (fungicides, insecticides, herbicides, rodenticides, etc.) in the study area. Among them 13 preparations were used in greenhouses. The preparations are all registered and included in the Pesticide Catalogue. Information on individual pesticide hazards is provided on the label, although users of the study area find it difficult to read and understand the information because the population is of mixed type and not everyone knows the Georgian language, or information is incomplete, or the label is lost. Particularly noteworthy is the risk of using pesticides in greenhouses. The analysis of morbidity statistics revealed a number of diseases - tumors, disease of the blood and blood-forming organ, digestive systems, respiratory organs, traumas and poisonings, pregnancy, childbirth, after birth pathology, as well as increase in the incidence of complications and diseases (per 100,000 population) in the perinatal period in Marneuli Region. At the same time, there was a higher number of congenital anomalies in Bolnisi than in Marneuli.</p> <p>These changes must be driven by the extensive use of pesticides of different chemical groups. Based on the data obtained, it is necessary to carry out public education activities to raise awareness of pesticides and pesticide use in a clear, popular language.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. I.Gvineria, V. Saakadze, M. Juruli, R. Javakhadze, M. Tsereteli, T. Oniani, G. Katsitadze TOXICITY AND SAFE USE OF PESTICIDES, Tbilisi 2012;</li> <li>2. И. Гвинерия, В. Саакадзе, М. Журули, И. Шавладзе, И. Хатиашвили К вопросу прогизирования вредного профессионального воздействия пестицидов. 1 ый съезд токсикологов России. Тезисы докладов 1998 г. ст. 135.</li> <li>3. Г. Кацитадзе, И. Гвинерия К вопросу токсичностей пестицидов при комбинированном воздействии. 1 ый съезд токсикологов России. Тезисы докладов 1998 г. ст. 145.</li> </ol>
23.	<p>Giorgobiani M., Chkhaidze N., Chigogidze N., Zurashvili B.</p> <p><b>«Ecotoxicology of Pesticides, Used to Fight Brown Marmorated Stink Bug and the Peculiarities of Their Action on Human Body</b></p>

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A world-approved mechanical method to bait the trap and chemical agents, in particular bifenthrin (from Pyrethroid chemical compound group) containing pesticides are used to fight brown marmorated stink bug in Georgia. Bifenthrin is a wide spectre insecticide and a member of the pyrethroid family of chemicals. Bifenthrin interferes with the nervous system of insects when they eat or touch it, disrupt permeability of neurons, as a result the insect gets paralyzed and dies.

**Aim of the work** is to study possible harmful impact on the employees' health condition, who work on the chemicals action area and prevention from acute and chronic chemical intoxication.

**Survey Methodology:** National Food Agency established special division to conduct measures against brown marmorated stink bug. Descriptive epidemiological survey, within the face-to-face interviewing method, was made among employees, who are working on spraying pesticides. According to the respondent's experience, they were divided as groups. The largest group is with two-month experience employees (55,3%). As the division is newly established and bigger part of staff is newly recruited. Working conditions of the employees were reviewed. 41.5% of respondents mention, that they have to work shifts, 14.9% works night shifts and 29.8% says, that their working hours are not rationed.

**Results of the survey:** It has to be mentioned, that 100% of respondents positively assess work organisation and are satisfied with working conditions. Those who need personal protection equipment are equipped and can use them if needed. Moreover, 100% of respondents certifies that controls over the usage of personal protection equipment are performed and they were instructed on the labor safety issues. 92% of respondents have direct contact with pesticides, such as: zonder, bifenthrin, Soki, Decisi, Insekari, alpaki, karate etc. Although, only 56.4% feel its effect. 80.4% of respondents notes that they feel the smell of pesticides, 0.5% feels pesticides by taste and skin, while 8% do not feel pesticides at all. 2.7% of surveyed note changes in their health condition. Particularly: headache (1.6%), Sensation of burning and itching in the eyes (1,1%), skin burning sensation, nausea, respiratory failure, lethargy, dizziness (0.5 – 0.5 %). It is possible, that in the both cases pesticides provoked main diseases, hence the changes in health condition were mentioned. Hereby, based on our research, it was determined that insecticides, used to fight against brown marmorated stink bug have not had an impact on the employees health condition and no pesticide infection was recorded



24.	<p>Gogitidze N., Mushkiashvili N.</p> <p><b>•Stimulators of Leucopoiesis from <i>Astragalus Borissovae</i></b></p> <p>Tbilisi State Medical University I.Kutateladze Institute of Pharmacochimistry n.gogitidze@tsmu.edu</p> <p>Introduction: Flavonoids, polysaccharides, and cycloartanes are usually considered as lead constituents, responsible for the therapeutic applications of herbal preparations from different <i>Astragalus</i> (Milk vetch) species used for the treatment of hypertension, chronic renal failure, pyelonephritis and related renal diseases. On the other hand, above-mentioned constituents of <i>Astragalus</i> are named among compounds that are used in China and the USA in adjunctive cancer therapy to restore chemotherapy-suppressed immune system [1, 2]. Due to previously mentioned we attempted to study the stimulatory effect of crude lipid-free extract, as well as polysaccharides and cycloartanes fractions of aerial parts of <i>Astragalus borissovae</i> in rodents with drug-induced leucopenia.</p> <p>Method: Stimulation of leucopoiesis was studied in a model of cytostatic drug cyclophosphamide-induced leukopenia in mice. In brief, 24 h after injection of cyclophosphamide (350 mg/kg i.p.) aqueous solutions of test compounds (each 20 mg/kg, i.p.) were administered 5 times (1 injection every 24 h). On day 6 of the experiment, total WBC was counted and compared with WBS in untreated animals. The effect was assessed by increase (in %) vs control [3].</p> <p>Results: Each of tested compounds revealed the ability to elevate total WBC. In particular, the specific activity was increasing in the following direction: polysaccharides (120%), cycloartanes (140%) and crude extract (180%).</p> <p>Conclusion: Due to the fact, that crude extract exhibited more pronounced leucopoiesis stimulating effect than the polysaccharides and cycloartanes fractions separately, further investigation of chemical constituents of <i>A.borissovae</i> is needed to identify individual compounds, responsible for the observed activity. Our results allow making preliminary suggestion, that it is likelihood to find such compounds rather among cycloartanes than polysaccharides.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Phytother Res. 2014; 28(9):1275-1283</li> <li>2. Cancer Chemother Pharmacol. 2009; 65(1):67-71</li> <li>3. BMC Infectious Diseases 2006; 6:55.</li> </ol>
25.	<p>Gorgaslidze N., Nadirashvili L., Erkomaishvili G., Korinteli T.</p> <p><b>•Comparative Analysis of Protein Determination Methods in Bromelain</b></p>

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Bromelain is an enzyme extract derived from the stem of pineapples (*Ananas comosus* (L.)Merr.). Due to the wide range of its biological activity, bromelain is considered one of the most interesting enzymes (1). We studied the physical-chemical properties of "stem Bromelain" (2) and then continued our research for obtaining the maximal quantity of the protein.

For getting the protein fraction from bromelain we used a protein precipitation method by alcohol, and the yield was 55-60%.

From many analysis methods, for determination of protein concentration in bromelain, we have chosen 2: The Bradford method for protein quantitation (3), where determination of protein concentration is made with the help of the Bradford reagent, and the method Extinction coefficient for determining the concentration of a protein (4). Determination of protein percent in bromelain is done by the Extinction coefficient  $\epsilon^{1\%}_{1\text{cm},280\text{nm}}=20.1$ , according to this, OD at 280nm is 20.1. According to this the protein's percent is calculated (see table, below).

Sample	Protein concentration determined by Bradford method (%)	Protein concentration determined by Extinction coefficient method (%)
The stem bromelain raw material	62-64	54-55
The fraction precipitated by alcohol	73-75	74-75

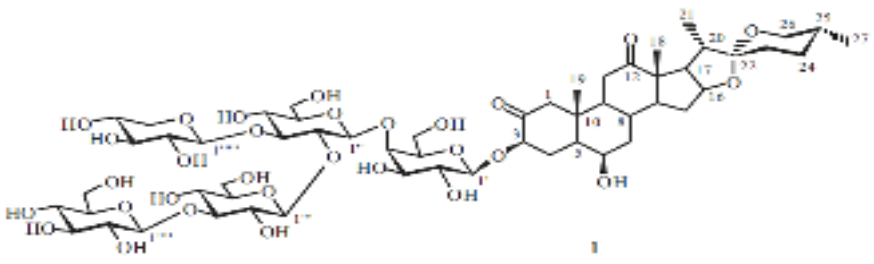
The results show that the concentration of bromelain raw material determined by Bradford method was 62-64%, the concentration of the precipitated fraction by alcohol determined by Bradford method was 73-75%, the concentration of bromelain raw material determined by Extinction coefficient method was 54-55%, and the concentration of the precipitated fraction by alcohol determined by Extinction coefficient method was 74-75%. According to both of methods, it is obvious that the protein content after the precipitated by alcohol was increased at about 20%.

Both of methods are reproducible, and it is possible to use them bromelain analysis.

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26.	<p>Gorgiladze L., Mepharishvili G., Koiava L., Jabnidze N., Dumbadze R.</p> <p><b>•Monitoring and Diagnostics of Kiwi Diseases in Subtropical Zone of Georgia</b></p> <p>Batumi Shota Rustaveli State University lgorgiladze@mail.ru</p> <p>Actinidia (kiwi), as a fruit crop for industrial, medicinal or preventive usage, has gained widespread and consumption in the world of fruit farming because of its good taste, high yield, and abundant content of biologically active substances. Actinidia is well-known to Georgian society as well. Its industrial gardens are widely distributed in Adjara, Guria and Samegrelo, as well as in relatively warm and humid Kolkheti lowlands.</p> <p>Due to the high demand for kiwi products on the world market, it is also possible to establish a civilized kiwi market in Georgia and to hold firm positions in this market. However, as in other countries, one of the main obstacles to the production of kiwi is pests. In recent years, farmers' demand for kiwi health has been increasing.</p> <p>Many microorganisms cause diseases of almost all organs of the plant (1,2,3). The main purpose of our study was to identify and diagnose the spectrum of Actinidia diseases in regions of western Georgia by monitoring them and to determine their status.</p> <p>In 2010-2018 Kiwi plantations were systematically monitored in the territories of Adjara, Guria and Samegrelo, and pathogenic microorganisms isolated from diseased samples in pure culture were identified. Microbiological and modern molecular methods were used to study the symptoms of the disease.</p> <p>As a result of monitoring in 2010-2018, fungal microorganisms of different genera were identified and isolated in a pure culture at different phases of plant development that cause various diseases: the verticillium wilt – <i>Verticillium sp</i>, the root rot – <i>Pythium sp</i>, the various spots of leaves – <i>Fusiccocum sp</i>, <i>Nigrospora sp.</i>, <i>Botrytis cinerea</i>, <i>Alternariaalternata</i>, <i>Pestalotiasp</i>, the anthracnose – <i>Colletotrichum sp.</i>, <i>Cercospora</i> leaf spot – <i>Cercospora</i>, the septorios – <i>Septoria sp.</i>, the phyllosticta</p>

	<p>leaf spot - <i>Phyllosticta</i>, the fruit rot –<i>Phomopsis spp</i>, <i>Alternaria alternata</i>, <i>Phoma sp.</i> <i>Pseudomonas syringaepv.Actinidiae</i> causative agent of bacterial cancer was isolated and identified. It has been included in the list of Georgian Quarantine Organisms since 2014 as an unregistered disease in the country.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. V. Goliadze, Z. Gabrichidze, B. Tutberidze, Ts, Kashakashvili, E., Jakeli, A., Nikolaishvili, I. Mamulashvili, T. Trapaidze. 1993. Biology and Agrotechnology of Chinese Actinidia (Kiwi). pp 84</li> <li>2. G.Meparishvili,L.Gorgiladze,Z.Sikharulidze,M.Muradashvili,L. Koiava,R.Dumbadze, andN.Jabnidze. „FirstReportofBacterial CankerofKiwifruitCausedbyPseudomonas syringaepv. actinidiaeinGeorgia“ .apsjournals.apsnet.org 2016,http://dx.doi.org/10.1094/PDIS-07-15-0759- PDN</li> <li>3. Михайлова, Е.И, Гультяева, И.М. Кокорина // Микология и фитопатология. - 2002. - Т.36.-Вып Л.- С. 63-67.</li> </ol>
27.	<p>Gvazava L., Skhirtladze A.</p> <p><b>•New Steroidal Glycoside from <i>Allium Porrum</i></b></p> <p>TSMU, I. Kutateladze Institute of Pharmacochemistry l.gvazava@tsmu.edu</p> <p>Previously, a new steroidal glycoside derived from 12-ketoporrigenin was detected in the BuOH fraction of the MeOH extract of <i>Allium porrum</i> [1]. Herein, the structure of another new steroidal glycoside <b>1</b>, a derivative of 2,12-diketoporrigenin, was elucidated using spectral data and chemical transformations.</p>  <p>Compound <b>1</b> gave a positive Sannie color reaction and an IR absorption band characteristic of a spiroketal group that indicated it was a 25<i>R</i>-spirostane. Acid hydrolysis of <b>1</b> produced aglycon <b>2</b> that was identified by physicochemical constants and spectral data as (25<i>R</i>)-5α-spirostane-3β,6β -diol-2,12-dione, which is known as porrigenin C [2]. GC analysis [3] of the sugars in the carbohydrate part showed that they included galactose, glucose, and xylose in a 1:3:1 ratio. The FAB mass spectrum of saponin <b>1</b> showed key peaks at relative mass <i>m/z</i> 1263 [M + Na]<sup>+</sup>,</p>

1131 [M + Na – pentose]<sup>+</sup>, 1101 [M + Na – hexose]<sup>+</sup>, 939 [M + Na – (hexose) × 2]<sup>+</sup>, 645 [M + Na – (hexose) × 3 – pentose]<sup>+</sup>, 483 [M + Na – (hexose) × 4 – pentose]<sup>+</sup>.

Hakomori methylation of **1** [4] produced its permethylated product. The completeness of the methylation was monitored using the disappearance of O–H IR absorption bands and the presence of a peak for the molecular ion [M + Na]<sup>+</sup> with *m/z* 1487 in the FAB mass spectrum.

Methanolysis of the permethylate produced the 6-*O*-methyl ether of (25*R*)-5-spirostane-3β, 6β-diol-2,12-dione [δ 3.67 (3H, s, 6-*O*-Me) in the PMR spectrum] and total methylated sugars. GC identified 2,3,4,6-tetra-*O*-methyl-D-glucopyranose (terminal), 2,3,4-tri-*O*-methyl-D-xylopyranose (terminal), 2,4,6-tri-*O*-methyl-D-glucopyranose (C-3 substituted), 4,6-di-*O*-methyl-D-glucopyranose (C-2 and C-3 disubstituted, branching center of the sugar chain), and 2,3,6-tri-*O*-methyl-D-galactopyranose (C-4 substituted).

FAB mass spectrometric and GC data were confirmed unambiguously by PMR and <sup>13</sup>C NMR spectra taken using the standard instrument methods (2D homo- and heteronuclear resonance and with a nuclear Overhauser effect, COSY, HOHAHA, HMQC, HMBC).

Thus, proton resonances of five sugars could be positively identified by interpreting the HOHAHA and HMQC spectra. These were three glucoses, xylose, and galactose. The SSCC of the anomeric protons of all sugars fell in the range 7.6–8.2 Hz. Therefore, all sugars had glycoside bonds with the β-configuration and adopted the pyranose form [5]. This was consistent with the lack of resonances in the range δ = 82–89, except for C-3'' (86.8) and C-3''' (δ 87.3), which experienced strong positive *α*-effects of glycosylation.

The HMBC spectrum showed cross peaks for long-range correlations that indicated the binding sites of the sugars to each other and to the aglycon between H-1' (δ 4.84) Gal and C-3 (δ 79.7) aglycon; H-1'' (δ 5.09) Glc and C-4' (δ 79.8) Gal; H-1''' (δ 5.44) Glc and C-2'' (δ 81.5) Glc; H-1'''' (δ 5.04) Glc and C-3''' (δ 87.3) Glc; and H-1''''' (δ 5.02) Xyl and C-3'' (δ 86.8) Glc.

Thus, glycoside **1** was (25*R*)-5α-spirostane-3β,6β-diol-2,12-dione 3-*O*-{β-D-glucopyranosyl-(1'→3)-β-D-glucopyranosyl - (1→2)-[β-D-xylopyranosyl-(1→3)]-β-D-glucopyranosyl-(1→4)-β-D galactopyranoside}.

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28.	<p>Jakeli E., Varshanidze N., Zarnadze N., Turmanidze N.</p> <p><b>Plants of Ajarian Flora Containing Essential Oils Used in Ethnomedicine To Treat Chronic Diseases</b></p> <p>Batumi Shota Rustaveli State University jakelieteri@gmail.com</p> <p><b>Introduction and purpose of the study:</b> For the treatment of chronic diseases, people often give priority to the use of medicinal plants, which have no side effects and are cheaper. Moreover, Adjara is characterized by a wide variety of medicinal herbs, and the population retains a wide experience of traditional medicine. The purpose of this study was to determine the biological diversity of plants containing essential oils used in the treatment of chronic diseases, and to study their use in folk medicine.</p> <p><b>Methodology:</b> the method of the research was traditional route expedition, also poll of local inhabitants was conducted. Study and determination of the plants was made with the help of identification guide of the plants of Georgia and “Georgian Flora”. The taxa are indicated according to Cherepanov.</p> <p><b>Results:</b> plants of Ajarian flora containing essential oils used in folk medicine to treat chronic diseases are: against chronic colitis: <i>Matricaria recutita</i> L.; <i>Mentha longifolia</i> (L.) Huds.; <i>Valleriana eriophylla</i>; <i>Carum carvi</i> L.; To cure chronic gastritis: <i>Mentha longifolia</i> (L.) Huds.; <i>Valleriana eriophylla</i>.; <i>Salvia glutinosa</i> L.; <i>Matricaria recutita</i> L., <i>Hypericum perforatum</i> L.; To treat acute and chronic kidney inflammation: <i>Origanum vulgare</i> L.; <i>Matricaria recutita</i> L.; <i>Hypericum .perforatum</i> L; <i>Orthosyphon stamineus</i> Benth.; For the treatment of chronic bronchitis: <i>Tussilago farfara</i> L.; For the treatment of chronic respiratory diseases: <i>Hedera colchica</i> (C. Koch.) C. Koch.; <i>H. helix</i> L.; <i>Matricaria chamomilla</i> var. <i>Recuitita</i>; <i>Althaeae officinalis</i> L.; For the treatment of chronic diseases of the gall, gall bladder and bile ducts: <i>Helichrisum graveolens</i> (Bieb.) Sweet. For the treatment of chronic enterocolitis: <i>Centaurium erythraea</i> Rafn.; For the treatment of chronic tonsillitis and gingivitis: <i>Origanum vulgare</i> L.; For the treatment of chronic cholecystitis: <i>Orthosyphon stamineus</i> Benth .; For the treatment of chronic diarrhea: <i>Primula sibthorpii</i> Hoffm. ; For the treatment of chronic enteritis: <i>Vaccinium myrtillus</i> L.</p> <p><b>Conclusion:</b> - plants of Ajarian flora containing essential oils used in folk medicine to treat chronic diseases are: <i>Carum carvi</i>; <i>Hedera colchica</i>; <i>Hedera helix</i>; <i>Matricaria chamomilla</i>; <i>Tussilago farfara</i>; <i>Helichrisum graveolens</i>; <i>Centaurium erythraea</i>; <i>Hypericum .perforatum</i>; <i>Mentha longifolia</i>; <i>Origanum vulgare</i>; <i>Orthosyphon</i></p>

