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MESSAGE FROM NEIL B. GODICK

Last month, in advance of Russia's Parliamentary elections I commented on likely shifts in voter sentiment. The shifts were significant. When the electorate felt there was wide spread voter fraud protests erupted. From various publications in Russia this is what is known of the demographics of the protesters:

Broadly, according to public opinion polls conducted by sociologists, most protesters are young successful people, representatives of the middle class.

From a polling of the people who attended the protest sociologists found that:

- 70% of the protesters are politically Liberals.
- 25% are either owners or managers of a privately owned enterprise
- They included businessmen, consultants, auditors, managers, office workers
- 46% were specialists, while 17% were managers, 8% were white-collar workers, 8 % were businessmen, and 12 % were students.
- 33% were between 25 and 39 years old, 25% were between 18 and 24.
- 64% were male
- 70% were a university graduate
- 56% had an average income
- 73% came to protest to express their indignation about the falsification of the parliamentary elections.
- 75% came to show their dissatisfaction regarding the state of affairs in the country and the policies of the current leadership.

- 66 % learned about the protest from the internet, 21% learned about it from media, and 13% heard about it from a friend
- 97% plan on coming to the next rally and bringing their relatives with them
- 50%+ came as they were dissatisfied about having no say in the key decisions the authorities make.
- 38% voted for the liberal party Yabloko at the parliamentary elections earlier this month
- 1% voted for Mr. Putin's United Russia, while that same party received 49.32% of the parliamentary vote
- 1% said they were going to vote for Mr. Putin in the March presidential election
- 82% said that if the presidential election is seen as falsified they would take to the streets again

I have frequently commented on Russia troublesome demographic trends. Here is another view.

As the gap in life expectancy between Russian men and women widens, cracks in the State pension system appear to be widening too. One way the State could maneuver its way out of the demographic imbalance is to equalize retirement ages for men and women, The country's male life expectancy is just 62, while for women life expectancy is 74.2. Russian women could be required to wait an extra five years to qualify for retirement.

To maintain the fund's solvency, experts suggest that the State increase the average retirement age, increase public sector pension contributions, and put a limit on the early retirement window. Russian men presently claim retirement benefits at the age of 60 while women's retirement age is 55. That means Russian women work for a shorter period and stay on pensions longer, according to OECD experts. A credible solution to the problem is to eliminate gender differentiation in the retirement age and adjust it for life expectancy.

Russia's negative demographic trends have reduced the number of contributors to pension funds. This has forced the State to increase subsidies to the Pension Fund. According to the government-approved 2020 Strategy, If a reasonable plan is implemented it is estimated that a 6 million reduction in pensioners (16%) could be achieved by 2030.

We do not intend for the following reports to solve any need our readers may have. We do intend to keep everyone current on technology developments in Russia. If you would like any additional information on any of the developments reported – send us a note.

Microbes devour poisons

Lomonosov Moscow State University has isolated microbial communities and later pure microorganism cultures from anaerobic silts in treatment facilities and bottom sediments in natural water bodies. They are able to efficiently decompose amino-aromatic compounds in anaerobic (oxygen-free) conditions.

The researchers studied anaerobic silts from Kuryanovskaya aeration station and Efes Pilsner brewery treatment facilities, and Tsaydam Lake (Buryatia) bottom sediments.

To create oxygen-free conditions, air in bacterial growth flasks was replaced with nitrogen. Cultivation was performed in complete darkness at 30 °C and media pH = 6.5–7.5. Using selective media that contained 2-benzaminic and 4-benzaminic acids, 5-aminosalicylic acid, and benzoic acid, 2-hydroxybenzyl alcohol, benzyl alcohol and salicylic acid, the researchers selected whole microorganism communities that could use those agents as a carbohydrate source. Microbes would split these aromatic compounds down to methane and carbon dioxide. This community includes various microorganisms: baculiform, filiform and globular – cocci. They cooperate; as each bacterium evidently plays a different role in substrate decomposition.

#2011-11-197

Where frogs find water

Amphibians cannot do without water for long. They have developed a mechanism to find water. Many amphibian species are attached to their own spawning body of water and return to it even if there is another pond or river much nearer. **Lomonosov Moscow State University** researchers found that this rule does not work in arid areas. In arid areas instead of their own water sources, frogs head for the nearest or larger body of water. Frogs follow this behavior even when the weather is humid and not hot.

In ordinary moderate climates, e. g. in Moscow, *Rana ridibunda* frogs are able to determine their traditional water for spawning. Frogs were caught in their mating season and then released at a considerable distance from their native pond. They always returned to their pond covering up to 350 m, even though there was a river at half the distance. Studies showed that, in arid regions, frogs aim for a river, not for any nearest body of water. This can be explained by lake frogs' behavior living in hot and dry climates. Somehow they know that it is the river that is a reliable water source, which guarantees their survival. Ponds may go dry if it is too hot.

The tests were conducted on cloudy cool moist days when amphibians could not suffer from moisture shortage. However, even in those conditions, they preferred a river.

