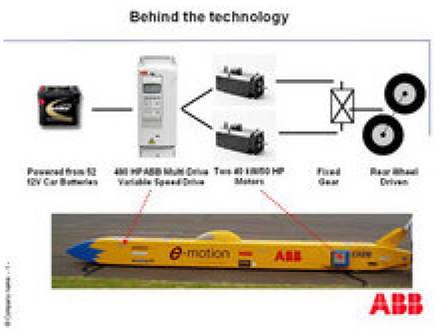
April 21, 2005

Electric Car Goes for Land Speed Record



A high-speed electrical car, powered by ABB motors and drives, will attempt to break the land speed record for an electrical vehicle on May 5 in Nevada.

The 32-foot (10 meter) long, “e=motion” car will try to beat the current official FIA (Fédération Internationale d’Automobile) electric land speed record of 245 mph (394 kph) and become the first-ever electrically powered vehicle to break the 300 mph (483 kph) barrier.

The e=motion has already reached 146 mph (237 kph) in just 1,000 yards (914 meters) in tests in the UK, and unofficially broke the 139 mph UK record for an electric vehicle.

Two 50 horsepower AC motors produce a combined output of more than 500 hp (hp). ABB’s system uses a regenerative standard inverter from its ACS800 motor drives line to convert the 600V DC (direct current) output from the car’s four packs of 52 lead-acid batteries into AC (alternating current) power for the two motors.

The ABB motor/drive system uses the company’s Direct Torque Control drive technology.

Other challengers to the record commonly use gear-driven systems in their cars to achieve the fastest possible acceleration, whereas the technology we’ve supplied steadily controls torque across the whole speed range. Although a geared vehicle can achieve 100 mph in a few seconds, its rate of acceleration falls away much more quickly compared to our system; this one will continue to accelerate even past the 300 mph mark, provided sufficient battery power is available.

—Frank Griffith, ABB power system team member

To prevent overheating during the record attempt, each motor has been adapted to include a forced-ventilation system that is comprised of a series of 24-volt DC fans, to help keep the motors below their maximum operating temperature of 180º C (356º F).

Resources:

- Team Site

April 20, 2005

DIY Solar Cycle

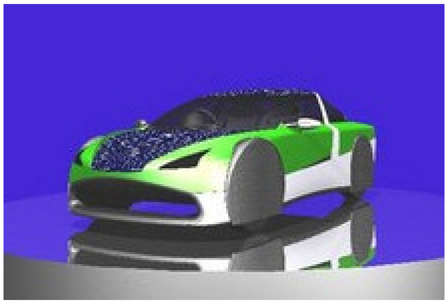
Treehugger writes about one of its readers who created his own solar-charged EVT 4000E electric scooter (Do-It-Yourself (DIY) Solar). According to Dominic, the writer, Don (the DIY'er) has lived off the grid for 20 years, and this bike is a natural extension of that lifestyle.

To pull off this feat, he installed two sets of folding panels that generate 120 watts/hour in good sun. The bike's batteries hold 2,400 watts, so a Michigan summer's 9 hours of daily sun charges the battery about ½ full. Don estimates his ride uses only 25% of that. So, even the occasional cloudy day (unfortunately, not uncommon in Michigan) doesn't mean the bike is dead. But, just in case, the factory charging apparatus is still intact.

In order to ride, the panels fold in close to the body of the bike, and lock down. When charging, the panel's symmetric layout reduces the possibility of tipping in the wind (though Don tells us he is considering adding parking outriggers to protect against this). He also plans to add a protective skin to the sides of the panels to protect against gravel on unpaved roads.

April 19, 2005

Solar Electric Hybrid Prototype on Display in Queensland



The University of Queensland's Sustainable Energy Research Lab (SERL) is displaying its two-seater solar electric hybrid prototype—the UltraCommuter—as part of the Royal Automobile Club of Queensland's centenary events.

Spawned by SERL's work on the SunShark solar vehicle in 2000, the UltraCommuter is an ultra-light weight, low drag, hybrid-electric commuter vehicle that combines photovoltaic recharging and grid recharging with a CNG-fueled range-extending generator.

Two-and-a-half square metres of solar panels provide 375 Watts of electric power, meeting 87% of the car's total power needs and cutting greenhouse emissions by 97 percent compared to a conventional sedan (Australia's Holden Commodore).

In sunny weather the UltraCommuter can travel up to 60 km (37.3 miles) a day on solar power alone. Drawing on power stored in its 360V Li-Ion battery pack extends this to 200 km. For longer journeys compressed natural gas (CNG) powers a 10 kW generator to feed electricity into the batteries, producing a total range of 500 km (310 miles).