	<p><i>stamineus; Althaea officinalis; Primula sibthorpii; Salvia glutinosa; Valleriana eriophylla; Vaccinium myrtillis;</i></p> <p>- Plants with essential oils used to treat chronic diseases are characterized by biodiversity and include 10 families, 15 genera and 16 species.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Eteri Jakeli, Natela Varshanidze, Inga Diasamidze, Ketevan Dolidze and Nana Zarnadze. Biodiversity of medicinal plants of wild flora in Ajara – South Colchis and their usage in folk medicine. Proceeding (editor: NWSA Academic Journals) 3<sup>rd</sup> International Science Symposium, Pristine, Kosovo, 2018,2, pp. 80-96</li> <li>2. Eteri Jakeli, Natela Varshanidze, Nana Zarnadze, Inga Diasamidze and Ketevan Dolidze. Medical Plants From the Flora of Ajara (South Colchis) Used Against Certain Chronic Diseases, Proceeding book. International Health Sciences Conference (IHSC), Diyarbakir, Turkey, 2018, pp. 352-357.</li> <li>3 N. Varshanidze, N.Turmanidze, K. Dolidze, N. Zarnadze, I. Diasamidze, T.Epitashvili, T.Katcharava. Biodiversity of Medicinal Plants Containing Essential Oil and Their Spreading in Adjara. Universal Journal of Agricultural Research, 2018, 6(3): pp. 99-104</li> <li>4. Dmitrieva A. Identify the plant of Adjara, Tbilisi, 1990, Vol. I,II.</li> </ol>
29.	<p>Javakhadze R., Kverenchkhiladze R., Tsimakuridze M., Khatiashvili N., Rukhadze N.</p> <p><b>•Use of Natural Balneo-Climatic Factors of Georgia in Occupational Medicine</b></p> <p>N. Makhviladze Research/Scientific Institute of Labor Medicine and Ecology TSMU, Department of Environmental Health and Occupational Medicine rusudanileo@yahoo.com</p> <p>Georgia is one of the richest countries with its balneo-climate resorts, the climate of which is characterized by favorable effects on the human body [2,3,4]. The use of these factors in occupational medicine has a positive influence [1,5].</p> <p>The purpose of this study is to evaluate the effects of using natural-climatic factors in the treatment, prevention and rehabilitation of various occupational and occupationally probable diseases.</p> <p>The results of the medical care of persons with occupational and occupationally probable diseases are analyzed on the basis of the Institute of Labor Medicine and Ecology.</p> <p>Many years of research have confirmed the positive impact of Georgia's climate factors on the treatment of a number of somatic, occupational and occupationally probable diseases. Speleotherapy is effective in chronic diseases of the cardiovascular and respiratory systems.</p> <p>Various procedures (balneal, physiotherapeutic, manual, acupuncture, massage) have</p>

	<p>been used successfully, especially in vibration diseases, vegetative-sensory polyneuropathy, functional and organic disorders of musculoskeletal system. The effect of treatment is increased by the inclusion of various measures such as: vitamin therapy, vasoactive drugs and balanced nutrition.</p> <p>The inclusion of climatic and balneological procedures in the scheme of preventive measures is a prerequisite for the creation of a robust system for the treatment, prevention and rehabilitation of occupational disease, with a particularly important end-effect to optimize the process of occupational rehabilitation of the employed person.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Javakhadze R., Kverenchkhiladze R., Tsimakuridze M. Prospects for the utilization of Georgia's natural-climatic conditions in the treatment and prevention of occupational diseases. / Collection of International Conferences - Scientific Works. Tbilisi: 2010.</li> <li>2. <a href="http://hotellafer.ru/balneotherapy/">http://hotellafer.ru/balneotherapy/</a>.</li> <li>3. <a href="http://sokolkamen.ru/heal/list/3.html">http://sokolkamen.ru/heal/list/3.html</a>.</li> <li>4. <a href="http://tskaltuboresort.ge/rus/static/61/mkurnaloba">http://tskaltuboresort.ge/rus/static/61/mkurnaloba</a>.</li> <li>5. Saakadze V. Occupational diseases. Tbilisi, 2000, 806 p.</li> </ol>
30.	<p>Jinikashvili I. <sup>1</sup>, Tsitsagi M. <sup>2</sup>, Lekishvili G. <sup>1</sup>, Arziani B. <sup>1</sup></p> <p><b>•Synthesis of Hesperidin Semi-Derivatives</b></p> <p><sup>1</sup>TSMU, Faculty of Pharmacy, Department of Medical Chemistry  <sup>2</sup>Petre Melikishvili Institute of Physical and Organic Chemistry of Iv. Javakhishvili Tbilisi State University  i.jinikashvili@tsmu.edu</p> <p>The skin of the citrus is a prospective source of ether oils, carotins, pectins and natural flavonoids, in particular hesperidin. Hesperidin content in the skin of the mandarin, depending on its species and ripeness varies in the range of 1,2-2,6%. It should be noted that hesperidin extraction from the raw materials is a significant obstacle, due to which this material is limitedly used. For processing of mandarin skin we have selected the methods of separation by supercritical fluids and sequential-batch extraction.</p> <p>Hesperidin is a wide-spread and cheap bio-flavonoid that has pharmacological properties, in particular, antioxidant, anti-inflammatory, hypolipidemic, vasoprotective, anticarcinogenic and cholesterol-reducing activities [1, 2]. However, despite this fact, hesperidin as a source of medications is still limitedly used. One of the reasons is poor solubility of hesperidin in water. Thus, it is important to generate</p>



	<p>water-soluble derivatives. It should be also noted the substantial role of biogenic amines, aminoacids in vital activity of plant and animal bodies. Increase in solubility through aminoacid fragment introduction into hesperidin molecule is an innovative approach to this problem solution.</p> <p>From this viewpoint, we have deemed topical the synthesis of new hesperidin derivatives [3]. Corresponding N-substituted imines were obtained from different aminoacids through hesperidin condensation, while corresponding hydrazones – through carbonyl group substitution by hydrazines.</p> <p>Carbonyl group is the most convenient from the viewpoint of chemical transformation, and its functionalization with aminogroup-containing compounds, in particular, aminoacids, made more probable formation of new complex of properties that is of crucial importance, first of all, from the standpoint of creation of effective health aids.</p> <p><b>References:</b></p> <p>[1] N. Lahmer, N. Belboukhari, A. Cheriti and K. Sekkoum. Hesperidin and hesperitin preparation and purification from Citrus sinensis peels. Der Pharma Chemica, 2015, 7(2), 1-4.</p> <p>[2] N. Duganath, C. Sridhar and K.N. Jayaveera. Synthesis and antibacterial evaluation of some novel hesperidin semisynthetic derivatives. Der Pharmacia Lettre, 2014, 6(1), 87-94.</p> <p>[3] L. Pripis-Nicolau, G. de Revel, A. Bertrand, and A. Maujean. Formation of Flavor Components by the Reaction of Amino Acid and Carbonyl Compounds in Mild Conditions. Journal of Agricultural and Food Chemistry, 2000, 48(9), 3761-3766</p>
31.	<p>Jokhadze M., Chinchradze D., Mskhiladze L., Bozhadze A., Gokadze S.</p> <p><b>•Phytochemical Study of Georgian Endemic Species <i>Salvia compar Trautv. ex Sosn.</i></b></p> <p>Tbilisi State Medical University, Direction of Pharmacognosy and Botany  m.jokhadze@tsmu.edu  mjokhadze@yahoo.fr</p> <p><b>Introduction</b></p> <p>The <i>Lamiaceae</i> family consists of over 230 genera. Many species of this family are considered of high importance due to widespread use in medicine, cooking and cosmetics, and as a source of essential oils. The same goes for the <i>Salvia</i> - major genus belonging to <i>Lamiaceae</i> family. About 900 <i>Salvia</i> species are cultivated throughout the world [3]. Phytochemical investigation of <i>Salvia</i> revealed a large number of bioactive compounds, including the most important - essential oils and polyphenols, which have been shown to possess antimicrobial, antioxidant, antiinflammatory, antiplasmodial, hypoglycemic and anticarcinogenic properties [1, 2].</p>

	<p>The aim of present study was the determination of essential oil and rosmarinic acid in Georgian endemic plant <i>Salvia compar</i> Trautv. ex Sosn.</p> <p><b>Methodology</b></p> <p>The aerial parts of <i>Salvia compar</i> were collected in Georgia (Meskheti) in June 2008. The essential oil was isolated by hydrodistillation in a Clevenger-type apparatus and analyzed by capillary gas chromatography (GC-MS). The latter was performed with Agilent Technologies 7000 Triple Quad gas chromatograph equipped with a HP-5MS capillary column (30 m×0.25 mm id, 0.25 μm film thickness) operated in the electron impact mode at 70 eV.</p> <p>Chromatographic separation and determination of rosmarinic acid was done by liquid chromatography using Agilent Technologies 1290 Infinity LC system with DAD and coupled to a Agilent technologies 6460 Triple quadrupole LC/MS machine. Separation was performed on Zorbax Eclipse plus C18 (100×3.0 mm, 1.8 μm) column. Mobile phase consisting of 0.1 % water solution of formic acid: 0.1 % acetonitrile solution of formic acid with gradient elution. Sample volume -5 μl, flow rate - 0.8 ml/min. Total chromatographic run time was 20 min. The MS was operated in negative ESI mode, and the analysis was operated in total ion acquisition mode. Identification of the main component of rosmarinic acid was carried out by comparing its retention time with authentic reference standard.</p> <p><b>Results</b></p> <p>40 terpenoids were identified in total. The principal components in the sage essential oil were camphor, carveol, alpha-thujone, borneol and bornyl acetate. The dominant compound among phenolics was rosmarinic acid, which is one of the most widespread caffeic acid derivatives. The <i>Lamiaceae</i> family, including genus <i>Salvia</i>, is characterized by the presence of rosmarinic acid, also known as labiatenic acid. The content of rosmarinic acid was 2.1%.</p> <p><b>Conclusions</b></p> <p>The results of this study allow suggesting <i>S. compar</i> as a promising source of bioactive compounds and target its products and extracts as agents for further research.</p> <p><b>References</b></p> <ol style="list-style-type: none"> <li>1. Farimani M, Khodaei B, Moradi H, Aliabadi A, Ebrahimi SN, De Mieri M, Kaiser M, Hamburger M. Phytochemical Study of <i>Salvia leriifolia</i> Roots: Rearranged Abietane Diterpenoids with Antiprotozoal Activity. <i>J. Nat Prod.</i> 2018 ;81(6):1384-1390.</li> <li>2. Tenore G.C., Ciampaglia R., Arnold N.A., Piozzi F., Napolitano F., Rigano D., Senatore F., “Antimicrobial and antioxidant properties of the essential oil of <i>Salvia lanigera</i> from Cyprus”. <i>Food Chem. Toxicol.</i> 2011, 49 (1), 238–243.</li> <li>3. Harley R.M., Atkins S., Budantsev A.L., Cantino P.D., Conn B.J., Grayer R., Harley M.M., Kok R., Krestovskaja T., Morales R., Paton A.J., Ryding O. “Labiatae”. In <i>The Families and Genera of Vascular Plants, Lamiales</i>”, vol. VII. Springer, Berlin, Kadereit, J.W. (Ed.), 2004. pp. 167–282.</li> </ol>
32.	<p>Kakhetelidze M., Churadze L., Yavich P.</p> <p><b>•Development of the Composition of Cosmetic Masks, Using Medicinal Mud Akhtala</b></p>

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**Introduction.** The healing mud Akhtala of pseudovolcanic origin contains macro and micro elements, including Ca, Mg, Fe, Al, Sn, Br, I, F and others, as well as a number of organic substances. Is used in the treatment of psoriasis, neurodermatitis, scleroderma and other cutaneous diseases.

Currently, the treatment process is organized only at the place, where the mud exits to the surface of the earth, which helps to reduce the number of potential patients, because for many of them it's rather hard to come to the place of treatment.

**Purpose of the study.** Therefore, the creation of appropriate cosmeceuticals has been recognized as expedient, this makes it possible to purchase medicinal products in pharmacies and treatment at the place of residence. To date, such cosmeceuticals are produced using salts and mud of the Dead Sea, Lake Tambukan, some French resorts and several others [3].

**Methodology.** When developing the composition of cosmetic masks using Akhtala medicinal mud, grape seed oil and Shea butter were used, their quantitative compatibility was studied both with the base for obtaining the mask and with Akhtal mud. Grape seed oil contains organic acids, flavonoids, vitamins A, E, C, B1, B2, B3, B6, B9, B12 and trace elements, for example K, Ca, Na. It has anti-inflammatory, antioxidant, antimicrobial, anti-allergic, antihistamine activity. Shea butter contains vitamins A and E, when applied to the skin, nourishes and smoothes it, has protective and soothing properties, stimulates collagen growth, reduces wrinkles, and promotes regeneration processes. The possibility of using distilled monoglycerides, emulsion wax, carbomer and others, has been investigated as emulsifiers, has been investigated. This helps to obtain the mass of the mask, satisfying existing requirements [4]. Along with oils, extracts of St. John's wort, chamomile and calendula flowers, lemon and mandarin essential oils are added to the obtained cream. The study of the rheological characteristics of the mask showed the compliance with existing requirements.

**The results.** The resulting masks are easily applied to the skin, absorbed well, and after a certain time after application, the residue is well removed, the masks do not cause irritation and allergic reactions.

**Conclusion.** The formulation of cosmeceutical masks with the use of Akhtal treatment mud has been developed.

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33.	<p>Kikalishvili B., Sulakvelidze Ts., Getia M., Malania M., Turabelidze D.</p> <p><b>•Study of Lipids from the Roots of Chicory (<i>Cichorium intybus L.</i>) Growing in Georgia</b></p> <p>Department of Phytochemistry of TSMU I. Kutateladze Institute of Pharmacochimistry  b.kikalishvili@tsmu.edu</p> <p>Flora of Georgia allows identifying and studying biologically active lipid-containing plants. The goal of the present work is to study the content of lipids and biologically active compounds in the roots of Chicory (<i>Cichorium intybus L.</i>) (<i>Asteraceae</i>) growing in Georgia /1/.</p> <p>As the literary sources suggest, Chicory roots are rich in vitamins C and K and carotinoids; they contain Ca, Mg, K, volatile oils, coumarins, bitter substance, flavonoids and phytosterols; they have analgesic, sedative, cholagogic and digestive system improving effects. They are used to prevent diabetes and oncological diseases /2, 3, 4/.</p> <p>Total neutral lipids were obtained by extraction with N-hexane from the Chicory roots (ratio of 1:5); were established main classes neutral lipids, such as: hydrocarbons, triglycerides, free fatty acids, sterols. Some physical-chemical properties of total neutral lipids were determined: specific weight <math>d - 0,936</math>; refraction index <math>n - 1,466</math>; acid number <math>2,7 /KOH/gr</math>.</p> <p>Method of Gas chromatography (Agilent 7890B, mass spectrometer 5977 AMS, column: HP-5ms Ullra Inetret 30mx 250umxo, 255 um) was used for qualitative and quantitative definition of the following fatty acids: pentadecane - 4,15%; hexadecane - 57%; 9-octadecen - 10,29%; 9,12-octadecadien - 11,8%; eicosane - 1,3%; docosene - 4%; docosane -0,58%; Heptadecane-2,79%.</p> <p>By using Folch's method total polar lipids with the yield of 1,25% were obtained from the plant residue after the isolation of neutral lipids by the extraction with chloroform-methanol mixture (2:1). The following phospholipids were identified in total polar lipids: lysophosphatidylinosite, phosphatidylinosite, phosphatidylcholine and phosphatidylethanolamine. The content of total phospholipids in total polar lipids of Chicory roots is 0,27%. This value was calculated by using the method of spectrophotometer according to inorganic phosphor, wave length 620 nm.</p>

	<p>Finally, 9 fatty acids were identified in total neutral lipids extracted from the roots of Chicory (<i>Cichorium intybus</i> L.). Between saturated fatty acids dominant is hexadecane acid (57%), while dominant non-saturated fatty acid is 9,12-octadecadien (11,8%); 4 phospholipids were identified in total polar lipids.</p> <p>In respect of practical use, based on the literary data and our study results, in the future Chicory oil can be used in medicine for treatment and preventive purposes.</p> <p><b>Reference:</b></p> <ol style="list-style-type: none"> <li>1. Gagnidze R. Vascular plants of Georgia, a nomenclatural checking. Tbilisi; 2005. 96-97.</li> <li>2. Kikalishvili B., Gorgaslidze N., Sulakvelidze Ts., Malania M., Turabelidze D. Lipids of the seeds of <i>Juglans regia</i> L. International academy journal Web of Scholar. ISSN 2518-167X. 2(20), Vol.1, February 2018. Warsaw, Poland.</li> <li>3. Zurabishvili Z.A., Suzanova E.V., Chromatographic analysis of fats and oils, Moscow, 2010.</li> <li>4. Dhellot G., Matoube E. Extraction chemical composition and nutritional characterization of vegetable oils. African Biotechnol. 2006; 5(11); 1095-2101.</li> </ol>
34.	<p>Kintsurashvili L.<sup>1</sup>, Pichette A.<sup>2</sup>, Legault J.<sup>2</sup>.</p> <p><b>•Biologically Active Alkaloids from the <i>Aconitum Nasutum</i> Fisch. Ex Reichemb, Spread in Georgia</b></p> <p><sup>1</sup>I. Kutateladze Institute of Pharmacochemistry, TSMU, Georgia  <sup>2</sup> University of Quebec, Chicoutimi, Canada  l.kintsurashvili@tsmu.edu</p> <p><b>Introduction and aim of the study:</b> Species of <i>Aconitum</i>: <i>Aconitum orientale</i> Mill, <i>Aconitum nasutum</i> Fisch. ex Reichemb, <i>Aconitum anthora</i> D. C. (<i>A. confertiflora</i> (D. C.) Gayer (family: <i>Helleboraceae</i>) are spread in the subalpine belt of Georgia [1]. They are a source for receiving diterpenic alkaloids. They have anti-arrhythmic, neurotoxic, central nervous system stimulating and anti-cancer activity. According to literature data in the traditional and folk-medicine, species of <i>Aconitum</i> are used with the form of tincture, decoction, ointment as a anti-cancer, analgetic, sedative, anti-pyretic medicaments [2, 3].</p> <p><b>Material and methods:</b> The aim of the study was investigation of underground and overground parts of <i>Aconitum nasutum</i> Fisch. ex Reichemb for the composition of biologically active diterpenic alkaloids.</p> <p>The research objects were underground and overground parts of <i>Aconitum nasutum</i> Fisch. ex Reichemb, which were collected in 2017 in Borjomi in the phase of fertility.</p>

	<p>The alkaloids sum was received from the air-dry raw material with extraction of chloroform, which was alkined beforehand with 5% sodium carbonate solution</p> <p>The alkaloids sum which was received from the underground and overground parts of <i>Aconitum nasutum Fisch. ex Reicheimb</i> was researched for the cytotoxic activity in Chicoutimi (Quebec, Canada) University fundamental sciences department, laboratory of LASEVE. Cytotoxicity was determined on In vitro alkaloids culture: "human lung carcinoma (A-549), rectum adenocarcinoma (DLD-1), human normal fibroblasts (WS-1). There were used etoposid as standart.</p> <p><b>Results:</b> The alkaloids sum from overground parts of <i>Aconitum nasutum Fisch. ex Reicheimb</i> in the phase of fruiting is 0.38%, from the underground parts -1%. There was established, that alkaloids: talatizamine, kammaconine, karakoline, lappaconitine are in the underground and overground parts, but in the overground parts of <i>Aconitum nasutum</i> is licoctonine, in the underground parts - aconitine and aconosine [4].</p> <p><b>Conclusion:</b> According to biologically screening data there is identified specific cytotoxic activity of overground parts of alkaloids sum of <i>Aconitum nasutum Fisch. ex Reicheimb</i> towards A-549 (lung carcinoma) and DLD-1 (rectum adenocarcinoma). It has not influence on WS-1 (human normal fibroblasts). The sum of alkaloids from underground parts has cytotoxic activity towards DLD-1(rectum adenocarcinoma), not affect on WS-1 (human normal fibroblasts).</p> <p><b>References:</b></p> <p>Vascular plants of Georgia a nomenclatural checklist/ Gagnidze, R.-Tbilisi.: UNIVERSAL, 2005; 33-39.</p> <ol style="list-style-type: none"> <li>1. Bryzgalov O., Romanov A. E., TolstikovaT. G., Shullts E. Lappaconitine: Influence of Halogen Substituent on the antiarrithmic activity. Cardiovascular &amp; Hematological Agents in Medical chemistry. 2013; 11: 211-217.</li> <li>2. Singhuberl., Zhu M., Prinz S., et all. Aconitum in traditional Chinese medicine: a valuable drug or an unpredictable risk. J. Ethnopharmacol. 2009; 126: 18-30.</li> <li>3. Kintsurashvili L. Alkaloids of some plants of families Helleboraceae and Ranunculaceae growing in Georgia. 3rdInternational conferense on pharmaceuticalScienses, abstract book.I cps –2015. Publish. House. Tbilisi.: UNIVERSAL; May 29-31. 2015; 116.</li> </ol>
35.	<p>Kirtadze N., Qemoklidze Z.</p> <p><b>•Stabilization of the Emulsion System with Saponins</b></p> <p>Tbilisi State Medical University, I. Kutateladze Institute of Pharmacochemistry</p>

Saponins - are natural, glycosidic nature, high molecular, nitrogen-free compounds. The saponin molecule consists of a carbohydrate chain and an aglycone called sapogenin. Depending on the number of molecules of monosaccharides (hexose or pentose), saponins are divided into mono-, bi-, tri-, tetra-, penta- and oligosides /3/. According to the structure of sapogenin, saponins are divided into steroid and triterpene saponins /1/.