#2011-11-198

Inexpensive and efficient solar batteries

RAS Ioffe Physico-Technical Institute (PTI) developed a 1 kW solar concentrator photoelectric plant. The researchers developed nano-heterostructured cascade photo converters with 36% efficiency. This efficiency is 2–3 times higher than in silicon-based batteries. This efficiency increase is achieved by dividing solar light into several spectral intervals and by more efficient photon energy transformation in each photo-converter. Three-cascade photo converters include three photoactive regions composed of three semiconductor plates based on chemical elements alloys – GaInP, Ga(In)As and Ge. Converted to energy in these semiconductors are the shortwave, medium-wave, and IR spectrum parts respectively. More cascades could increase the efficiency from 36 to 45–50 %. However, such multicascade elements are much more difficult to produce.



The solar battery modules developed by PTI scientists are composed of the photoconverters being placed on heat-removing substrates at the focus distance from mini-lenses. The mini-lenses provide for a thousandfold solar radiation concentration. This technology reduces both the solar batteries' active surface area and their cost.

In these batteries, modules are arranged stepwise on the electronic-mechanical tracking system equipped with a sun position sensor. The batteries are constantly oriented toward the sun and can collect sunrays better than fixed batteries. This configuration also reduces wind loads. For its own functioning, the device consumes as little as 0.1 % of the generated energy.

#2011-11-199

Using plants' physiological rhythms

Stavropol State Agrarian University (SGAU) developed a technology and equipment to considerably increase energy efficiency while enhancing the hothouse-grown seedlings quality.

All living creatures – from bacteria to humans – have their own «internal biological clock». These clocks regulate both seasonal and daily rhythms. These fluctuations in biological processes' intensity related to day-night alternation are known as circadian rhythms. Plants also have them. Photosynthesis intensity (the key process that forms most biomass on this planet) significantly changes during the day.

SGAU developed an alternating illumination technology, manufactured appropriate equipment and an illumination control system. These are based on an electronic starting and control device. The system functioning was fine-tuned in an experimental hothouse. Every illumination mode was selected experimentally. In many experiments, basic plant growth parameters were controlled by internode lengths, dry and wet biomass weight, and photosynthesis pigments content. In addition, various illumination source types and their spectra were analyzed. Specific illumination modes were selected for different agricultural crops.

The alternating irradiation helped reduce the vegetable seedlings' cultivation time by 20–25 % while simultaneously enhancing their quality. In its turn it ensured an earlier and higher yield (on average, 15–20 % higher than with conventional technologies). The alternating plant illumination mode enables a 38–40 % reduction in electric power consumption compared to the standard mode involving artificial illumination in dark periods. This energy savings is realized in reducing the final product's cost.

#2011-11-200

Chickens hatch a day earlier

Lomonosov Moscow State University researchers found that external sound background accelerates chicks' development and reduces the energy required for their growth. Absence of this background noise in the incubator was compensated with clicks (3 pulses per minute, 80 dB). The clicks simulated embryo clicks but were much more intensive. Eggs were exposed to this sound action in the last four development days (from day 17 to day 21). In the control incubator, silence was interrupted only by unhatched chicks' clicks and squeaks.

Between days 17 and 19, embryo metabolism usually decreases (e. g. gas exchange is down 8–19 %). It sharply increases only on the 20th incubation day when the chick breaks the egg-shell and starts breathing atmospheric air. The growth rate also falls as the space becomes too tight for the embryo. Carbon dioxide accumulates in the egg air chamber and there is not enough oxygen. Unhatched chicks' muscles are already quite developed but they cannot really use them in this cramped space. Moreover, in the last incubation days, sense organs and brain activity develop quickly, which slows down the growth rate.

The embryos exposed to continuous clicking sounds did not show slower development and their metabolic rate remained as before. Chicks for those eggs hatched on day 20, i. e. a day before than the control. An embryo exposed to external acoustic action spends less energy on development. It was calculated that the average saving on the growth rate is 4.9 kJ, and on the metabolism as a whole – 10.5 kJ.

#2011-11-201

Researching genetic diversity of Russian population

A group of 23 biologists (lead scientist: Dr. Nikolay Yankovsky) representing Russia's nine leading research centers completed a large-scale project involving evaluating existing genetic analysis methods' efficacy, optimum methodology development. Then they studied Russia's population genetic diversity.

The studies covered 17 populations (1156 persons) from Russia's different geographic regions (European Russia, Northern Caucasus, Volga-Ural region, Siberia). Among them were representatives of various language groups and anthropological types. Six groups represented ethnic Russian city dwellers from Moscow, Belgorod, Oryol, Orenburg, Yaroslavl and Tomsk. Eleven groups represented a wide range of different ethnic groups in Russia and FSU: Komis, Maris, Khakasses, Bashkirs, Tatars, Chuvashes, Dargins, Avars, Lezgins, Ukrainians and Belorussians.

These data were used to develop and fine-tune methods for setting up a genetic database. *PowerPlex 16 panel* was developed for the studies. As to information on reference groups, they were taken from specialized databases. These reference databases are the legal base for forensic medical opinions on interpreting genotype comparison results. The researchers' findings provide grounds for setting up that base. Genetic markers used for medico-criminalistic expert examination must be highly polymorphous and have a high resolution. Multiallelic (mostly including 8–10 alleles) non-linked microsatellite markers – STR-loci proved to be the most effective for these purposes. Using *PowerPlex 16 panel* the researchers examined the degree of genetic variety and population variability among Russian population, characterized genetic heterogeneity levels, and genetic interrelations between populations.

#2011-11-202

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