The car is propelled by two 75 kW motors producing 500 Nm (369 lb-ft) torque each that sit inside the rear wheels. These motors also act as brakes and perform regenerative braking to recharge the batteries to extend the UltraCommuter's range.

With its combined high peak torque of 1,000 Nm, the drivetrain can accelerate the vehicle from 0–100 km/h (0–62 mph) in less than 8 seconds.

Comparing the UltraCommuter

Vehicle	Weight (kg)	Fuel cons. (l/100km)	Well-Wheel GHG (kg/100km)
UltraCommuter w/ solar	520	0.44	0.85
Ultra Commander w/o solar	520	1.6	3.5
Toyota Echo	850	6.2	16.2
Holden Commodore	1580	11.0	28.7

Fuel consumption of 0.44 liters/100km is equivalent to fuel economy of 535 miles per gallon.

Resources:

- The UltraCommuter

April 15, 2005

Reva Introduces NXG Electric City Car

GoinGreen, a retailer of electric cars in the UK, showcased the new Reva NXG electric concept car in London. GoinGreen has been marketing another Reva EV—the G-Wiz—since May 2004.

Created by the Reva Electric Car Company (RECC) of Bangalore, India, the new NXG made its debut last week at EVS-21 in Monaco.

The two-seater is powered by a 37kW AC induction motor with 220 Nm (162 lb-ft) torque driving the front wheels. Regenerative braking recharges the sodium nickel chloride batteries during operation.

The battery pack has a capacity of 18 kWhr, and a plug-in recharge time of 6 hours.

The NXG has a range of 125 miles (200 km) per charge and a top speed of 75 mph (120 km/h).

The car also features a high-resolution single touch-screen display system featuring all vehicle dashboard functions as well as personal communication tools such as a GPS navigation system, a GPRS modem for internet and email access and an MP3 music player.

April 06, 2005

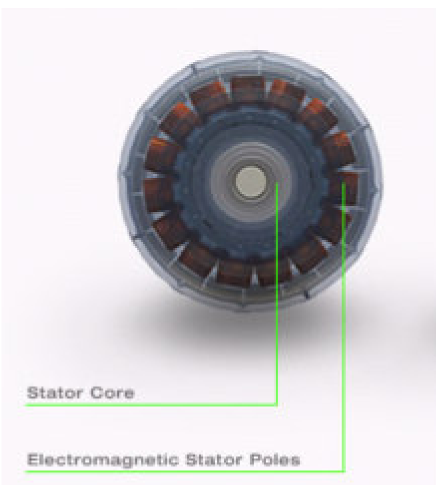
WaveCrest Adaptive Motor Technology at EVS-21

Clean@auto reports that WaveCrest Technologies brought its Adaptive Motor technology and electric bikes to EVS-21.

The company, a developer of advanced electric propulsion and drive systems, last year launched its first product line based on its motor technology. At EVS-21, Wavecrest highlighted the TidalForce M-750— a foldable electric mountain bike that uses the WaveCrest Adaptive Motor in the rear hub and Saft NiMH batteries in the front hub.

Working with WaveCrest, Saft engineers developed the unique circular battery. Thirty Ni-MH cells are linked via 15 cables and 4 connector systems to the bike's motor and controls. The M-750 has a range of 20 miles (about 32 km) on a single battery charge. It reaches top speeds of 20 mph, which is consistent with US government regulation of light transport vehicles.

WaveCrest's ambitions go far beyond the personal vehicle market, however.



The core of the company's efforts is the dynamically reconfigurable Adaptive Motor system, which consists of a multiple-phase, DC brushless motor arranged such that the rotor surrounds and rotates around the center-mounted stator. (Diagram at right.) In a traditional electric motor, the rotor rotates within the outer stator.

The WaveCrest stator consists of a series of independently controlled electromagnets driven by a proprietary power electronics module. The electromagnetic cores are identical and isolated.

The associated control system and software are integral to the operation of the motor and account for its flexible, broad range of performance. A digital signal processor connected to the power electronics activates the electromagnets by analyzing motor position, desired torque and the electrical characteristics of the energy management system that powers the motor. The patented adaptive algorithms adjust the current and excitation sequence of each electrical phase to maintain the motor at the optimal operating condition while minimizing energy consumption through a very broad speed range.

(WaveCrest can also apply its technology to the traditional electric motor arrangement in which the rotor rotates inside the outer stator.)

This ability to manage the performance of the motor delivers high efficiency and torque at high and low RPM with less heat and noise than conventional systems.

WaveCrest is developing a number of electric propulsion architectures for a range of vehicle types, including in-wheel system solutions from sub-class A passenger cars to class 4 trucks and commercial vehicles.