Saponins are surfactants and used as emulsifiers, stabilizers and foamers. In addition, there is data on their bactericidal and fungicidal activity, which allows us to be used as a technological supplement that provides microbiological stability of the product /1, 2/.

Despite all the positive technological features, saponins have toxicity. It depends on the length and branching of the hydrocarbon chain. As the chain grows, its toxicity decreases /2/.

The aim of the study was to investigate the ability of stabilizing saponins as emulsion systems.

To determine the ability to stabilize saponins, we prepared 500.0 g cream divided into 10 equal portions, each containing 50 g, and incorporated in equal quantities saponins from beetroot, saponaria, yucca, licorice, tribulus (goat's-head) and Japanese aralia (*Fatsia japonica*,). We used lecithin and twin-80 for a comparison, and we left two creams in check.

We have studied the physico-chemical and technological characteristics of the creams. Experimental studies showed that the creams were thermally unstable, in which we used saponins from yucca and licorice.

In the next phase of the study, we studied the rheological characteristics of creams (Kurosaur, Beetroot, Saponaria and Japanese aralia). The best structural-mechanical properties are characterized by saponaria cream containing saponins. The latter is continuing studies on stability under normal conditions for the purpose of determining expiration dates.

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**•The Study Results of Some Introduced Medical-Aromatic Plants in Conditions of Batumi Botanical Garden**

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**Introduction:** The purpose of our research was the introduction of some medicinal aromatic plants, which are widely used not only in medicine, but also in pharmaceutical industry, perfumery, cosmetology and cooking.

Medicinal aromatic plants are especially important because of their high content of vitamins, carotenes, biologically active substances and other mixtures. Our body needs about 85 micro and macro elements for various processes, some of which are contained in aromatic spicy plants.

Aromatic plants have a beneficial effect on the gastrointestinal tract, the circulatory system, the central nervous system Also on the psychophysical state.

The introduction of medicinal aromatic species was carried out on the basis of the Batumi Botanical Garden by purchasing seeds from online sites and through the seed exchange foundation, subscription. Works on the extraction of seedlings from seeds were carried out in the greenhouse of exotic plants in the Batumi Botanical Garden. At the next step, a temporary “experimental plot of aromatic plants” was allocated in the garden for seedlings cultivated in the greenhouse.

**Methodology:** The study of the cultivation of seedlings, their morphogenesis and features of the growth and development of the plant was carried out mainly according to the methods of Beideman and Serebryakov.

**Results:** The features of growth and development of aromatic plants in open and closed ground are analyzed. Recommendations for the creation of a collection in the open ground in the future were given to three species: *Polianthes tuberosa*, *Iris pallida*, *Cuminumcyminum*. These species are widely used in medicine and perfumery. At the present, the following species are located in open ground: *Cuminum cyminum* L.; *Polianthes tuberosa* L.; *Iris pallida* Lam.; *Zingiber officinale* Roscoe.; *Elettaria cardamomum* Maton.; *Coffea arabica* L.; *Coffea conephora* L.; *Vanilla planifolia* Jacks.; *Cassia acutifolia* Delile.; *Geranium macrorrhizum* L., *Piper suaveolens* Ham., *Piper piperita* L., *Thymus citriodorus* Schreb., *Satureja Montana* L., *Mentha piperita* L., *Origanum vulgare* L., *Mentha longifolia* L., *Hyssopus officinalis* L.; *Phyla scaberrima* Moldenke.

**Conclusions:** Based on three-year observations, we can conclude that *Polianthes tuberosa*, *Cuminumcyminum* and *Iris pallida* bloom, bear fruit and produce seeds in open ground conditions, which means that the plants are adopted to new



	<p>environment; <i>Cassia acutifolia</i> blooms in the open field, but cannot grow fruit , In December, the plant freezes and dries. in the greenhouse, the plant blooms, bears fruit and produces seeds. Creating a collection of aromatic plants continues.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Afifipour Z., Khosh-Khui., „Efficacy of Spraying a Mixture of Amino Acids on the Physiological and Morphological Characteristics of Tuberose (<i>Polianthes tuberosa</i> L.) ”Department of Horticulture, College of Agriculture, Shiraz University, Shiraz, Iran. International Journal of Horticultural Science and Technology.</li> <li>2. Hajlaoui H., Mighri H., Noumi E., Snoussi M., Trabelsi N., Ksouri R., Bakhrouf A., „Chemical composition and biological activities of Tunisian Cuminum cyminum L. essential oil: A high effectiveness against <i>Vibrio</i> spp. Strains”. Food and Chemical Toxicology.</li> <li>3. Wang H. 2010: Wang H., Cui Y., Zhao C., „Flavonoids of the Genus <i>Iris</i>(Iridaceae), Mini-reviews in Medical Chemistry.</li> <li>4. Кочетов А.А. „Новый подход построению теории и созданию методологии ускоренной интродукции растений. Фундаментальные и прикладные проблемы ботаники в начале XXI века”. Русское ботаническое общество XII съезд. Часть 6. Материалы Всероссийской конференции. Петрозаводск.</li> <li>5. Сачивко Т.В., Босак В.Н., „Особенности коллекции пряно-ароматических растений в ботаническом саду”, Белорусская государственная сельскохозяйственная академия, Белорусский государственный технологический университет.</li> <li>6. ესვანჯია ვ., „ეკოლოგიურად სუფთა სამკურნალო-არომატულ-სანელებელი მცენარე კვლიავის <i>Carum carvi</i> L. კულტივირება საქართველოში“ ი.ლომოურის სახელობის მიწათმოქმედების სამეცნიერო-კვლევითი ინსტიტუტი., დისერტაცია, თბილისი.</li> </ol>
37.	<p>Kvizhinadze N.</p> <p><b>•Peculiarities of Price Regulation of Medicines in Georgia</b></p> <p>Tbilisi State Medical University, Department of Social and Clinical Pharmacy  n.kvizhinadze@tsmu.edu  natia0807@gmail.com</p> <p><b><u>Introduction</u></b></p> <p>Healthcare professionals consider price regulation of medicines as one of the tools in the healthcare cost containment system. The pharmaceutical field was characterized by rapid transformation and expansion. In the modern market, it occupies quite a large and important place. According to the latest study of United Nations Children's Fund (UNICEF), around of 70% of medical expenses incurred by families in Georgia</p>

	<p>come from medicines. 28% of respondents mentioned that buying drugs last year was their main problem.</p> <p><b><u>Study aim:</u></b> Study aim is to discuss the specifics and features of price regulation in the Georgian pharmaceutical market.</p> <p><b><u>Study objectives:</u></b></p> <ul style="list-style-type: none"> <li>- Economic analysis of Georgian pharmaceutical market;</li> <li>- Determination of retail prices on imported medicines by appropriate formula;</li> <li>- Determination of market price by the market</li> </ul> <p><b><u>Results and conclusion:</u></b> The dominance of several companies in the pharmaceutical market is due to the high cost of medicines, which in turn results in higher costs for pharmaceutical products. The average price of medicines added to the price of medicines in Georgia is much higher than in other European countries. The rule of registration of the pharmaceutical regimen creates a low risk of low quality medicines entering the market; Polypragmasy remains a topical problem in the country (Unnecessary prescription of many drugs and medical procedures at the same time for the patient) and lack of a comprehensive pharmacovigilance system.</p> <p><b><u>References:</u></b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.transparency.ge/sites/default/files/post_attachments/parmacev_tuli_bazari_sakartveloshi.pdf">https://www.transparency.ge/sites/default/files/post_attachments/parmacev_tuli_bazari_sakartveloshi.pdf</a></li> <li>2. <a href="https://www.pharmaceutical-technology.com/features/cost-control-drug-pricing-policies-around-world/">https://www.pharmaceutical-technology.com/features/cost-control-drug-pricing-policies-around-world/</a></li> <li>3. Regulation of Price and Reimbursement for Pharmaceuticals, Patricia M. Danzon, The Oxford Handbook of the Economics of the Biopharmaceutical Industry, Edited by Patricia M. Danzon and Sean Nicholson, Print Publication Date: Apr 2017</li> <li>4. <a href="https://www.communitycatalyst.org/resources/publications/document/2018/CC-PrecripDrugPrices-Report-FINAL.pdf">https://www.communitycatalyst.org/resources/publications/document/2018/CC-PrecripDrugPrices-Report-FINAL.pdf</a></li> </ol>
38.	<p>Lagazidze D., Orjonikidze M., Tsagareishvili G., Kutateladze G.</p> <p><b>•Study of Carotenoids Release from 0.5% Marigold Suppositories</b></p> <p>TSMU, I. Kutateladze Institute of Pharmacochemistry d.lagazidze@tsmu.edu</p> <p>Marigold (<i>Calendula officinalis</i>) flowers are one of the richest sources of natural carotenoids and are characterized by antimicrobial, anti-inflammatory, analgesic, wound healing, spasmolytic, anticoagulant effects. Its constituent beta-carotene is considered to possess immunoenhancing properties. <math>\beta</math>-carotene is also vital for</p>

normal growth and functioning of vaginal tissues. For medicinal purposes, dosage forms from a floral alcohol extract, including homeopathic suppositories, are mainly used. The Institute of Pharmacochemistry developed vaginal suppositories with an oil extract of *Calendula officinalis*' flowers. Since the process of drug release from the dosage form partially determines its complete and rapid absorption into the bloodstream, its study is important for creating a dosage form for a given drug.

**The aim** of the study was the evaluation of the *in vitro* bioavailability of marigold suppositories.

**The objects** of the study were marigold oil extract suppositories that we have prepared based on cocoa butter and Witepsol W35 (yellow suppositories with a characteristic odor). The active ingredient was a marigold oil extract – 0.5 g (the sum of carotenoids measured in  $\beta$ -carotene is no less than 120 mg %)

**Research methodology.** Suppositories were prepared on a lipophilic basis, cocoa butter and diphilic base Witepsol W 35 by pouring. We used a dialysis method to evaluate the bioavailability of suppositories (Kruvchinsky). Dialysis medium - 100 ml 95% ethyl alcohol. Membrane – semipermeable cellophane, thermostat temperature + 37  $\pm$  2 ° C. Observation period - 6h, sampling - once per hour. We determined the optical density of the carotenoids using a UV-Vis spectrophotometer (Jasco -V730), cuvettes 10 mm thick, wavelength - 450 nm. Reference solution - 95% ethyl alcohol. The experimental results were statistically processed.

**Results.** Thus, the kinetics of carotenoid release from marigold suppositories has been experimentally studied using a dialysis method.

**Conclusions.** It was determined that between marigold suppositories prepared on the basis of cocoa butter and witepsol W35 the latter shows more complete and intensive active constituent release (83%).

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39.	<p>Lion Q., Mshvildadze V., Legault J., Simard F., Pichette A.</p> <p><b>•Quantification of Phenolic Markers in Biologically Active Extracts of <i>Aralia nudicaulis</i> L. Rhizomes During Different Stage of Vegetation.</b></p> <p>Laboratoire LASEVE, Département des Sciences Fondamentales, Université du Québec à Chicoutimi, 555, Boulevard de l'Université, Chicoutimi, Québec, Canada G7H 2B1</p> <p><i>Aralia nudicaulis</i> L. (Araliaceae) has been used in traditional Amerindian remedies for cancer, inflammation, liver protection, anti-mycobacterial and adaptogenic properties. The main activities recorded in species of this gender are anti-oxidant and anti-inflammatory effects mainly caused by the high concentration in phenolic compounds. However, no validated analytical methods for the standardization and optimization of the biological properties about phenolic contents of <i>A. nudicaulis</i> extracts have been reported in the literature. In this study, a simple and validated HPLC method for identifying and quantifying major phenolic compounds in this two species was developed. Rhizomes methanolic extracts from different stages of vegetation were compared with regard to their chemical compositions and biological activities. The contents of phenolic compounds such as Chlorogenic acid, Caffeic acid and Protocatechuic acid were quantified.</p> <p>The antioxidant effect of extracts could be attributed to the marker compounds. Quantitative variation of phenolic markers and biological activity in <i>Aralia nudicaulis</i> also depends on the stage of vegetation.</p>
40.	<p>Makhniashvili T., Baramidze K., Nizharadaze N., Ioramashvili H., Lekishvili N.</p> <p><b>•Biowaiver Study of “Normodipin” 5 mg Tablets vs “Amlodipine-Dexel” 5 mg Tablets</b></p> <p>TSMU, Department of Pharmaceutical and Toxicological Chemistry; Laboratory “ Globaltest”, Tbilisi</p> <p>Amlodipine, the most commonly prescribed medication of hypertension treatment, belongs to I group by biopharmaceutical classification. Accordingly, it has good solubility and good bioavailability. In respect of above mentioned determination of the amlodipine equivalence of test product to reference by in vitro dissolution study is absolutely acceptable.</p> <p>Due to this circumstance, the aim of our study was to conduct the in vitro dissolution profile comparison of two products, registered in Georgia: “Normodipine” (GEDEON RIXTER) and “Amlodipine-Dexel” (DEXEL GmbH).</p> <p>The experiment was done as a blind, crossed randomized comparative study for two periods and two sequence in three different pH media, on 12 tablets of each product.</p>

	<p>Study was conducted in accordance with WHO and FDA recommendations and products USP monograph.</p> <p>It was determined that dissolution profile similarity index of “Normodipiene” to “Amlodipine-Dexel” is following: 78.73% in dissolution media pH = 1.2; 78.39% in dissolution media pH = 4.5; 73.67% in dissolution media pH = 6.8 (N&gt; 50%). The difference index is 2.14% in dissolution media pH = 1.2; 2.59% in pH = 4.5; 4.59% in dissolution media pH = 6.8 (N&lt; 15%). The received data is absolutely acceptable.</p> <p>As a result of conducted studies, we can conclude that dissolution kinetics of both products “Normodipine” and “Amlodipine-Dexel” 5 mg tablets are same in each media and according, these two products could be considered as the equivalent to each other.</p> <p>References:</p> <ol style="list-style-type: none"> <li>1. Hernandez R.H., Armas- Hernandez M.J., Zfar H.J., Armas-padilla M.C. Calcium antagonists and atherosclerosis protection in hypertension. Am J Ther. 2009, 10(6)-409-414</li> <li>2. Zang X.P., Joke K.E., Mital S. et al. Paradoxical release of nitric oxide by an L-type calcium channel antagonist, the R- enantiomer of amlodipine. J cardiovascular pharmacology 2002, 39; 208-214.</li> <li>3. USP 41NF 36</li> <li>4. WHO Technical Report Series, No.937, 2006, app. N7</li> <li>5. In vitro dissolution testing methods for oral immediate release drug products containing BCS class of drugs, WHO, WD QAS/04.062, 2004</li> </ol>
41.	<p>Masiukovich T., Antelava N., Gongadze N., Gotsiridze R.</p> <p><b>•Results of the Study of "Barezhin" Type Peloids Widespread in Adjara and Prospects for Their Use in Medicine</b></p> <p>Tbilisi State Medical University tatia.masiukovich@gmail.com</p> <p>The use of natural healing factors for treatment and prevention of various diseases represents the one of the actual tasks for modern medicine. The introduction of balneological methods of treatment at the resorts as well as outside of them promotes the effective improvement of population’s health.</p> <p>In the world today, the demand for peloids, as well as for preparations and cosmetics made on peloids is rising significantly, which is explained by the increased interest of the society towards the ecologically clean raw materials of natural origin. They often replace expensive chemical preparations, which are frequently followed by some contraindications and side effects. The increased interest in peloids in the world put on the agenda not only the question of rational use of acting mud ores, but also the</p>

issue of developing cosmetic and medicinal preparations on their basis /1, 2, 3, 4, 5, 6/.

Peloids are widespread in Adjara, which are found on the seacoasts, as well as in the mountains. These resources have been known to the local population since the ancient times and have been used empirically for therapeutic and preventive purposes. In the available literature there is found no data on the research and use in medical practice of "Barezhin" type peloids widespread in Adjara.

The objective of the research was to study the chemical compositions of "Barezhin" type peloids of Adjara; to determine the antibacterial activity and the contents of bacteriophages in peloids; develop recommendations for the use of "Barezhin" type peloids in balneological practice.

By using the modern instrumental methods of analysis the contents of micro, macroelements and minerals have been studied in Chakhati and Kvirike "Barezhin" type peloids, the contents of important balneological components have been stated in the study objects. Using Disc Diffusion and Agar Well Diffusion methods have been revealed, that Kvirike and Chakhati "Barezhin" type peloids have antibacterial effect against gram-positive (*Staphylococcus aureus*) and gram-negative bacteria (*Escherichia coli* and *Proteus spp.*); using Adams method have been stated, that Kvirike and Chakhati "Barezhin" type peloids contain bacteriophages with the ability of lysis of *Escherichia coli* and *Staphylococcus aureus* /7, 8/.

On the basis of the conducted experimental studies Chakhati "Barezin" type peloid have been recommended for using in balneological practice as application for osteo-articular system diseases, the balneological recommendations have been developed.

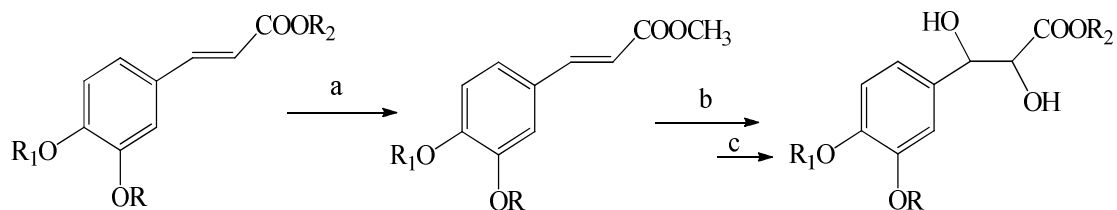
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42.	<p>Mchedlidze K., Churadze M., Anelli J., Lomidze E.  <b>•Sustainable Microstructural Diagnostic Traits of <i>Daphne species (Thymelaeaceae)</i> Stems</b></p> <p>TSMU, I. Kutateladze Institute of Pharmacochemistry, Tbilisi, Georgia  k.mchedlidze@tsmu.edu</p> <p>Introduction: Along with morphological features of the plant the determination of sustainable diagnostic characteristics of its anatomical structure is one of the basic components of pharmacognostic research when studying biologically active compounds of promising medicinal plants. The present study aimed to determine sustainable microstructural diagnostic characteristics of vascular (conductive, transport) system of stem internodes in <i>Daphne</i> L. species: <i>D. glomerata</i> Lam., <i>D. albowiana</i> Woronow ex Pobed., <i>D. odora</i> Thunb., <i>D. mezereum</i> L., and <i>D. axilliflora</i> (Kiesl.) Pobed. (<i>D. caucasicana</i> Pall.).</p> <p>Results: The transport system texture of studied species is monocyclic; architectonic of transport tissue is bilateral considering the bast and timber interposition [1]. Fibrous cells in perixylary and hypoxylary phloem are arranged in tiers; differentiated cambium tissue in central cylinder internodes is continuous, while in the timber it is scattered. Level of growth ring distinction is unequal, some are quite distinct, others - less so. Most of the tracheal elements' (tracheids, conductive vessels, fibers) lumens are singular, rarely grouped in pairs; lumens of conductive vessels are of angular (<i>D. glomerata</i>, <i>D. albowiana</i>, <i>D. odora</i>) or oval (<i>D. mezereum</i>, <i>D. axilliflora</i>), shape, without thyloses. Lumens of tracheides and fibers have different diameter and membrane thickness and are disposed in the timber chaotically scattered or stripped. Fibers have thick tegument and some of them are filled with grayish blackish content. Early to latewood transition is quite clear, with a significant difference in the number and diameter of vessels and timber, but the ring-porous structure is not distinguishable.</p>

	<p>Most of studied Daphne species (<i>D. glomerata</i>, <i>D. albowiana</i>, <i>D. odora</i> and <i>D. axilliflora</i>) are characterized by apotracheal distribution of cells in timber. In timber cylinders they are located terminally (<i>D. glomerata</i>), diffusely (<i>D. odora</i>, <i>D. albowiana</i>) and narrow metatracheally (<i>D. axilliflora</i>), while only in <i>D. mezereum</i> parenchymal cells are distributed vasicentrally. Membrane thickness of parenchymal cells in fibers is little greater than in timber.</p> <p>In the central cylinder of studied plants the radial single-row rays with straight or slightly inclined direction of tangential walls are identified; edges of radial rays coincide with the common border of growth-ring; on cross-sections of the rays the beam conductivity is direct, without inclination when approaching vascular lumen. Tangential diameter of the conductive vessels prevails over the rays' width. Radial rays' shape and width are not changed either in growth-ring transition and wood parenchymal zones. No secretory channels, depots and other structural abnormalities were detected in stem internodes of studied species.</p> <p><b>References:</b></p> <p>1. Н.А.Анели-Анатомическое строение междоузлия, как диагностический признак; Химия и биология активных веществ лекарственных растений Грузии, изд. «Мецниереба» Тбилиси 1969 г., Ст.148-165</p>
43.	<p>Merlani M., Barbakadze V., Amiranashvili L., Gogilashvili L., Geronikaki A.  <b>•Caffeic Acid Derivatives: Synthesis and Antimicrobial Activity</b></p> <p><sup>1</sup> TSMU I.Kutateladze Institute of Pharmacochemistry, Georgia  <sup>2</sup> Aristotle University of Thessaloniki, School of Pharmacy, Thessaloniki 54124, Greece  m.merlani@tsmu.edu</p> <p>Phenolic acids (caffeic-, ferulic and <i>p</i>-coumaric acid) are widely distributed in the plant kingdom and exhibit broad spectrum of biological activities with high antioxidant, immunomodulatory and anticancer properties. Several caffeic I and isoferulic acid II derivatives have been synthesized by alkylation (methylation or benzylation) of them, following by dihydroxylation of alkylated products (<b>5,6</b>) (Scheme 1). Methylation of caffeic acid I and acids (<b>1, 2</b>) using CH<sub>3</sub>I in DMF at room temperature gave esters (<b>3</b>), (<b>5</b>) and (<b>6</b>) respectively in good yields (90-95%), whereas refluxing of I with CH<sub>3</sub>I in acetone yields fully protected product (<b>4</b>). Benzylation of I and II in acetone was performed by reflux with BnBr for overnight. Sharpless dihydroxylation of obtained alkylated products using catalyst K<sub>2</sub>O<sub>8</sub> · 2H<sub>2</sub>O and co-oxidant NMO in acetone: acetonitrile : water (3:1:1) mixture at room temperature leads to the corresponding dihydroxylated products (<b>9-13</b>). Removing of benzyl protecting groups carried out using the catalytic hydrogenation procedure over Pd/C (10%).</p>





I. R =R<sub>1</sub> =R<sub>2</sub> =H

II. R =R<sub>2</sub> =H R<sub>1</sub> =CH<sub>3</sub>

1. R =R<sub>1</sub> = Ac, R<sub>2</sub> =H

2. R =R<sub>1</sub> = Bn, R<sub>2</sub> =H

3. R =R<sub>1</sub> = H

4. R =R<sub>1</sub> = CH<sub>3</sub>

5. R =R<sub>1</sub> = Ac

6. R =R<sub>1</sub> = Bn

7. R =R<sub>1</sub> = H, R<sub>2</sub> = CH<sub>3</sub>

8. R =R<sub>1</sub> = CH<sub>3</sub> R<sub>2</sub> = H

9. R =R<sub>1</sub> = Ac, R<sub>2</sub> = CH<sub>3</sub>

10. R =R<sub>2</sub> = H, R<sub>1</sub> = CH<sub>3</sub>

11. R =R<sub>1</sub> =R<sub>2</sub> = Bn

12. R =R<sub>1</sub> = Bn, R<sub>2</sub> = CH<sub>3</sub>

13. R =R<sub>1</sub> = CH<sub>3</sub>, R<sub>2</sub> = Bn

Scheme 1. Synthetic route to caffeic acid derivatives. Reagents and conditions: (a) CH<sub>3</sub>I, DMF, NaHCO<sub>3</sub>, r.t., 24h (b) K<sub>2</sub>O<sub>8</sub> · 2H<sub>2</sub>O, NMO, acetone: CH<sub>3</sub>CN:H<sub>2</sub>O (3:1:1), 4h; (c) H<sub>2</sub>, Pd/C, THF-EtOH, 12 h.

The structure of the novel compounds (**7-10** and **12,13**) were confirmed by NMR-, and IR spectroscopy. Twelve tested compounds have shown good antibacterial activity. Five out of twelve tested compounds appeared to be more active than the reference drugs ampicillin and streptomycin. Despite that all compounds exhibited good activity against all bacteria tested, the sensitivity of bacteria towards compounds in general was different. The evaluation of antifungal activity revealed that all compounds were more active than ketoconazole, while seven compounds (**2, 3, 4, 5, 7, 8** and **12**) appeared to be more active than bifonazole. Docking results indicate that gyrase inhibition is the putative mechanism of antibacterial action while the inhibition of 14 $\alpha$ -demethylase may be responsible for antifungal action. Prediction of cytotoxicity by PROTOX showed that compounds are not toxic (LD<sub>50</sub> 1000-2000 mg/kg).

44. Memarne Q.

**•Kolkheti Lowland and Ethnoecology**

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**Introduction.** The Kolkheti lowland has for centuries been shaped by a tradition of dealing with the human environment, focusing mainly on nature conservation and the use of its resources. Archaeological and ethnographic studies, as well as descriptions

	<p>of ancient authors, indicate that the ancient population used the national park and its surrounding area mainly for grazing, fishing, and hunting.</p> <p><b>Aim and goal.</b> To study ethnoecology of Kolkheti lowland including: ethnobotany, ethnozoology and landscape ecology.</p> <p><b>Methodology.</b> Social analysis and the population survey</p> <p><b>Results.</b> In the Middle Ages, most of the Colchis wetlands belonged to the Church, or secular feudal lords. Hunting and fishing in the area were partially restricted and subject to certain rules. The fish were not caught during the peating. One of the main forms of hunting was hunting of trained birds of prey.</p> <p>Particularly important was the tradition of planting and carving on the homesteads of wild plants, which has remained nowadays. For instance, such as: <i>Prunus laurocerasus</i>, <i>Hippophaë rhamnoides</i> and so on. From the technical cultures, the Colchis flora had a special place in the National Park. It is well known that Colchis was famous for its high-quality linen fabric. Also, <i>Molinia litoralis</i> was well-known technical culture.</p> <p><b>Conclusion.</b> It is necessary to study and to create master degree program on ethnoecology.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Kolkheti National Park management plan, s</li> <li>2. Kolkheti National park and Katsoburi sanctuary management plan, 2019</li> </ol>
45.	<p>Metreveli M., Tchaidze F., Jakeli J., Kandelaki M., Kodanovi L.</p> <p><b>•Angiosperms Introduced Woody Plants, Containing Biologically Active Substances in the Landscapes of Coastal Adjara</b></p> <p>Institute of Phytopatology and Biodiversity of Batumi Shota Rustaveli State University  Batumi Botanical Garden  metrevelim@list.ru;  metreveli.mariam@bsu.edu.ge</p> <p><b>Introduction and purpose of the study:</b> In the cultured green landscapes of coastal Adjara: in the Batumi Botanical Gardens, in parks and squares, in the boulevard, in different collections, mainly exotic, introduced woody flora prevails. The biochemistry of most of them has been studied; many are completely or not at all studied. We study the phytochemical composition of such species and bioecological features.</p> <p>Our goal was to analyze the existing data in the scientific literature and isolate deciduous and evergreen woody introduced species containing biologically active substances, to study their bioecological and morphobiological features, in order to</p>

	<p>determine the prospects for obtaining pharmaceutical raw materials.</p> <p><b>Research methodology:</b> Aanalysis of scientific papers on introduced woody plants; Botanical expeditions and route studies; Phenological observations.</p> <p><b>Results:</b> Based on the analysis of scientific papers, we identified species that are especially distinguished by the content of biologically active substances, in particular: <i>Ilex aquifolium</i>, <i>I. Latifolia</i>; <i>Aralia elata</i>, <i>A. racemosa</i>; <i>Arbutus unedo</i>; <i>Vaccinium bracteatum</i>; <i>Eucommia ulmoides</i>; <i>Securinega suffruticosa</i>; <i>Maackia amurensis</i>, <i>M. Chinensis</i>; <i>Milletia yaponica</i>, <i>M. Reticulata</i>; <i>Pueraria lobata</i>; <i>Fagus sylvatica</i>; <i>Xylosma yaponica</i>; <i>Hypericum patulum</i>; <i>Hamamelis virginiana</i>; <i>Liquidambar styraciflua</i>; <i>Parrotia persica</i>; <i>Hydrangea paniculata</i>, <i>H. Macrophylla</i>; <i>Dichroa febrifuga</i>; <i>Illicium religiosum</i>, <i>I. Verum</i>; <i>Lindera angustifolia</i>; <i>Persea gratissima</i>; <i>Hibiscus mutabilis</i>, <i>H. syriacus</i>; <i>Melia azedarach</i>; <i>Maclura pomifera</i>; <i>Morus alba</i>; <i>Cocculus laurifolius</i>, <i>C. trilobus</i>; <i>Alangium chinensis</i>, <i>A. platanifolium</i>; <i>Peumus boldus</i>; <i>Myrica rubra</i>; <i>Myrtus communis</i>; <i>Camptotheca acuminata</i>; <i>Ligustrum vulgare</i>; <i>Passiflora coerulea</i>; <i>Howenia dulcis</i>; <i>Amelanchier Canadensis</i>, <i>A. spicata</i>; <i>Aronia melanocarpa</i>; <i>Chaenomeles yaponica</i>; <i>Laurocerasus lusitanica</i>; <i>Rhaphiolepis umbellate</i>; <i>Quillaya brasiliensis</i>; <i>Phellodendron amurense</i>, <i>Ph.chinensis</i>; <i>Ptelea trifoliata</i>; <i>Sapindus mukorossi</i>; <i>Kadzura japonica</i>; <i>Paulownia fortunei</i>; <i>Firmiana platanifolia</i>; <i>Camellia oleifera</i>, <i>C.sasanqua</i>; <i>Callicarpa americana</i>; <i>Vitex negundo</i>; <i>Alnus glutinosa</i>; <i>Uncaria rhynchophylla</i>; <i>Schisandra sphenanthera</i>; <i>Rhodotypos scandens</i>; <i>Choisya ternate</i>; <i>Melia azedarach</i> and some exotic species of the genus: <i>Mahonia Nutt.</i>; <i>Rhododendron L</i>; <i>Rhamnus L</i>; <i>Fraxinus L.</i>; <i>Actinidia Lindl.</i>; <i>Rhus L.</i>; <i>Berberis L</i>; <i>Quercus L.</i>; <i>Aesculus L</i>; <i>Iuglans I</i>; <i>Magnolia L.</i>; <i>Eucalyptus I. Her.</i>; <i>Cotoneaster L.</i>; <i>Crateagus L.</i>; <i>Padus Mill.</i>; <i>Photinia Lindl.</i>; <i>Physocarpus maxim.</i>; <i>Rosa Juss.</i>; <i>Rubus L.</i>; <i>Sorbus L.</i>; <i>Spiraea L.</i>; <i>Evodia Forst.</i>; <i>Zantoxylum L.</i>; <i>Populus L.</i>; <i>Koelreuteria Laxm.</i>; <i>Staphylea L.</i>; <i>Styrax L.</i>; <i>Celtis L.</i>; <i>Tilia L.</i>; <i>Osmanthus Lour.</i>; <i>Cinnamomum Blume.</i>, <i>Hibiscus L.</i> etc.</p> <p>Almost all of these species are characterized by the normal development of organs containing biologically active substances. Some of them are known in traditional and official medicine. And some can be considered a promising culture.</p> <p><b>Conclusion:</b> On the basis of the study thera separated woody angiosperms plants species containing biologically active substances. Their biomorphological development proceeds normally in the soil and climatic conditions of Adjara littoral.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Medicinal plants, Med-books.info</li> <li>2. Flora of North America. <a href="http://www.erloras.org">www.erloras.org</a></li> <li>3. „Trees and shrubs of Batumi Botanical Garden“. Tbilisi, 2012, 245pp.</li> </ol>
46.	Mulkijanyan K., Gogitidze N., Sulakvelidze M., Novikova Zh., Mushkiashvili N.

	<p><b>•The Healing Potential of Steroidal Compounds from <i>Yucca gloriosa</i></b></p> <p>TSMU, I. Kutateladze Institute of Pharmacochemistry k.mulkiyanyani@tsmu.edu</p> <p><b>Introduction:</b> <i>Yucca</i> species are an important source of steroid sapogenins, sex hormone precursors, and steroids. <i>Yucca</i> extracts are claimed to treat various diseases including rheumatism, arthritis, edemas, ulcers, diarrhea, dysentery, hormonal and menstrual disorders and varicose veins, though there is a lack of clinical trials supporting these uses [1].</p> <p>In order to extend the knowledge about possible biological effects of <i>Yucca</i> constituents we have studied anti-inflammatory and hepatoprotective effects of steroid glycosides and stilbenes from different parts of <i>Y. gloriosa</i> (Roman Candle, Mound Lily).</p> <p><b>Methods:</b> i) anti-inflammatory activity was studied using formalin-induced paw edema model in rodents [2]; ii) hepatoprotective effect was assessed by a CCl<sub>4</sub>-induced liver injury model (Pentobarbital sleep) in mice [3].</p> <p><b>Results:</b> i) comparative investigation of anti-inflammatory efficacy of crude steroid glycosides from the, air-dried leaves (50 mg/kg), raw leaves (50 mg/kg) and flowers (25 mg/kg) of <i>Y. gloriosa</i> revealed, that all investigated compounds exhibited moderate to strong inhibition of the edema development (50%, 78% and 89%, respectively); ii) <i>Yucca</i> crude stilbenes administered orally (30 mg/kg) showed positive dynamics in Pentobarbital sleep assay, completely abrogating the negative effect of CCl<sub>4</sub> and returning the sleep duration to normal values.</p> <p>Conclusion: Based on the obtained results, it can be concluded that i) crude steroid glycosides from leaves and flowers can be considered as prospective anti-inflammatory compounds; ii) crude stilbenes from <i>Yucca</i> exhibit pronounced hepatoprotective properties. It should be noted, that hepatoprotective properties of <i>Yucca</i> stilbenes was never mentioned before and is detected for the first time. Thus, the necessity of further investigations towards detecting the leading components responsible for observed effects is obvious.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.drugs.com/npp/yucca.html#18502074">https://www.drugs.com/npp/yucca.html#18502074</a></li> <li>2. Int.J. Pharm Tech Res. 2010, 2(2), pp 1364-1368.</li> <li>3. Pakistan Journal of Biological Sciences, 2003; 6: 448-451</li> </ol>
47.	<p>Murtazashvili T., Sivsivadze K., Tatanashvili M., Khotivrishvili T.</p> <p><b>•Determination of Organic Acids in the Shoots of Some Georgian Grapevine Varieties</b></p>

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Organic acids - a large group of biologically active compounds that perform important functions in the metabolism of plants. The content of organic acids in medicinal herbs is important for their taste, flavor and therapeutic effects [1, 2]. Organic acids show a wide range of biological activity on the human body, are involved in maintaining the acid-base balance of the blood and other physiological fluids, characterized as: antiseptic and anti-inflammatory, choleric, diaphoretic, antioxidant. Therefore, search for new plant sources of organic acids as well as development methods for their quantitative determination in plant materials is the interest area of research [3,4].

This study was carried out to determine the organic acids content in the grapevine shoots, which is a waste product of viticulture. Gathering of plant material conducted in June-early July. The amount of shoots gathered on one hectare is up to 1500 kg.

In the scope of this study, three types of organic acids were analysed in shoots of different Georgian grapevine varieties. As material was used shoots of Savage, Rkatsiteli, Ojaleshi, Aladasturi grapevine varieties. Extraction process has been focused on the discovery and design of green and sustainable extraction techniques to optimize the recovery of organic acid.

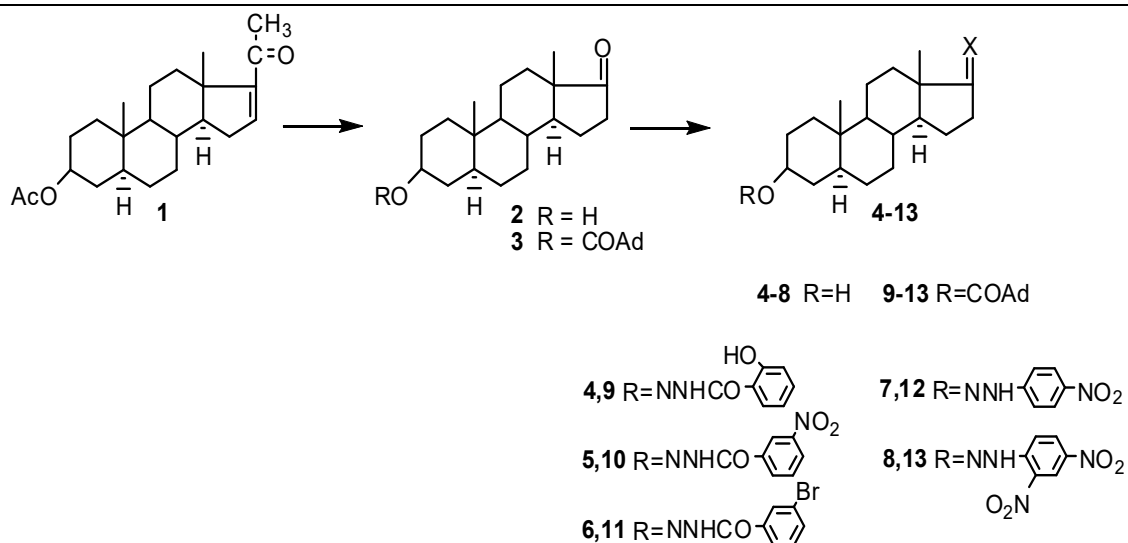
Analyses were performed using high-performance liquid chromatography (HPLC) - Waters. Separation was performed on ZORBAX SB-C18 column. The mobile phase 0.1 % phosphoric acid. Injection volume was 20 µl, flow rate 1.0 mL/min with UV detection at 210 nm. Organic acids were identified and quantified by comparing the retention times and peak area of the samples against standards. Were determined tartaric, Citric and lactic acids. According to the obtained data, was observed following total concentration of organic acid Savage – 5.7 %, Rkatsiteli – 6.3 %, Ojaleshi – 7.2 %, Aladasturi – 7.7 %. Based on the results can conclude that was selected simple, rapid, reliable method for analysis of grapevine shoots and was quantified individual and total content of three important organic acids in shoots of four Georgian grapevine varieties. Our studies would lay the foundation for effective qualitative and quantitative evaluation of organic acids in Georgian grapevine shoots.