One of the prototypes being developed by the R&D team is an electric car based on a DaimlerChrysler smart roadster chassis, and using Wavecrest in-wheel motors.

Currently, the company offers three motor families:

- 17" Delta: 225 kW
- 14" Gamma: 15/30 kW
- 9.48" Alpha: .75 kW

April 05, 2005

Toshiba's Fast-Charging, Long Life Li-Ion Battery

Toshiba has developed a new fast-charging lithium-ion battery with an extended lifecycle that has significant potential for application in hybrid and full-electric vehicles.

According to the company, the prototype of the battery can recharge 80% of its energy capacity in only one minute, approximately 60 times faster than the typical lithium-ion batteries in wide use today, and will lose only 1% of its capacity after 1,000 cycles of discharging and recharging.

On those two criteria, the Toshiba battery meets the long-term specifications for advanced battery technology for vehicles set by the US Advanced Battery Consortium.

Toshiba Li-Ion vs. Select USABC Criteria			
Parameter	USABC Mid-term	USABC Long-term	Toshiba Li-Ion
Energy Density (Wh/l)	135	300	150–250
Fast Recharge (40%–80%)	<15 min	<15 min	80% in 1 min
Normal Recharge	<6 hours	3–6 hours	10 minutes
Cycle life	600	1,000	1,000

Pragmatically, the speed and capacity of the recharge isn't as major a factor for grid-connected plug-in recharging of the battery (which presumably would happen at night), as it is for the capture of energy from regenerative braking. (Although I suppose you could hypothesize a widespread infrastructure of electric recharging stations where drivers could queue for a quick jolt.)

The current crop of more slowly charging batteries let much of the converted kinetic braking energy go to waste—they just can't capture the charge fast enough. To counter that, some hybrid and full EV applications use ultracapacitors as a means of burst capture and release. The US Advanced Battery Consortium in funding the development of ultracapacitors for use in hybrids for that purpose. (Earlier post.)

Although Toshiba did not release full performance specs for its new battery, the company is positioning it as nearly equivalent in terms of speed of recharge to capacitors. (Nothing said about the speed of discharge, which is the other critical aspect to ultracapacitors in electric vehicles.)

The energy density of the new battery is between is 150 to 250 Wh (Watt-hour)/liter, equal to the lower range of energy densities existing lithium ion batteries have, according to a report by *EE Times*. Ni-MH batteries have lower energy densities.

The battery's voltage, which Toshiba did not specifically disclose, is lower than the 3.6 volts of present lithium ion batteries. The prototype has a capacity of 600mAh and measures 8mm thick, 62mm high and 35mm deep.

A description of the technology comes from the *EE Times* report:

The battery employs a cobalt-based anode and a non-carbon material cathode in place of carbon material that is used for conventional lithium ion batteries, but Toshiba calls it a lithium ion battery because the electric charge movement depends on lithium ion.

Toshiba achieved the breakthrough by using nanoparticles of several hundred nanometers coated uniformly on the negative electrode and newly developed electrolytic solution. This stable formulation does not react with lithium ions at the cathode in a manner that would lower the battery's cycle time. The electrolytic solution and nanoparticles enable large number of lithium ions move quickly to the cathode and store in the particles in recharging mode.

Now Toshiba just has to figure out how to scale it and manufacture it. That latter may be complicated by Toshiba's closing its Li-Ion battery subsidiary last year and selling the plants to Sanyo. Toshiba plans to produce the battery in its fiscal 2006 (ending March 2007).

April 03, 2005

Clean@uto at EVS 21: CLEANOVA II EV

Clean@uto is providing live coverage from EVS21: The 21st Worldwide Battery, Hybrid- and Fuel Cell-Electric Vehicle Symposium & Exhibition, held this year in Monaco.

They have an update on the CLEANOVA II, the electric delivery vehicle developed by SVE for La Poste in partnership with CEREVEH (Development and Innovation Centre for Electric and Hybrid Vehicles). (Earlier post.)

The CLEANOVA II, based on a Renault Kangoo platform, first appeared at the Paris Motor Show in October 2004.

Available in 2 versions, a utility vehicle (2 seats) and a passenger car (5 seats), the CLEANOVA II has been chosen by the French Government for its national demonstration program, carried out within the framework of PREDIT (Program of Research and Innovation for Transportations).

LA POSTE, through its research and development partnership with CEREVEH, is going to be the first corporate customer to test CLEANOVA II. LA POSTE is a pioneer in the integration of electric vehicles in a corporate fleet and owns the 2nd largest "clean" vehicle fleet in Europe.