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48.	<p>Murtazashvili M., Chikviladze T., Tushurashvili P.</p> <p><b>Analysis of Synthetic Cannabinoids AB-FUBINACA and 5-F-AB-PINACA in Plasma Using LC-MS/MS Method</b></p> <p><sup>1</sup> Tbilisi State Medical University, Department of Pharmaceutical and Toxicology Chemistry</p> <p><sup>2</sup> Tbilisi state Medical University, Department of Biochemistry justmary92@yahoo.com</p> <p><b>Purpose:</b> Synthetic cannabinoids emerged on the designer drug market in recent years due to their ability to produce cannabis-like effects. SCs represent an emerging worldwide drug problem, as these compounds are constantly being modified and rapidly sold as soon as they become available.[1] Despite the increasing number of SCs, there are few comprehensive screening methods for their detection in biological specimens.[2] In this context, the purpose of this study was to develop a fast and simple liquid chromatography–tandem mass spectrometry screening procedure for detection and identification of SCs in plasma.</p> <p><b>Methods:</b> This application note details a strategy for the successful extraction and analysis of indazole based synthetic cannabinoids from plasma. Chromatographic separation and detection were achieved using an Agilent Technologies 1290 liquid chromatograph coupled to a 6460-triple quad mass spectrometer with an electrospray source. Separation was performed on Zorbax Eclipse plus C18 (100×3.0 mm, 1.8 μm) column. The mobile phases consisting of 0.1 % water solution of formic acid: 0.1 % acetonitrile solution of formic acid with gradient elation. Sample volume - 5 μl, flow rate - 0.8 mL/min. Total chromatographic run time was 3 min. The MS was operated in positive ESI mode, and the analysis was operated in multiple reactions monitoring acquisition mode.</p> <p>The following parameters were evaluated for the validation of method for the analysis synthetic cannabinoids: selectivity, specificity, linearity, limit of quantitation, limit of detection, within- and between-day precision, accuracy, matrix effects and extraction recovery.</p> <p><b>Results:</b> Mass spectrometer parameters for both synthetic cannabinoids were presented. Both of the compounds were well-separated by their retention times and/or transitions.</p>

	<p>Linearity for analytes was established along the range of 0.2–100 ng/mL. Intraday and interday accuracy and precision data were all within acceptable limits <math>\pm 15\%</math> RSD. Recovery ranged from 84% to 104% with an average of 93% and matrix effects were less than 15%. This method has shown to be selective and specific, providing no evidence of interference or carryover concerns</p> <p><b>Conclusions:</b> Estimated LODs make this assay suitable for the analysis of biological material. The procedure can be easily expanded for both substances, which is an indispensable advantage in the dynamically developing drug market. It can have wide application in various analytical forensic and clinical laboratories.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. European Monitoring Centre for Drugs and Drug Addiction. Perspectives on drugs. Synthetic cannabinoids in Europe. 2017</li> <li>2. <b>Katarzyna A., Piotr A.</b> Simple screening procedure for 72 synthetic cannabinoids in whole blood by liquid chromatography–tandem mass spectrometry. <b>Forensic Toxicology</b>. 2018; 36(2): 280–290</li> </ol>
49.	<p>Nadaraia N., Barbakadze N., Kakhabrishvili M.  <b>•New Hydrazones of Epiandrosterone</b></p> <p>TSMU, I. Kutateladze Institute of Pharmacochimistry  Department of Plant Biopolimers and Chemical Modification of Natural Compounds  n.nadaraia@tsmu.edu</p> <p>Among steroidal hydrazones compounds with various biological activity were identified in which antiproliferative and cytotoxic activity occupies a special place. It is known, that steroids modified with adamantane sometimes are characterized with increasing a certain specific activity [1].</p> <p>Some of the azasteroids of 5<math>\alpha</math>-series synthesized by us were exhibited cytotoxic activity [2]. In order to study correlation of structure-activity on the basis of tigogenin 3<math>\beta</math>-acetoxy-5<math>\alpha</math>-pregn-16-en-20-one <b>1</b> was synthesized, from which epiandrosterone <b>2</b> was obtained and by esterification of the latest 3<math>\beta</math>-(1-adamantoat)-epiandrosterone <b>3</b> was formed. By modification of ketones <b>2,3</b> with corresponding arylhydrazines and arylhydrazides two series of hydrazones <b>4-8</b> and <b>9-13</b> were synthesized. Their structures were determined by IR, NMR, mass-spectral data and <i>in vitro</i> cytotoxic activity were studied.</p>



Among the synthesized compounds some hydrazones **4-7** of epiandrosterone were exhibited cytotoxic activity, while the hydrazones modified by 1-adamantanecarboxylic acid **9,10** showed smaller activity and steroids **8,11-13** lost this activity.

It is established, that for the exhibition of cytotoxic activity among the studied compounds **4-13** the most favorable are the presence of hydroxygroup at C-3 and fragment of *m*-nitrobenzoylhydrazone at C-17 in 5 $\alpha$ -androsterone ring (hydrazone **5**).

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50. Nemsitsveridze N., Khvedelidze S., Nikuradze N., Dugashvili N., Zarkua T.

#### •The Role of Management in the Turnover of the Psychotropic Drugs

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The role of a manager is absolutely vital in overturn of the medicaments which are under special monitoring. In Georgia, these types of drugs, as well as the narcological aid are regulated by the constitution and normative acts signed by Georgia as part of many international treaties. The goal of this research was to present this statement to the managements of authorized drugstores and analyse the data received from them. For this purpose, we conducted interviews with the managers, as well as the government representatives. The results of the research showed that in Georgia



	<p>psychotropic medicine are distributed both for wholesale and individual purchases. 408 permission documents have been signed to allow authorized drugstores to sell such medicine, amongst these 242 apothecaries are active and other 100 have the permission to proceed with such activity. Based on demand quota, here is the list of list of drugs that are imported the most: Deazepam, Fenobarbital, Clonazepam, Medazepam, Bromazepam; Survey also showed that the most demanded and requested medicines are: Diazepam, Alprazolm, Pregabalin, Bromazepam, Klonazepam and Lorazepam</p>
51.	<p>Nikuradze N., Nemsitsveridze N., Dughashvili N., Zarkua T., Iamanidze N. (Georgia):  <b>•Some Aspects of Medical Tourism Based on Data of Tbilisi’s Family Hotels</b></p> <p>Tbilisi State Medical University, Department of Social and Clinical Pharmacy  n.nikuradze@tsmu.edu</p> <p>Tourism – As form of worldwide service industry was firstly established by wealthy and powerful ancient Romans, as they travelled to gaze upon Pyramids for the first time. However, it gained increased popularity starting from the 17<sup>th</sup> century. It became essential industry for many countries (France, Egypt, Greece, Italy, Spain, USA and etc), as it created additional income as well as opportunities. It covered nearly every field starting from culture, history, religion, education, business, trade, healthcare and etc. The last one is such a fast growing sector that it has overtaken world’s pharmaceutical business by times four. The goal of this paper was to analyze how popular and profitable are the resources that our country possesses and their potential: Climate, Thermal and Mineral Waters, Balneotherapeutic Health Resorts, Spaleotherapy in caves and medical services overall; Why aren’t medical services enough to be competitive with other countries; Why the trust on a worldwide scale is so low, while the prices remain affordable. For instance, the hip replacement surgery in USA costs up to 47 thousand dollars, in Poland – around 6, and here that price is around 3 thousand. What are the factors that prevent us from boosting the income received from medical tourism? The data and results are provided based on general information, usage of Internet resources, as well as the statistical input we received from three different hotels in Tbilisi.</p>
52.	<p>Nozadze B., Kutkhashvili M., Shonia E.  <b>•Determination of Fentanyl in Postmortem Blood with LC-MS/MS</b></p> <p>Levan Samkharauli National Forensics Bureau  batu.nozadze@gmail.com</p> <p>Fentanyl is an opioid used as a painkiller together with other medications</p>

for anaesthesia and analgesia. Fentanyl is also used as a recreational drug, often mixed with heroin or cocaine. Fentanyl provides some of the effects typical for other opioids through its agonism to the opioid receptors [1,2]. Fentanyl can also bind delta and kappa opioid receptors, but with a lower affinity. It is about 100 times stronger than morphine [3].

Over recent years, the abuse of fentanyl and other opioids has become a slow-motion mass disaster in Georgia, resulting an increased number of drug-related deaths. Various postmortem biological samples are collected by forensic pathologists during autopsy and then sent to a toxicology laboratory for further analyses on the presence of various compounds such as Fentanyl.

The purpose of the research is to develop an optimal method of isolation Fentanyl from a postmortem blood, also to describe the development and validation of a new liquid chromatography-tandem mass spectrometry (LC-MS/MS)-based method.

An optimal condition for isolation were determined by means of liquid-liquid and solid-phase extraction. A sensitive and highly specific method for the determination of fentanyl in whole blood using combined liquid chromatography and mass spectrometry (LC-MS) with electrospray ionization was developed. Instrumental parameters for quantitative analysis were set for multiple reaction monitoring. Quantification was performed by using an Agilent technologies 1290 Infinity LC system consisting a DAD and coupled to a Agilent technologies 6460 Triple quadrupole LC/MS. The column was a 100 mm X 4 mm 3  $\mu$ m particle size Zorbax Eclipse C18, maintained at 35°C and protected with a UHPLC GUARD Zorbax Eclipse column of the same material using 0.1% aqueous formic acid and 0.1% formic acid in acetonitrile.

The validation of this method has been performed. Recoveries was 89%, and detection limit was 0.1 ng/ml. The coefficient of variation for repeatability was lower than 4%. Limits of quantitation were 0.5 ng/ml. Linearity was in the range of 0.1 to 50 ng/m; ( $r > 0.997$ ,  $n = 9$ ).

The method is not expensive, it needs a minimum time for blood sample preparation and has a run-time of 2.5 min for instrument analysis (retention times of fentanyl was 0.7 min). The developed and validated LC-MS/MS method is very simple and more rapid than other similar methods. It can be useful for the rapid quantification of fentanyl in human plasma in forensic toxicology analyses.

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53.	<p>Oproshanska T.V., Khvorost O.P.</p> <p><b>•The Analysis of Morphological Features of Medicinal Plant Raw Material</b></p> <p>National University of Pharmacy, Kharkiv, Ukraine arctium55@ukr.net</p> <p>The assortment of medicines based on medicinal plant raw material is increasing and increasing every year. At the same time, the base of raw material is expanding, which leads to necessity to determine quality of new types of plant raw material. In the State Pharmacopoeia of Ukraine 2 editions and Appendices 2.1-2.3 are included 263 monographs on medicinal plant raw materials (respectively 149, 75, 18 and 21 monographs) [1-4].</p> <p>One of the important parameters of the quality of medicinal plant raw material is its identification, which includes the determination of macroscopic and microscopic characteristics and the study of qualitative content. Macroscopic features of medicinal plant raw material are important because they provide an opportunity to determine the identity of raw materials in the first stage of identification. That is why, it is important to analyse literary sources with a macroscopic description of medicinal plant raw material to identify approaches to its description.</p> <p>The aim of the work is to analyse monographs of the State Pharmacopoeia of Ukraine with medicinal plant raw materials root, rhizome, leaves and herb to establish common and distinguishing features of their morphological description.</p> <p><b>Materials and methods:</b> For the study was used more than 200 morphological descriptions of medicinal plant raw materials, which are available in the monographs of the State Pharmacopoeia of Ukraine [1-4].</p> <p><b>Results and discussion:</b> Having analysed more than 200 morphological descriptions of medicinal plant raw materials of roots, rhizomes, leaves and herbs, it is found that the authors use different approaches to the description. In most monographs, the general features of the description are "shape" and "surface colour" for the root and rhizome and "leaf blade shape", "colour", "presence / absence of pubescence" for leaves and herb. Such features as "branching", "description of the root neck", "bark surface", "breaking" at the roots and rhizomes and "leaf type", "leaf margin", "presence /</p>

	<p>absence of petiole", " form of stem " in the leaves and herb in some monographs are absented in others. In addition, some authors pay attention only to the presence of diagnostic features, while such description parameters as "appearance", "leaf shape", "leaf type", "pubescence", etc. are missing. Other sources describe common morphological features that make it impossible to distinguish the raw material of one species from another. This variety approach to the morphological description of medicinal plant raw materials makes it difficult to carry out a comparative analysis of the morphological characteristics of certain medicinal plant raw materials, especially if there are several species of the same genus.</p> <p><b>Conclusions:</b> The analysis showed that a common feature in the description of the root, rhizome is the shape and colour of the surface; in the description of leaves and herbs - leaf blade shape, colour, presence / absence of pubescence. In addition, most monographs describe different morphological features of the raw material, which leads to different levels of its description and the inability to identify medicinal plant raw materials of a particular species at this phase of the study.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. State Pharmacopoeia of Ukraine (2014). (2-d ed.). Vol. 3. Kharkiv: Government enterprise "Ukrainian Scientific Pharmacopoeia center of quality of medicine preparation, 732.</li> <li>2. State Pharmacopoeia of Ukraine (2016). (2-d ed.). App. 1. Kharkiv: Government enterprise "Ukrainian Scientific Pharmacopoeia center of quality of medicine preparation, 360.</li> <li>3. State Pharmacopoeia of Ukraine (2018). (2-d ed.). App. 2. Kharkiv : Government enterprise "Ukrainian Scientific Pharmacopoeia center of quality of medicine preparation, 336.</li> <li>4. State Pharmacopoeia of Ukraine (2018). (2-d ed.). App. 3. Kharkiv: Government enterprise "Ukrainian Scientific Pharmacopoeia center of quality of medicine preparation, 416.</li> </ol>
54.	<p>Orjonikidze M., Tzagareishvili G., Lagazidze D., Vachnadze V. (Georgia):  <b>•Evaluation of Leukobetin Incorporation into Liposomes</b></p> <p>TSMU, I. Kutateladze Institute of Pharmacochemistry, Tbilisi, Georgia  m.orjonikidze@tsmu.edu</p> <p>In the spectrum of plant-based medications, ones containing alkaloids hold an important place. Namely medications containing indole alkaloids from the genus <i>Vinca</i>. Researchers at the I. Kutateladze Institute of Pharmacochemistry have developed a biologically active substance from the underground parts of <i>Vinca herbacea</i> Waldst. et Kit – Leukobetin – with the property to stimulate leukopoiesis.</p>

	<p>Since all chemotherapy drugs inhibit the activity of the bone marrow, the search for plant derived means for post-chemotherapy hemopoiesis restoration is a relevant issue. Concerning the dosage form of Leukobetine, a liposomal form was chosen. Liposomal vesicles were obtained using the method of hydration of a lipid film of soy lecithin, cholesterol and the active substance of Leucobetine in the form a sum of alkaloid tartrates. Vesicle size between 120 – 150 nm (Zetasizer Nano ZS (Malvern Instruments, Malvern, UK). The size and shape of the liposomal dosage form was confirmed via negative contrast transmission electron microscopy (Tesla BS 500). The level of incorporation of a medication into the vesicles is an important technological parameter determining the efficiency of liposomal dosage forms.</p> <p><b>Aims of the research.</b> Determination of the efficiency of Leukobetin incorporation into liposomes</p> <p><b>Materials and methods.</b> The experiment used the following objects: soy phosphatidylcholine (Sigma), cholesterol, Leukobetine-tartrate developed in the laboratory of alkaloids at the TSMU I. Kutateladze Institute of Pharmacochemistry. To assess the loading efficiency, the dispersion of the drug was first purified from the non-incorporated drug by methods of gel filtration. For quantification, an HPLC analysis method was developed. Maidine was chosen as the marker alkaloid.</p> <p><b>Experiment.</b> Leukobetin-tartrate not incorporated into the liposomes was separated by gel filtration, passing the liposome suspension through a Sephadex G50 column (eluent-water, flow rate 0.5ml / min). Two fractions were obtained: 1 — a fraction of liposomes containing Leukobetin, 2 — a fraction of Leukobetin not incorporated into liposomes. A quantitative HPLC analysis method was used to determine the content of the marker alkaloid maidine in the mentioned fractions. The efficiency of incorporation into the liposomes was evaluated by the difference in the content of maidine in the initial suspension and in the first fraction.</p> <p><b>Results.</b> The study has shown that the average incorporation of Leukobetin into liposomes is 75-80%.</p> <p><b>Conclusions.</b> The developed technique allows the evaluation of the effectiveness of Leikobetin incorporation into liposomes.</p>
55.	<p>Papiashvili N.<sup>1</sup>, Gongadze N.<sup>2</sup>, Bakuridze K.<sup>1</sup> (Georgia):</p> <p><b>•Designing, Technology and Study of Antihypertensive Potential of Orodispersible Tablet’s Containing Herbal Phenolic Compounds</b></p> <p><sup>1</sup>TSMU, Department of Pharmaceutical Technology  <sup>2</sup>TSMU, Department of Pharmacology  nika.papiashvili1991@gmail.com</p>

**Background:** Arterial hypertension still remains the main problem of modern cardiology(1). Studies provide evidence that epoxygenase metabolic products of arachidonic acid, such as epoxyeicosatrienoic acids (EETs), being involved in blood pressure regulation (2,3,4) are rapidly transformed in the body by soluble epoxide hydrolase (sHE) into less active(5)-dihydroxyeicosatrienoic acids (DHETs). The purpose of this study was to develop orodispersible tablets (ODTs) containing structural analogues of sHE inhibitors and evaluate their influence on cardiovascular parameters and baroreflex sensitivity (BRS) in normotensive Wistar-Kyoto (WKY) and hypertensive rats (HR).

**Methods:** From domestic plants was selected individual compound-Hesperidine using modern instrumental methods for determination the content of the active substance as well as parameters characterized uniformity, mechanical strength, accuracy of dose, dissociation and solubility of ODTs. During experimental study have used direct compression technology, fillers, and disintegrators. In male anesthetized WKY and HR (Two kidney, one clip) with implanted catheters into right jugular vein and carotid artery alterations in blood pressure (BP), heart period (HP) and BRS were assessed after i.v. administration of Hesperidine.

**Results:** In HR, BP was significantly higher vs. WKY rats ( $162 \pm 7,4$  mm Hg and  $108 \pm 6,2$ ,  $P < 0.05$ ) which was associated with reduction in HP ( $138 \pm 5,6$  ms,  $P < 0.05$ ) and BRS ( $0,42 \pm 0,06$  ms mmHg<sup>-1</sup>,  $P < 0,001$  in comparison with WKY rats ( $152 \pm 6,0$  ms and  $0,94$  ms mmHg<sup>-1</sup>, respectively) in WKY rats administration of Hesperidine 2,4 mg/kg did not markedly change hemodynamic parameters and BRS, which in HR along with significant hypotensive action ( $-24 \pm 5,0$  mmHg) it increased HP ( $148 \pm 2$ ms) and improved BRS ( $0.66 \pm 0,0406$  ms mmHg<sup>-1</sup>,  $P < 0.05$ ).

**Conclusion:** It is suggested that plant derived phenolic compounds as structural analogue of sHE inhibitors may provide hypotensive effect indicating about their possible positive properties in hypertensive states.

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56. Prokopenko Yu., Georgiyants V.

•Herbal Resources for New Antiepileptic Drugs Creation

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Introduction. Nowadays, the problem of increasing the number of neurological pathologies, in particular, epilepsy, which is one of the most widespread neurological diseases, remains relevant. At the same time, epilepsy treatment is still the most pressing problem, mostly due to the fact that the known methods or remedies are not sufficiently effective: improvement of the patients' condition or regression of clinical manifestations of the disease is observed only in every second case, and every fourth case of epilepsy is characterized by drug resistance. In this regard, patients suffering from epilepsy receive predominantly palliative care.

The lack or insufficiency of the desired therapeutic effect of the most popular anticonvulsants, preferably synthetic, is apparently due to their limited influence on individual pathogenesis. However, the use of herbal remedies may be appropriate and substantiated, given the complex impact seizure development mechanisms and mild psychotropic effects, which significantly eliminate the development of epileptic personality changes.

Aim of the research. Therefore, the search of new algorithms, development and standardization of new herbal remedies with proven anticonvulsant activity is expedient and relevant.

Methodology of the research. During the present study, theoretical and experimental substantiation of the approaches to the search for the most promising herbs development and standardization was carried out. It's worth mentioning that the possibilities and principles of the use of different types of herbs or herbal extracts as anticonvulsants were pharmacologically substantiated on the models of seizures induced by PTZ, thiosemicarbazide, picrotoxin, camphor, strychnine, MES, and PTZ-induced kindling. Besides, to identify, what substances act like the main markers influencing on epileptic attack development mechanisms, the modern analytical methods, i.e: HPLC, UPLC, HPTLC, GC-MS, HILIC MS/MS, NIR, FTIR, spectroscopy, as well as molecular docking and QSAR programs, were used.

Results. Qualitative and quantitative correlation using BuildQSAR software between the content of biologically active compounds in the dry extracts of different herbs – members of the *Lamiaceae*, *Fumariaceae*, *Solanaceae*, *Betulaceae*, *Polemoniaceae*, *Berberidaceae*, *Caprifoliaceae*, *Oleaceae*, *Hydrangeaceae*, and *Santalaceae* families were determined. Correlation between flavonoids and rutin content and the significant of anticonvulsant activity was found. Statistically significant correlation was 0.551 for flavonoids, 0.572 for rutin and 0.580 for amino acids.

	<p><i>In silico</i> study of correlation between chemical composition and anticonvulsant activity of herbal material using PASS software and molecular docking using Scigress Explorer was carried out for the screening. Considering the obtained results of chemical composition of the studied herbs, the most specific components of the above mentioned extracts were selected for the further molecular docking study and a deeper understanding of mechanisms of their anti-seizure activity, but affinity of the given chemical structures to proteins was not detected.</p> <p>The main chemical compounds of the given herbs were isolated, and flavonoid fraction, isoquinoline alkaloid fraction, protein-polysaccharides, as well as individual alkaloids have shown their moderate anticonvulsant activity on the model of PTZ-induced seizures.</p> <p>On the basis of the study the general algorithm of the aimed search for herbs having anticonvulsant activity is proposed. «AntiConvulsant_Test» software was developed and tested to calculate the anticonvulsant action possibility depending on its chemical composition.</p> <p><u>Conclusions.</u> On the basis of the research, the possibilities and the principles of the use of medicinal plants in epilepsy were formulated.</p>
57.	<p>Sagareishvili T., Shalashvili K. (Georgia):  <b>•Flavonoids of <i>Salvia Garedji</i> and <i>Trifolium Canescens</i></b></p> <p>TSMU, I. Kutateladze Institute of Pharmacochimistry  Department of Phytochemistry, Laboratory of Phenolic Compounds  t.sagareishvili@tsmu.edu</p> <p><i>Salvia garedji</i> Troitzk. is an endemic species of Georgia. It significantly differs from <i>Salvia officinalis</i> L. by its chemical composition [1]. The content of condensed tannins in <i>S. garedji</i> is average 25.3 % that makes a sense to search the ways of its practical use.</p> <p>Glucuronides of apigenin and luteolin were isolated from the over ground parts of <i>S. garedji</i> previously extracted by acetone and after by aqueous alcohol. The structures of obtained compounds were determined by their physical-chemical properties, UV, mass-spectrometry and NMR spectral analysis.</p> <p>Derivatives of luteolin also were isolated from the flowers of <i>Tr. canescens</i> Willd. Isolated compounds from these species are described for the first time.</p> <p>T. Sagareishvili. <i>Phenolic compounds and essential oils of some higher plants growing and introduced in Georgia</i>. Tbilisi, 2008, 213 p.</p>



58. Sanikidze T., Tikaradze E., Ormotsadze G.

**•The Structure and Risk of Chronic Morbidity in Some Villages of the Upper Imereti Region of West Georgia and Their Molecular and Cytogenetic Markers**

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The purpose of our study was to identify the nature of the cause-effect relationship between the risks of developing of Chronic Obstructive Pulmonary Disease (COPD) and Cardio-vascular Disease (CVD) in patients residing in the villages of Chiatura district, characterized by varying degrees of environmental stress. The residents (n=400) of the Chiatura district living in the villages, Khreiti, Perevisa and Rgani were examined. The villages are characterized by different degrees of ecological tension (the villages differ both in their remoteness from sources of environmental pollution - manganese mining quarries and the scale of its extraction, which allows them to rank according to the degree of environmental tension: Khreiti - low, Perevis - medium, Rgani - high). In the patients the blood general redox balance and genetic parameters (the number of micronuclei in the scrapings of the oral mucosa) were studied. In the zone of moderate environmental stress (the village of Perevisa), a significant increase in the indicator of the total antiradical activity of blood plasma and an increase in the frequency of micronucleated buccal cells were revealed in comparison with the zone of low environmental stress (the village of Khreiti). In residents of the village of Rgani, characterized by the highest level of pollution, the indicator of the total antiradical activity of blood plasma decreases sharply, the number of micronuclei decreases, the presence of various types of damage to the nucleus is noted, which is characteristic of intensive apoptosis. Under the conditions of moderate air pollution, observed mobilization of protective anti-radical and replication mechanisms in the body are aimed at preserving the stability of the somatic cell genome. Identified oxidative stress can also act as mediators of secondary alteration and the development of the inflammatory process in the circulatory bed, resulting in an increased risk of arterial hypertension (AH) against the background of a relatively high risk of chronic nonspecific obstructive pulmonary diseases (COPD). High level of environmental pollution contributes to the development of permanent intense oxidative stress in the affected tissues of the respiratory tract. That contributes to the development of predominantly nonreparable changes in the cell genome, apoptosis and intensification of secondary oxidative stress, which, under conditions of depletion of antiradical protection, causes preferential defeat of the microenvironment of apoptotic cells, the development of local effects, reflected in a sharp increase in the risk of COPD.

59. Savchenko L.<sup>1</sup>, Ivanauskas L.<sup>2</sup>, Materiienko A.<sup>1</sup>, Georgiyants V.<sup>1</sup>

**Stability Estimation of the Compounding Deflagilic Ointment**

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**Introduction and aim of the research.** The need of the compounding medicines stability comprehensive study is an urgent problem for the pharmaceutical industry of Ukraine. Requirements for their quality regulate by number of the State Pharmacopoeia of Ukraine (SPhU) articles. Their shelf life is limited to 10 days. At the same time, its increasing for compounding preparations for stock, is possible only in the presence of relevant scientific data concerning the study of all necessary quality parameters during a certain storage period. The aim of our work was stability estimation of compounding deflagilic ointment (sodium thiosulfate 5.0; urea 5.0; water purified 3.0 ml; paraffin liquid 10.0; wool fat 10.0) by the required pharmacopoeial parameters: description, quantitative content of active pharmaceutical ingredients, microbiological purity, rheological parameters.

**Methodology of the research.** Studies were conducted on three ointment samples from three different series prepared in the same pharmacy. The samples were stored at  $5 \pm 3^\circ\text{C}$  and relative humidity 60-65 %. Analytical balance AXIS ANG 200 (Poland), spectrophotometer Evolution 60S (USA), rotary viscometer Rheolab QC (Anton Paar, Austria), cabinet of biological safety (AC2-4E1 «Esco», Indonesia) were used for the work.

**Results.** Throughout the shelf life (6 months) the ointment remains homogeneous. There are no signs of its bundle or the formation of individual visible particles separated from the ointment base. After four months of storage, the ointment gradually changes the color (from light yellow to a more saturated yellow). The ointment smell remains unchanged.

The ointment active pharmaceutical ingredients quantitative content determination was carried out in a freshly prepared ointment, and then every other 30 days of storage (on the 60<sup>th</sup>, 90<sup>th</sup>, 120<sup>th</sup> and 150<sup>th</sup> day). Sodium thiosulfate quantitative determination was done by the iodometric titration method (by the SPhU requirements). For the urea assay spectrophotometric method was developed. The determination was based on the reaction of indophenol formation with blue color and maximum absorption at the 630 nm. After 3.5 months of storage, the sodium thiosulfate amount in three tested ointments was 4.75 g (95.0 %), 4.74 g (94.8 %) and 4.72 g (94.4 %). The urea amount was 4.66 g (93.2 %), 4.59 g (91.8 %) and 4.55 g (91.0 %). The obtained results correspond to the SPhU requirements (the tolerance is  $\pm 10$  %).

To assess of the ointment structural stability and the degree of its rheological parameters preservation, determination of its structural and mechanical parameters within 30 days was made (on the 10th, 20th and 30th day of storage, table 1).

Table 1: Indicators of the deflagilic ointment rheological parameters for 30 days

Parameter	10 <sup>th</sup> day of storage	20 <sup>th</sup> day of storage	30 <sup>th</sup> day of storage
Hysteresis area, A, Pa/s	34399.20	30844.46	31813.89
Yield stress, $\tau_0$ , Pa	0.93	0.60	0.53
Structural viscosity at $\tau_0$ , $\eta_{st}$ , Pa×s	1.71	2.05	2.44
Mechanical stability, MS	1.45	1.37	1.39

The obtained results indicate that the ointment has sufficient thixotropic ability. It can dissolve on the skin during application, is well-spread, has a satisfactory consistency and will remain stable for all storage period.

The ointment microbiological purity was assessed using double-layer inoculation method. After 6 months of storage total viable aerobic count were 20 CFU per gram for bacteria and 10 CFU per gram for fungi. Staphylococcus aureus and Pseudomonas aeruginosa were absent during all period of storage.

**Conclusions.** The obtained results indicate the possibility of deflagilic ointment shelf life increasing from 10 days to 3 months at  $5 \pm 3$  °C and relative humidity 60-65 % based on the ointment chemical stability studies results and changing of its color after four months of storage.

60. Shekiladze E.<sup>1</sup>, Mdzinarishvili T.<sup>2</sup>, Sanikidze T.<sup>1</sup> (Georgia):  
**Antioxidant Activity of Green Tea Catechins Containing Liposomes on Jurkat and MDCK Cells Experimental Models**

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Identification of natural compounds with effective pharmacological properties and the investigation of molecular mechanisms of their activity is essential for the creation of pharmaceutical preparations that can be therapeutics for a wide range of common diseases. Increase effectiveness and ensure stabilization of phenolic compounds, characterised by low solubility in water, poor absorption and fast metabolism, can be

	<p>accomplished by establishing liposomes.</p> <p><b>Purpose:</b> In the research the impact of DPPA and DPPC liposomes on the antioxidant activity of green tea catechins (GTC) on Jurkat and MDCK cells experimental models was examined.</p> <p><b>Method:</b> In order to model the oxidative stress, 30% H<sub>2</sub>O<sub>2</sub> was added to cells incubation medium Viability of Jurkat and MDCK cells was studied via the MTT test.</p> <p><b>Results:</b> Our research results showed that, Jurkat and MDCK cells revealed selective sensitivity to GTCs, which related with the synergistic effect of exogenous and endogenous antioxidant system of these cells. The positive charged DPPC liposomes easy interacts with the negative charged cellular membranes and strengthens the antioxidant effect of GTCs in both types of cells. Negative charged DPPA liposomes can only weaken the effect of GTCs on the MDCK cells, incubated at the intensive oxidative stress conditions.</p> <p><b>Conclusion:</b> Based on the research results, we can conclude, that liposomes can modulate bioactivity and therapeutic effects of GTCs.</p>
61.	<p>Sikharulidze Z., Natsarishvili K., Dumbadze R. and Sikharulidze K.</p> <p><b>•Resistant Cultivar–Guaranty for Increasing of Crop Yield and Food Safety</b></p> <p>Batumi Shota Rustaveli State University, Institute of Phytopathology and Biodiversity zsikharulidze@ymail.com</p> <p><b>Introduction.</b> Wheat is the staple food crop during the millennium and the base for global food security. Wheat rusts are one of the most important biotic factors which cause significant economic damage. The major and ecologically reliable way for rust control is development the resistant wheat cultivars and their realizing. “Green revolution” started by Norman Borlaug in 50-70th of the 20th century continues to the day. The main goal of the PhD works completed in the last three years was to select new rust-resistant, high yielding and adapted to local conditions wheat cultivars.</p> <p><b>Methods.</b> Appropriate wheat testing scheme and international methods were used for immunological evaluation of wheat breeding material at seedling and adult plant stages (Анпилогова и др., 2000; Knott, 1989, Peterson <i>et al.</i>, 1948); To analyze of disease progress on breeding materials the coefficient of infection (C.I.), Area Under Disease Progress Curve (AUDPC) and rAUDPC was calculated for each entry (Stubbs <i>et al.</i>, 1986). The yield and yield component were counted in accordance with the international standards (Roelfs <i>et al.</i>, 1992). The trial results were analyzed using ANOVA.</p> <p><b>Results.</b> In the frame of PhD works the nurseries: 17FAWWON-SA, 20HRWYT, 17IWWY IR, 4<sup>th</sup>IWWSRRN, 1<sup>st</sup>CACWWYT obtained from CIMMYT and ICARDA was evaluated under artificial infection of stem rust and yellow rust and 15 genotypes resistant to diseases were selected. Also, these genotypes were tested in the different agroecological zones</p>

	<p>Meskheta, Javakheti, Shida Kartli) and the main agronomic characteristics (spike length, grain number in spike, 1000 kernel weight, average yield) were analyzed by ANOVA. Statistical analysis of trial results showed that the effects of genotypes were statistically significant at all locations but the effect of geographical zones was not statistically significant.</p> <p>Almost all selected genotypes exceeded the standard-variety Bezostaya 1 by yield and yield components. As a result of the trials' data analysis the genotype - CUPRA-1/3/CROC1/AE.SQUARROSA (224)//2*OPATA/ 4 /PANTHEON have been selected from International nursery 17FAWWON-SA as the improved wheat variety for official release in Georgia. The part of entries (MCCORMICK/TREGO, TAM-107/T21, NC00-14622/213 KR11-003) is transferred for registration.</p> <p><b>Conclusion.</b></p> <p>The genotype CUPRA-1/3/CROC1/AE.SQUARROSA(224)// 2*OPATA/ 4 /PANTHEON with the best characteristics was registered by Saqpatent as new variety "Lomtagora 143".</p> <p><b>References:</b></p> <p>Анпилогова Л.К., Волкова Г.В. Методы создания инфекционных фондов и оценки образцов пшеницы на устойчивость к вредоносным болезням, Краснодар, 2000.</p> <p>Knott, D.R. 1989. The Wheat Rusts-Breeding for Resistance. Springer-Verlag, Berlin Heidelberg.</p> <p>Peterson, R.F., Campbell A.B., and Hannah, A.E. 1948. A diagrammatic scale for estimating rust intensity on leaves and stems of cereals. Canadian Journal of Research 26: 496-500.</p> <p>Roelfs, A.P., Singh, R.P. and Saari E.E. Rust diseases of Wheat: Concepts and Methods Diseases Management. Mexico.DF:CIMMYT.</p> <p>Stubbs, R.W., J.M. Prescott, E.E. Saari, and H.J. Dubin. 1986. Cereal Disease Methodology Manual. CIMMYT: Mexico</p>
62.	<p>Simard F., Gandrieau S., Derot-Desclaux É., Legault J., Ripoll L., Pichette A.</p> <p><b>Wastewater Obtained During Industrial Processing of <i>Betula papyrifera</i> Wood is a Source of Antioxidant Polyphenols</b></p> <p>Laboratoire LASEVE, Département des Sciences Fondamentales, Université du Québec à Chicoutimi, 555, Boulevard de l'Université, Chicoutimi, Québec, Canada G7H 2B1</p> <p>Fractionation of the wastewater obtained by industrial rotary cutting of white birch wood (<i>Betula papyrifera</i>) led to isolation of two new phenolic glycosides and one new cyclic diarhylheptanoid never reported before. Their structures were identified thanks to MS and NMR data. Along with them, nine known compounds were similarly isolated and identified, including three lignans), three cyclic diarhylheptanoids and</p>

	<p>three phenolic glycosides. Antioxidant activity of isolated compounds were evaluated using ORAC and a WS1 cell assay. Carpinontriol A showed the highest ORAC value (<math>7 \pm 1 \mu\text{mol Trolox} / \mu\text{mol}</math>) and lyoniresinol glucoside the lowest <math>\text{IC}_{50}</math> in the cellular assay (<math>0.6 \pm 0.1 \mu\text{M}</math>). Monthly monitoring of the chemical composition and biological activity of wastewater obtained directly from the industrial plant was also conducted. This work highlights the potential of valorization of this industrial waste into valuable bioproducts.</p>
63.	<p>Shalashvili K., Gauarashvili N.  <b>•Biologically active compounds of <i>Rhododendron ponticum</i> L.</b></p> <p>TSMU, I. Kutateladze Institute of Pharmacochimistry  Department of Phytochemistry, Laboratory of Phenolic compounds  k.shalashvili@tsmu.edu</p> <p>The genus <i>Rhododendron</i> is represented by six species in Georgia: <i>Rh. luteum</i> Sweet., <i>Rh. ungeronii</i> Trautv., <i>Rh. ponticum</i> L., <i>Rh. Sochadze Gwaladze</i>, <i>Rh. caucasicum</i> Pall., <i>Rh. smirnovii</i> Trauru. They are decorative plants and also are used for treatment of various diseases in traditional medicine.</p> <p>An anti-herpetic ointment “Rhodopes” containing the sum of phenolic compounds as active substance was developed at the I. Kutateladze Institute of pharmacochimistry [1]. The ointment is recommended for treatment of lesions caused by <i>Herpes simplex</i> virus.</p> <p>Due to the scarcity of <i>Rh. ungeronii</i> as raw material we started to study the composition of polyphenolic compounds of other species of genus <i>Rhododendron</i>, in particular phenolics of <i>Rh. ponticum</i> in order to compare them.</p> <p>The air-dried leaves of <i>Rh. ponticum</i> were extracted by aqueous ethanol. The obtained extract was evaporated and aqueous residue was fractionated by chloroform and ethyl acetate. The sum obtained by ethyl acetate contained the main phenolics was evaporated to the dry residue (yeld 11 %). 24 phenolic compounds were observed in this sum using two dimensional TLC. The main components were represented by catechins, anthocyanins, flavonols and flavones. This was further confirmed by HPLC-MS analysis.</p> <p>Ethyl acetate sum was separated on the polyamide column into 3 enriched fractions. 5 individual substances were obtained by the chromatography of fraction 2 on the silica gel. Three of these compounds by their physical-chemical properties, UV, IR and NMR spectroscopic data were identified as quercetin, isoquercitrin and catechine. According to the literary sources these compounds are biologically active and constitute a part of “Rhodopes” ointment’s active substance [1]. The study of other</p>

	<p>phenolics of <i>Rh. ponticum</i> continues.</p> <p>E. Kemertelidze, M. Alania, K. Shalashvili, T. Sagareishvili, N. Kavtaradze. <i>Original remedies from the flavonoid containing plants of Georgia</i>. Georgian National Academy Press, Tbilisi, 2016, 120 p.</p>
64.	<p>Sulakvelidze M., Novikova Zh., Mulkijanyan K. (Georgia):  <b>•Glycosides from <i>Tribulus terrestris</i> - Analgesics with Minor Gastrotoxicity</b></p> <p>TSMU, I.Kutateladze Institute of Pharmacochemistry  m.sulakvelidze@tsmu.edu</p> <p>Introduction: <i>Tribulus terrestris</i> (Goat's head) is traditionally used in folk medicine for the treatment of many diseases due to its anti-inflammatory, anabolic, spasmodic, myorelaxant, hypotensive, hypoglycemic properties [1]. At the same time, little was known about the analgesic action of this extract, though it was quite predictable from its anti-inflammatory activity. In present investigation, we aimed to study analgesic potency of <i>T. terrestris</i> extract containing flavonoids and steroid glycosides (TTE) and evaluate its safety during chronic (28-day) consumption.</p> <p>Methods: The "Hot plate" assay was used to study the analgesic activity of TTE (100 and 200 mg/kg. i.p.) in mice [2]. Indomethacin and metamizole were used as reference drugs. Safety of TTE was studied in acute and chronic experiment in accordance with [3,4].</p> <p>Results: When assessing the safety of TTE in acute experiment it was determined that its LD<sub>50</sub> - &lt;500 mg/kg corresponds to category IV of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). In "Hot plate" assay, TTE revealed a dose-dependent analgesic effect that appeared equivalent to the one of reference NSAIDs. In chronic (28-day) toxicity study, it was established that differently from indomethacin and metamizole the TTE had minor irritant effect on the gastric mucosa: only slight hyperemia was observed.</p> <p>Conclusion: Hence, it can be concluded that TTE in the studied exhibits analgesic effect. Given that the specific effect of TTE was equivalent to the one of reference NSAIDs metamizole and indomethacin, but with much less gastrotoxicity, TTE may be of interest in the long-term treatment of chronic inflammatory processes. It is advisable to further study the chemical composition of TTE to identify the compound (s) responsible for its analgesic activity.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Chemistry Central Journal. 2017; 11: 60. doi: 10.1186/s13065-017-0289-x</li> <li>2. International Research Journal of Pharmacy, 2013; 4(1),15-19. doi: 10.7897/2230-</li> </ol>

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65. Tabatadze N., Tsomaia I.

•HPLC Analysis of Di-O-caffeoylquinic Acids from the Roots of *Cephalaria gigantea*

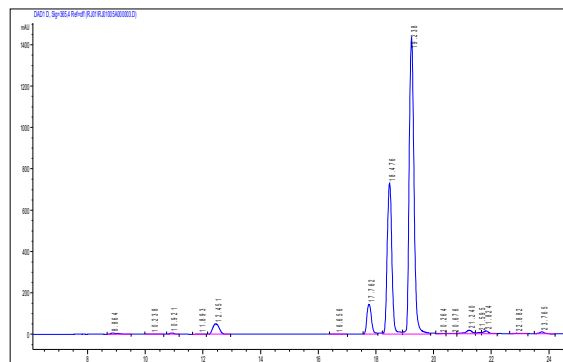
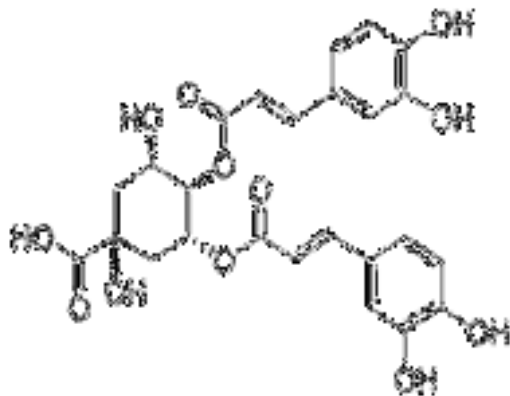
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The roots of *Cephalaria gigantea* (Ledeb.) Bobr. (Dipsacaceae), an endemic plant of Caucasus growing in Georgia, contain a large amount of triterpene saponins and phenolic compounds. The roots are well-known in traditional medicine as anti-epileptic, sedative and anti-inflammatory remedies.

The high performance liquid chromatographic (HPLC) analysis method was proposed for identification of two di-O-caffeoylquinic acid (CQA) compounds - **3,4-di-O-caffeoylquinic acid** and **3,5-di-O-caffeoylquinic acid**. The mobile phase A (H<sub>2</sub>O+HCOOH 0.1%) and phase B (Acetonitrile + HCOOH 0.1%) were used with gradient condition (acetonitrile 5% →40%). All solutions were of HPLC purity, volume injection 10μL. Solid phase - C18 reversed phase column Kinetex XB-Rp18, 250X4.6mm (Phenomenex), run time 25mn. UV detection was performed at 365nm.



The phenolic compounds - 3,4 di-O-caffeoylquinic acid (r.t. 19.273min) and 3,5-di-O-caffeoylquinic acid (r.t. 18.511) were reported for the first time from *Cephalaria gigantea* roots, which are well-known as antioxidant and DNA-protective ones.

66. Tetemadze N., Machutadze I.

•Peculiarities of the Composition of Acids in Sphagnum Species of the Percolation Bog of the Kolkheti Lowland



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Polysaccharides, phenols, hexadecanoic acid, fatty acids produced by some plants have recently attracted the attention of scientists because of their good antiseptic, immunomodulator, mycotoxic and cytotoxic effects. Over the past decade, biotechnology methods have been based on an innovative and interesting method - their use as an antimicrobial agent [1,2]. Today, scientists considered Sphagnum as a source of many biologically active substances that have antibacterial, antiviral, antifungal effects. Biologically active substances found in some species have the cytotoxic effect on cancer cells [3]. Sphagnum has long been used in ethnopharmacology for the treatment of infected wounds, eye diseases and intestinal infections [2]. Georgia, namely the South Kolkheti lowland are characterized by an abundance of peat, but the most important thing in the world is the unique, virgin, percolation bog "Ispani 2", formed during the tertiary ice age, and its ecosystem is relict [4]. Therefore, it is important to determine the content of the chemical composition of some Sphagnum species that spread to Ispani 2 mire in the Kolkheti peatland.

The study was conducted on five sphagnum species, such as *Sph. palustre*, *Sph. Papillosum*, *Sph. rubelum*, *Sph. imbricatum*, *Sph. cuspidatum*. For analysis of methanol extracts, we used the tool – Agilent Technologies 7000 GC/MS/MS Triple Quad, the pipe – Eline 5-MS; 30m × 250µm × 0.25 µm, the heater temperature - 60°C–310 °C (Mode software), the injector temperature - 250 °C and carried gas Helium – 1 ml/m.

16 biologically active substances were detected in 5 species of Sphagnum (*Sphagnum austinii* Sull. (*Sphagnum imbricatum* ssp. *Austinii*), *Sph. papillosum* Lindb., *Sph. palustre* L., *Sph. cuspidatum* Ehrh.ex Hoffm., *Sph. rubellum* Wilson.) As it turned out, the Sphagnum contains biologically active substances such as the hexadecanoic acid - palmitic acid, fatty acid - oleic acid – Cis-9-Octadecenoil acid, and the carbohydrates such as Alpha-D-Glucopyranoside, ribofuranose and phenolic compounds - phenolic acid - Methyl 4-O-benzyl-á-D-xylopyranoside; phthalic acid or 1,2-Benzenedicarboxylic acid.

Despite the fact that samples were taken from different zones of the bog (the buffer and the dome), the study showed the same composition of fatty acid, hexadecanoic acid and polysaccharides and the difference in the content of phenolic compounds. The phenol compound Methyl 2- O-benzyl-D-xylopyranoside was found in *Sphagnum cuspidatum*, which is adapted to a high water level and only spreads to the buffer zone.

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67.	<p>Topuria D., Kvizhinadze N.  <b>Insurance Market in Georgia</b></p> <p>Tbilisi State Medical University, Department of Social and Clinical Pharmacy  Tbilisi State Medical University, Department of Human Normal Anatomy  d.topuria@tsmu.edu</p> <p><b><u>Introduction</u></b></p> <p>Medical insurance is a social guarantee for the protection of the health of the population, with the aim of reimbursement of medical expenses incurred by the person on the basis of a contract through insurance contributions and accumulated funds. Medical insurance is important both for the individual insured and for the general public and the state. An important objective of the social policy of the state is the formation of a social protection system for the employed population, the central focus of which is social insurance.</p> <p>Insurance is one of the forms of risk management that allows its beneficiaries to avoid the risk of loss. The first insurance company was established in Georgia in 1990, and the State Insurance Supervision Service of Georgia has been operating since 1997. At this time (1997) 25 insurance companies were already registered in the country, and today their number is 14.</p> <p><b><u>Study aim:</u></b></p> <p>The aim of the research is to study the insurance rights of medical insurance policyholders (insured's), to determine the role of social insurance and to analyze the problems in the insurance system.</p> <p><b><u>Study objectives:</u></b></p> <p>To achieve this goal, the following tasks need to be solved:</p>

	<ul style="list-style-type: none"> <li>- Evaluate the effectiveness, efficiency and sustainability of existing and earlier public insurance programs</li> <li>- Analyze the effectiveness of the current insurance system in Georgia</li> <li>- The role of the state in the social security system of the population.</li> </ul> <p><b><u>Results and conclusion:</u></b></p> <p>Social insurance is an important element of the finance system, the Institute for Social Security and the branch of insurance that combines the interests of citizens of any country. Its qualitative and quantitative characteristics give rise to the social, economic, legal and cultural levels of society; Government of Georgia has to Update Voluntary Insurance Program for Unused Resources to Promote Insurance Business Sustainability Improving the quality of service in the country;</p> <p><b><u>References:</u></b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.transparency.ge/sites/default/files/post_attachments/The%20Georgian%20Health%20Insurance%20Industry.pdf">https://www.transparency.ge/sites/default/files/post_attachments/The%20Georgian%20Health%20Insurance%20Industry.pdf</a></li> <li>2. <a href="https://forbes.ge/blog/177/romeli-sadazRvevo-produqtia-yvelaze-popularuli-saqarTveloSi%3F">https://forbes.ge/blog/177/romeli-sadazRvevo-produqtia-yvelaze-popularuli-saqarTveloSi%3F</a></li> <li>3. <a href="https://www.transparency.ge/sites/default/files/post_attachments/janmrtelobis_dazgveva_sakartveloshi_0.pdf">https://www.transparency.ge/sites/default/files/post_attachments/janmrtelobis_dazgveva_sakartveloshi_0.pdf</a></li> </ol>
68.	<p>Topchiyeva Sh. <sup>1</sup>, Aziz-zade N.A. <sup>2</sup>, Kerimova R.Z. <sup>2</sup>, Yıldız L.Z. <sup>3</sup></p> <p><b>Enzymatic Activity of Aspartate Transaminase in the Blood of Goats Infested with Parasites</b></p> <p><sup>1</sup><i>Institute of Zoology of ANAS, Baku, Azerbaijan</i>  <sup>2</sup><i>Azerbaijan Medical University, Baku, Azerbaijan</i>  <sup>3</sup>Recep Tayyip Erdoğan University (RTEU), Medical Faculty, Department of Medical Physiology, Turkey  shafiga.topchiyeva@mail.ru</p> <p>Blood, being the internal environment of the body, has a relative constancy of its composition, however, it is a system that displays to one degree or another all the changes that occur in the body.</p> <p>Hematological indicators are interrelated with animal productivity. In this regard, for the early assessment of economically useful traits of animals, biochemical blood parameters are increasingly being used.</p> <p>Alanine aminotransferase (AIAT) is an enzyme that catalyzes transamination processes. Alanine transferase activity indicators have differences in blood by gender,</p>

and also vary during the physiological development of young animals. The synthetic function of the liver can be assessed by studying the activity of the transamination enzymes AlAT and AsAT (aspartate transaminase), the main function of which is the synthesis and breakdown of certain amino acids in the body.

Based on the foregoing, the aim of the study was to study the enzymatic activity of the blood of goats, both healthy and parasitized.

Experimental studies have been carried out to identify the activity of aspartate transaminase in the blood of goats of the Khizi-Khachmaz zone of Azerbaijan in different seasons of the year, depending on the degree of invasion by animal parasites.

Determination of enzymatic activity in the blood was carried out spectrophotometrically with a Specol 1500 spectrophotometer (Analitik Jena). Assessment of the reliability of differences between the compared samples was carried out according to the Student criterion. It was found that, the activity of AsAT in the blood of goats infested with parasites in winter in February is 2.14 times lower ( $p < 0.05$ ) than in the first half of spring. The activity of AlAT in the serum of goats in September was 1.04 times ( $p < 0.01$ ) higher than in February. In addition, in the blood of goats in summer- in June, there was a decrease in the activity of AlAT by 1.38 times ( $p < 0.05$ ), compared with the activity of the enzyme in spring (March).

An analysis of the data shows that the activity of enzymes that regulate the conjugation of protein and carbohydrate metabolism in the blood of goats during parasitic infestation can be associated with their subsequent ability to animal survival and their reproductive performance.

As a result of experimental studies, the activity of the aspartate aminotransferase enzyme in the blood of healthy goats was determined, which is in the range from  $20.8 \pm 1.2$  to  $31.8 \pm 1.3$  U / L.

It was experimentally revealed that an increase in the enzymatic activity of AsAT in the blood of goats is revealed during invasion by parasites. Moreover, the activity of AsAT in the blood at all times of the year is significantly lower in healthy goats than in infected ones. The activity of AsAT in the blood of healthy goats is 1.39 times lower ( $p < 0.05$ ) than in winter. The activity of AlAT in the blood serum of animals increased 2.97 times ( $p < 0.02$ ) compared with the control group of animals. Thus, the activity of AsAT enzyme in the blood of healthy goats was found, which ranges from  $20.8 \pm 1.2$  to  $31.8 \pm 1.3$  U / L. The activity of AsAT in the blood, at all times of the year, is significantly lower in healthy goats than in infected ones.

Based on the foregoing, it should be noted that monitoring on the biochemical parameters of goat blood will allow for efficient breeding activities to form the gene pool of an animal population with a high metabolic rate in order to improve the high productivity of small cattle.

69.	<p>Tsagareishvili N.<sup>a</sup>, Qurdiani N.<sup>a</sup>, Mikaia G.<sup>a</sup>, Maisuradze A.<sup>a</sup>, Imnadze N.<sup>b</sup></p> <p><b>•Development of Cosmetic Liposomal Gel</b></p> <p><sup>a</sup>Tbilisi State Medical University, Department of Pharmaceutical Technology  <sup>b</sup>Tbilisi State Medical University, Department of Pharmaceutical and Toxicological Chemistry  n.tsagareishvili@tsmu.edu</p> <p><b>Introduction:</b> The main task of cosmetology is to develop the cosmetics with target delivery, namely to penetrate the dermal barriers and supply the biologically active compounds deeply in tissues. The solution of the problem became possible after introduction of the nanotechnologies in cosmetology. And based on this new technology the development of professional cellular cosmetics is now available.</p> <p><b>The aim of the work:</b> The aim of the submitted work was to develop the antiaging liposome gel, with target distribution ability.</p> <p>To reach the envisaged aim was needed to solve the following <b>tasks</b>: reception of the basics from natural gel producer compounds (for example seeds of linen); the inclusion of the quercetin, as an antioxidant agent, in liposomal mixture; and development of the liposomal gel technology.</p> <p>During the experiment was used the following methods: the microscopic analysis of developed liposomal gel; the quantitative determination of quercetin by UV-spectrometry; the liberation level detection of quercetin from the gel with diffusion method; rheological characteristics analysis of the product with viscosimeter.</p> <p>As a <b>result</b> of conducted study was selected the optimal composition and technology; was developed the method of quantitative analysis of quercetin in gel; And microscopic picture of the gel shown the homological liposomal structure of the product.</p> <p><b>References</b></p> <ol style="list-style-type: none"> <li>1.Bettina E.B.Jensen, Leticia Hosta-Rigau,Phillipp R.Spycher,Erik Reimhult,Brigitte Stadler,Alexander N.Zelini. // Lipogels: surface-adherent composite hydrogels assembled from poly(vinyl alcohol) and liposomes.2013.</li> <li>2.David Kiefer, MD. //Skin Care Vitamins and Antioxidants. 2012.</li> <li>3.Food and Drug Administration. // Liposome Drug Products-Guidance for Industry. Pharm. Qual. 2015.</li> </ol>
70.	<p>Tsiklauri L.<sup>1</sup>, Slovák L.<sup>2</sup>, Švík K.<sup>2</sup>, Kemoklidze Z.<sup>1</sup>, Bauerova K.<sup>2</sup> (Georgia):</p> <p><b>•Elucidation of Mechanism of Anti-arthritic Action of Saponin Rich Fraction PS -551</b></p> <p><sup>1</sup>I. Kutateladze Pharmacochemistry Institute, TSMU, P. Sarajishvilist 36, Tbilisi 0159, Georgia</p>

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**Introduction and aim of the study:** Rheumatoid Arthritis (RA) is complex disease characterized by aggressive synovial hyperplasia and inflammation (synovitis), destruction of articular tissues and restricted joint movement. The pathogenesis of RA has not yet been fully understood, it has been suggested that the abnormal activation of inflammatory signalling pathways and subsequently excessive oxidative stress play a critical role in the development of RA. Presently available anti-inflammatory drug therapy is often not successful or causes undesirable side effects. Therefore, new substances are still urgently needed. Herbal anti-inflammatory medicines allocate a wide-ranging mechanism of action including interaction with the inflammatory cascade, cytokine production, increased anti-oxidative effectiveness and other still unspecified effects that may contribute to joint protective effects.

**Material and methods:** In the present study first time was investigated and evaluated mechanism of anti-arthritic action of orally administrated Saponin Rich Fraction with code name PS 551 (PS) and compared to original anti-rheumatic drug Fatsiphlogin (FS). Both PS and FS are obtained at the TSMU I. Kutateladze Pharmacochimistry Institute, from the plant *Fatsia Japonica* (Thumb) Decneet panache cultivated in Georgia. Furthermore, combined effect of PS or FS with methotrexate (MTX) – a popular anti-rheumatic drug, on the progression of adjuvant-induced arthritis (AA) in the rat was examined. For this purpose, it was used monitoring of a basic clinical parameters along with evaluation of oxidative stress and inflammation markers assessed in plasma and tissues.

**Results:** PS in monotherapy displayed anti-arthritic and antioxidant dose dependent effect; at 50 mg/kg decreased significantly joint swelling (by 39.6–54.6%), GGT activity (by 17.19 %) in joints and the level of interleukin-17 A (up to –64.26%) in plasma, and was substantially more effective in comparison with FS and MTX. However, FS improved the effect of MTX in combination treatment, especially on basic parameters, assessed in the spleen, and plasmatic IL-17A levels.

**Conclusion:** The present study suggests that PS has higher protective activity against arthritis comparing to original anti-rheumatic medicine Fatsiflogin® and demonstrated its potential beneficiary effect. The obtained results are interesting for development effective drug delivery system for this substance and future possible innovative therapy of patients with RA.

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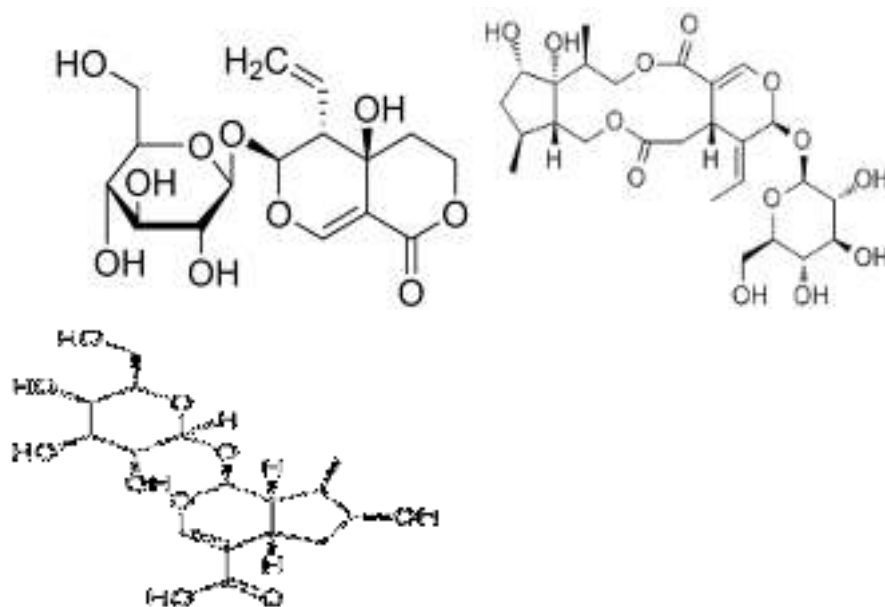
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71.	<p>Tsertsvadze A.</p> <p><b>•Nanoconstructed Biogenic Compounds of Ispani Sphagnum Peat Peloids</b></p> <p>Department of Pharmaceutical Technology, Tbilisi State Medical University, Georgia  Fatih University / BINATAM (Bio-Nano-Technology R&amp;D Center), Turkey, Istanbul  sandrogmprd@gmail.com</p> <p>Currently, peloids are widely used in balneology as well as dermatology and cosmetology.</p> <p>Scientific research has proved that the use of peloid-application increases blood circulation, body temperature, skin conductance response, absorption capacity, activates hormones and enzymes.</p> <p>Based on the data Peloids are rich with humic acids, aminoacids, fatty acids, phenolcarboxylic acids, which are formed due to degradation of organic compounds.</p> <p>Besides Peat peloids also contain: chloride, sulfate, carbonate anions, potassium, magnesium, calcium, sodium cations, and microelements.</p> <p>Bioelements are found in all living organisms, and their role in the human body is very diverse.</p> <p>Considering the chemical composition and the composition of biologically active substances of Ispani Sphagnum Peat Peloids formulation of application dosage form composing biogenic nanoparticles for joint disorder treatment is promising and actual issue.</p> <p>Furthermore, development of nanoconstructions on the one hand will increase range of use of Ispani Sphagnum Peat Peloids and on the other hand will contribute economic and rational utilization of natural resources</p>

	<p>Objective of the research was determine content of micro and macro elements, study mineral composition, develop formulation method of biogenic nanocomposites and Determine physical characteristics of the biogenic NPs.</p> <p>Research objects: Ispani Sphagnum Peat Peloids from 6.0 m depth. Based on the performed studies spectrum of micro and macro elements, also content of minerals was determined by x-ray diffraction spectroscopy, X-ray Fluorescence Spectrometer. Preparation conditions of biogenic nanoparticles is developed. Physical characteristics of the biogenic NPs (particle size, size distribution, zeta potential, shape) is determined by scanning electron microscope, influence of biopharmaceutical factors on biohenic nanocomposite characteristics is studied.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Chadzopulu A.1, Adraniotis J.1, Theodosopoulou E, Prog Health Sci, Vol 1 , No 2 Therapeutic mud. 2011.</li> <li>2. Celso Gomes a,, Maria Isabel Carretero b, Manuel Pozo c, Francisco Maraver d, Pedro Cantista e,Francisco Armijo d, José Luis Legido f, Frederico Teixeira g, Michel Rautureau h, Rafael Delgado; Peloids and pelotherapy: Historical evolution, classificationand glossary-journal homepage: <a href="http://www.elsevier.com/locate/clay">www.elsevier.com/locate/clay</a>-April 2013</li> <li>3. Nirvesh Chaudhri, Girish C. Soni, S. K. Prajapati, Nanotechnology: An Advance Tool for Nano-cosmetics Preparation, International Journal of Pharma Research &amp; Review, 4(4):28-40, April 2015;</li> <li>4. R. Suresh, S.N. Borkar, V.A. Sawant, V.S. Shende, S.K. Dimble, International journal of pharmaceutical sciences and nanotechnology, Volume 3, Issue 2, Nanoclay Drug Delivery System p.p. 1-4. July-september 2010.</li> </ol>
72.	<p>Tsomaia I.**, Tabatadze N.*, Chikovani A.*, Gigoshvili T.** (Georgia):  <b>•Iridoid Glycosides from <i>Cephalaria gigantea</i></b></p> <p>*Sokhumi State University, Faculty of Natural Sciences and Healthcare  * Georgian Technical University, Department of Pharmacy  nino_tabatadze@yahoo.com</p> <p>An endemic plant of Caucasus - <b><i>Cephalaria gigantea (Ledeb.)</i></b> Bobr. (fam. Dipsacaceae) is known in Georgian traditional medicine as sedative and anti-inflammatory remedies, also the main constituents of the plant - triterpene saponins, alkaloids and phenolic compounds are characterized antifungal, antiprotozoal, antiseizure and cytotoxic activities. HPLC analysis method of the purified extract of <i>Cephalaria</i> and the identification by about 17 individual components have been previously proposed.</p>



The present work describes isolation and structure elucidation of three iridoid and secoiridoid glycosides: **swertiamarin (a)**, **cantleyoside(b)** and **loganic acid(c)**. The structural determination of the obtained compounds were performed on the bases of 2D-NMR experiments (gs-COSY, gs-HMQC, gs-HMBC and gs-HSQC-TOCSY) and mass spectrometry (MALDI-TOF, ESI-HR-MS) and confirmed by comparison with the previously reported data.



a) swertiamarin

b) cantleyoside

c) loganic acid

$^1\text{H}$ - and  $^{13}\text{C}$ -NMR spectra were recorded on a Bruker DRX-500 spectrometer in  $\text{CD}_3\text{OD}$  solutions.

High-resolution Mass Spectra (HR-MS) were obtained on Applied Biosystems MALDI-TOF Voyager Spec.

Low-pressure liquid chromatography was carried out on ChromatoSPAC Prep 100 (Jobin Yvon) with Lichroprep C-18 Merck (15-25  $\mu\text{m}$ , 50X4cm), using a step gradient of  $\text{H}_2\text{O}$ -MeOH condition. For fraction purification was used Column chromatography - silica gel 60 (Merck, 0.040 – 0.063 mm), with an applied pressure of 300 mbar.

All isolated compounds - iridoid and secoiridoid glycosides are reported for the first time from *Cephalaria gigantea* roots. These components are used as chemosystematic markers for plants of the Dipsacaceae family.

73. Tsurtsunia I., Makatsaria T., Datuashvili R.

•**Development of Prophylactic and Treatment Cosmetics for Acne Blackheads**

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**Topicality of the research** - One of the main problems in dermatocosmetology is the acne blackheads appearing on the skin and its treatment. Unhealthy lifestyle of most of the population, impaired immune system, disturbed metabolism, irregular and unhealthy gastro-intestinal tract, contaminated environment, dramatically changing climatic conditions, the unqualified use of the cosmetics – these are the factors that cause the dysfunction of sebaceous glands. Modern pharmacies have plenty of synthetic skin care products and skin treatment often undergoes with antibiotics, which is often accompanied by side effects. Therefore, the objective of this research was to develop prophylactic and treatment cosmetics for acne blackheads.

**Research results and findings** - Based on the study of organoleptic and physicochemical characteristics, the recipes of cosmetics are made as follows: 1. Lotion-solution (salicylic acid 2,0 g; camphor spirit 15 ml, glycerin 20 g; ethanol 70%-50 ml, Eucalyptus aromatic water 50 ml); 2. Lotion-suspension (Zinc oxide 5,0 g; amylum 1,0 g; talc 1,0 g; white clay 1,0 g; clay from Askana 1,0 g; Chirukhi clay 1,0 g; glycerin 20,0 g; Eucalyptus aromatic water 50 ml); 3. Cream-soap (base - cosmetic soap 100,0 g, distilled water 150,0 ml, glycerin 10,0 g, citric acid 1,5 g, camphor spirit 10 ml, ammonia spirit 10 ml, hydrogen peroxide 80 ml, Eucalyptus essential oil 10 drops); 4. Cream (Zinc oxide 2,0 g; white clay 2,0 g; talc 1,0 g; clay from Askana 1,0 g; Chirukhi clay 1,0 g; glycerin 5,0 g; white wax 2,0 g; spermaceti 6,0 g; Olive oil 40,0 g; lanolin 10,0 g; distilled water 55,0 g; vitamin A 2,0 g; vitamin E 2,0 g; Eucalyptus essential oil 10 drops). Technological schemes of the lotions, cream-soaps, creams for the treatment and prophylactic care of acne blackheads being developed on basis of technological researches; preparation technologies are developed, material balances are compiled and technical-economic indicators are calculated; quality factor of the cosmetic products have been studied: lotions (physical form, solid particles, density, uniformity, odor, color, pH); Cream-soap (physical form, odor, color, solid particles, pH, foam height foam stability); Cream (uniformity, odor, color, pH, rheological factor, colloidal stability, thermostability). The results obtained from the conducted studies meet the requirements for the cosmetic products.

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74.	<p>Vachnadze N., Vachnadze V., Suladze T., Mchedlidze K.  <b>Pharmacological and Biological Activity of Indole Alkaloids from <i>Vinca Herbacea Waldst it Kit.</i> and of <i>Peganum harmala L.</i> Growing in Georgia</b></p> <p>TSMU, I. Kutateladze Institute of pharmacochemistry, Tbilisi, Georgia  n.vachnadze@tsmu.edu</p> <p>Since the time of Ftheophrastus, alkaloid containing plants have been known as one of the main sources of medicinal products. Alkaloids are characterized by multilateral pharmacologi cal activity, broad spectrum of therapeutic action and hypotoxicity. Biologically active substance was obtained by liquid-liquid extraction from roots and rhizomes of <i>Vinca herbacea Waldst it Kit.</i> and ripe seeds of <i>Peganum harmala L.</i> Biological and pharmacological studies revealed: Alkaloids derived from <i>Vinca herbacea Waldst it Kit.</i> act on leukopoiesis and stimulate: apoptosis. Have adrenoblastic, antioxidant, antiradical activity. The fraction of simple indole alkaloids derived from the seeds of <i>Peganumn harmala L.</i> and used in traditional and scientific medicine to treat Parkinson's disease, after encephalitis and in cranial palsy. Cytotoxic activity has been studied in three cell cultures: lung tumor cell culture (A-549), rectal adenocarcinoma cell culture (DLD-1), and normal fibroblast cell culture (WS-1). The study of microstructural diagnostic characteristics of the plant’s vegetative organs was carried out in the pharmacobotanical direction. Substance from roots and rhizomes of <i>Vinca herbacea Waldst it Kit.</i> and fraction from ripe seeds of <i>Peganum harmala L.</i>, containing indole alkaloids exhibit leukopoiesis and cytotoxic activities respectively.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>1. Миронова А.Н. Руководство по проведению доклинических исследований лекарственных средств. М., Гриф и К, 2012, 944.</li> <li>2. Гагуа Н.Д., Бакуридзе А.Дж., Вачнадзе Н.С., Берашвили Д.Т., Вачнадзе В.Ю. Изучение процессов экстракции фармакологически активных алкалоидов <i>Vinca</i>. GMN., 2017(6), 22-24.</li> <li>3. Vachnadze V.Yu., Vachnadze N.S., Suladze T.Sh. Study of cytotoxic activities of alkaloids from medicinal plants in Georgia. Future Technologies and quality of life. Batumi, Georgia, 2017, 62.</li> </ol>
75.	<p>Zarnadze N., Dolidze K., Manjgaladze S., Bolkvadze C., Chitanava J. (Georgia):  <b>Induction of Callusogenesis and Study of the Potential of Bioactive Material</b></p>

## **Accumulation in *in vitro* Cultures of Groundsel (*Senecio Platyphiloides*)**

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**Introduction:** Synthesis of secondary metabolism substances is a unique feature of the plant. For that reason it is an important object for pharmacists and medicine to obtain new medical substances. The supply of medicinal plants as raw materials is limited and quantitatively reduced in the natural area. It is often difficult to find ways of chemical synthesis of biological substances. Therefore cellular technology has the advantages: biomass intake throughout the year indefinitely, regulation of synthesis with phytohormones, easy separation of substances, purification of preparations and more.[2]

The aim of our study was to induce callus in the *in vitro* culture of groundsel (*Senecio Platyphiloides*) and to optimize tropical factors for platyphyllin synthesis and accumulation.

**Research Material and Methodology:** Groundsel (*Senecio Platyphiloides*) is a perennial medicinal plant of the family of composites, endemic to Adjara flora, extending from 1500 to 2500 meters above sea level, medicinal alkaloids are found in all organs of this plant (platyphyllin, seneciophyllin, neoplatyphyllin, saracen) in all organs of this plant.

In the experiment, we used fragments from the stem and leaf plates isolated from *in vitro* cultivated shoots. For induction of callusogenesis, we used Gamborg's (B5) [1] medium area from auxins: 2,4-D (dichlorophenoxyacetic acid); NAA ( $\alpha$ -naphthylacetic acid); IAA (indolilacetic acid) at a concentration of 10-25 mkM and from cytokines: BAP (benzylaminopurine) at a concentration of 2-4 mkM. The incubation was carried out in the dark at a temperature of  $25 \pm 1^\circ\text{C}$ , followed by transplanting every 25 days. The crops were selected according to the "growth rate". We analyzed intensely growing calluses after the transition to the "slowdown" period. platyphyllin content in the calluses was checked according to the article by Pharmacopoeia.

**Results and Discussion:** The results of the experiment showed that callus was present in all studied medium areas. Transition to dedifferentiation began 8-10 days after. The etiology of callus was influenced by: type of plant, components of food area, as well as the nature and concentration of phytohormones. Analysis of callus biomass showed that IAA is effective for the induction of platyphyllin synthesis from auxins. Its concentration of 20-25 mkM resulted in the accumulation of a small amount of platyphin in the callus tissue; other studied auxins did not induce the synthesis of the substance in the callus tissue. The combination of BAP with auxins in the medium area influenced callus morphology and growth-intensity, but not metabolism. Callus developed from stem explants contained greater amounts of platyphyllin than leafy

	<p>callus.</p> <p><b>Conclusion:</b> Thus, the obtained results confirm that the cell cultures of groundsel (<i>Senecio Platyphiloides</i>) are potential sources of medicinal raw materials and are promising in the future for obtaining highly productive callus lines for research.</p> <p><b>References:</b></p> <p>Gamborg, O. L., Miller, R. A., and Ojima, K. (1968) Nutrient Requirements of Suspension Cultures of Soybean Root Cells. <i>Exp. Cell Res</i>, 1968, Vol.50: 151-158 pp. <a href="https://www.sciencedirect.com/science/article/abs/pii/0014482768904035">https://www.sciencedirect.com/science/article/abs/pii/0014482768904035</a>;</p> <p><b>Verpoorte R., Contin A., Memelink J.</b> Biotechnology for the production of plant secondary metabolites // <i>Phytochem Rev</i>, 2002. – Vol.1. – P.13–25. DOI: 10.1023/A:1015871916833</p>
76.	<p>Zazadze R., Bakuridze A.</p> <p><b>▪Determination of Formulation and Elaboration of Technology of the Active Pharmaceutical Ingredients of Dry Foam of Golden Standard for Eradication of <i>Helicobacter pylori</i></b></p> <p>Tbilisi State Medical University, Department of Pharmaceutical Technology  rezozazadze@yahoo.com</p> <p><i>Helicobacter pylori</i> is a helical gram-negative bacterium, which was first identified in stomach in 1982, by Australian physicians B. Marshall and R. Warren. It resides in gastrointestinal tract of more than half of the world population, inclusive in 70% of the population of developed countries and 25-50% of advanced countries. Namely <i>H. Pylori</i> is the main cause that leads to gastro-intestinal tract diseases such as: peptic ulcer and gastric cancer /2,3/. At present, there are many methods of treatment against <i>H. pylori</i>, but optimal therapeutic treatment against this bacterium has not been found yet. At the recommendation of Maastricht-2, Toronto Consensus, application of the first-line triple therapeutic treatment (the so-called “Golden standard”) for <i>H. Pylori</i> eradication is efficient, which implies using a combination of two antibiotics (Clarithromycin and Amoxicillin or Levofloxacin or Metronidazole) with proton pump inhibitors (Lansoprazole/Omeprazole/Pantoprazole/Rabeprazole) /1,4/. Disadvantages of <i>H. pylori</i> eradication treatment have been widely discussed recently. Studies have shown that traditional and innovative systems do not fully deliver the drug to the infected site and achieve effective antibiotic concentrations /5/. It is expedient to develop formulations with foaming systems and technology from active pharmaceutical ingredients of “golden standard”. Foam has cell structure, they are distinguished by high dispersion grade</p>

	<p>and as its result their biological permeability is high. Foams are not precipitated, on the contrary, they use to increase in volume, thoroughly cover mucous and concentrated solutions are not formed at the spot of foam-generation, which doesn't cause mucous irritation. The aim of the project is Determination of formulation and elaboration of technology of the active pharmaceutical ingredients of dry foam of golden standard for eradication of helicobacter pylori. The study uses modern biopharmaceutical research methods to determine foam stability, foam quality, and technical characteristics of foam fillers. The study revealed that the optimum foaming agent is 1.3% sodium lauryl sulfate, as well as the stability and foam quality of foam stabilizing agents in the ratio of xanthan and guar gum 1: 1. From the results of the technical characteristics of foam fillers, the optimum filler with 10% concentration of Isomalt was selected.</p> <p>References</p> <p>Doffou AS, Attia KA, Mamert FYB, Bangoura AD, Kissy-Anzouan YH, Kouamé HD, Mahassadi KA, Kouamé JN, Kouyaté M, Assi C, Dri-Yoman AHN. The <i>H. pylori</i> eradication rate in a high prevalence area (West Africa): Three triple therapy comparative studies. <i>Open J Gastroent</i>, 2015; 5: 200-206.</p> <p>Mégraud F. Current recommendations for Helicobacter pyloritherapies in a world of evolving resistance. <i>Gut Microbes</i> 2013; 4: Epub ahead of print [PMID: 23929066]</p> <p>Patel A. A REVIEW ON MUCOADHESIVE MICROCAPSULES: NOVEL APPROACH FOR STOMACH SPECIFIC DRUG DELIVERY. <i>INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIO-SCIENCE. IJPRBS</i>, 2014; Volume 3(2): 449-465.</p> <p>The Toronto Consensus for the Treatment of Helicobacter pylori Infection in Adults/Carlo A. Fallone, Naoki Chiba, Sander Veldhuyzen van Zanten// <i>Gastroenterology</i> 2016; 151: 51–69.</p> <p>Yang Y, Manda P, Pavurala N, Khan MA, Krishnaiah YS (2015) Development and validation of <i>in vitro-in vivo</i> correlation (IVIVC) for estradiol transdermal drug delivery systems. <i>J Control Release</i> 210: 58-66.</p>
77.	<p>Oniashvili. M., Sulaberidze G., Okujava M., Liluashvili k.</p> <p><b>•Dietary Pattern Among Different Aged Pregnant Women</b></p> <p>Tbilisi State Medical University oniashvilim68@gmail.com</p> <p>Pregnancy is a critical period during which good maternal nutrition is a key factor influencing the health of both the child and mother. Dietary Patterns during pregnancy can cause excessive gestational weight gain (EGWG) and long-term obesity in both mothers and their babies. Analysis of principal components of a diet is widely used for evaluation of Dietary Patterns during pregnancy</p> <p>The aim of this study was to estimate the amount of macro- and micro-nutrients and</p>

energy intake in groups with different BMI and Age based on the evaluation of Dietary Patterns.

Pregnant women filled the questionnaire "Dietary history" for the research at their first visit. They were divided in the groups of different ages (from 18 to 30 and from 31 to 40) and BMIs (BMI from 18 to 25 and BMI>25).

Conducted research revealed deficit of dietary fiber in the both age categories. Per 1g fibre usage of carbohydrates and energy is higher among pregnant women older than 30 years ( $p=0.059$ ) as well as with BMI higher than 25.

Conclusion: Based on the results of the research it's recommended for the pregnant women to receive fibre from the low energetic value carbohydrates, this will prevent women from excessive gestational weight gain.

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