March 30, 2005

ArvinMeritor Developing New All-Electric Commercial Vehicle

ArvinMeritor, an $8B Tier One supplier to the auto industry, is developing an all-electric drivetrain for commercial vehicles with Unicell, a medium-duty body builder. The resulting new Class 4 medium-duty vehicle (GVWR of 16,000 lbs), which is being designed for a fleet customer, will use a fully-electric drivetrain and will be demonstrated to the public in 2006.

The initial vehicle application is for pickup and delivery vehicles. The particular fleet name is being withheld pending completion of the vehicle development.

This is an exciting new vehicle application for our expanding role as a true systems integrator. We are leveraging our experience in electric drive axles and are gaining the know-how to design similar systems for other applications, such as school bus and low-floor bus and coach vehicles.

—Garrick Hu, vice president of Advanced Engineering, ArvinMeritor's Commercial Vehicle Systems business unit

Hu projected that this type of zero-emissions vehicle will become dominant in many commercial vocational applications over the next five to 15 years, primarily due to the need for reducing emissions in urban environments. The rate of adoption will depend largely on the cost of battery energy storage relative to the cost of fossil fuel.

ArvinMeritor has been designing and manufacturing electric drive axles for more than 15 years, specifically for low-floor buses in Europe. The new drivetrain system relies on onboard energy storage and delivers the torque to the wheel ends via dual motors integral to the vehicle's rear axles.

March 23, 2005

Toyota Brings Electric Personal Transit Concept to New York: the i-unit

Toyota is bringing its i-unit concept electric personal transit vehicle to the 2005 New York International Auto Show for its North American debut.

The concept vehicle had appeared earlier at the Tokyo Motor show last year.

The components are made with decomposable and recyclable materials to reduce impact on the environment.

The i-unit operates upright in low-speed mode, but reclines to a more horizontal stance (shown at right) when at high speed. The resulting lower center of gravity ensures more stable handling.

Toyota i-unit Dimensions

	Low-speed	High-speed
Length (mm / inches)	1,100 / 43.3	1,800 / 70.9
Height (mm / inches)	1,800 / 70.9	1,250 / 49.2
Width (mm / inches)	1,040 / 40.9	1,040 / 40.9
Wheel Base (mm / inches)	540 / 21.3	1,300 / 51.2

The vehicle features drive-by-wire technology, a driver support information system that uses sound, light and vibration, and Toyota's Intelligent Transport System (ITS) technology that permits efficient autopilot driving in specially equipped lanes.

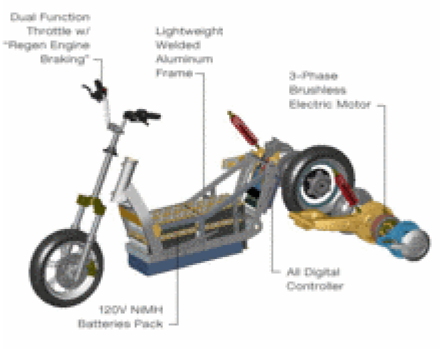
A personalized recognition system can provide information and music to the driver, while the body color can be personalized according to the driver's preferences and emotions.

The i-unit uses rear in-wheel motors powered by a Lithium Ion battery.

More details as they come.

March 20, 2005

Vectrix Readies its Electric and Fuel Cell Hybrid Scooters for Market



Car Buyer's Notebook reports that Vectrix is preparing to launch its VXe plug-in electric scooter internationally. The $10,000 rechargeable electric scooter will go on sale in Europe first, late this year or early in 2006.

The VXe combines a 30 Ah, 125 volt Nickel Metal Hydride (NiMH) battery pack and a 20 kW electric motor that delivers 65 Nm (48 lb-ft) torque. The battery pack has a rated capacity of 3.7 Kwh and is designed for up to 1,700 full charging cycles.

The scooter also uses a throttle-activated regenerative braking system to capture some of the braking energy.

The VXe offers a top speed of 60 mph and a range of about 68 miles (110 km) at 30 mph. Recharge time is about two hours.

The company is also developing a fuel-cell series-hybrid scooter, the VXfce, using components and systems from the VXe mated with a Protonex NGen fuel cell.

The 500-watt NGen continuously tops off the charge of the battery, which in turn provides the power for the electric motor. The fuel cell shuts off automatically when the battery is fully charged.

With its on-board fuel cell, the VXfce should have more than twice the range of the VXe—155 miles (250 km) instead of 68 miles.

Protonex specializes in portable fuel cell applications, especially for military use. In partnership with Millenium Cell, for example, Protoenx just delivered to the U.S. Air Force the industry's first fully-integrated 30 Watt portable fuel cell power system fueled by chemical hydride cartridges.

Vectrix is working with both hydrogen-fueled and methanol-fueled versions of the NGen stack, although currently the methanol-fueled stack produces only up to 200 watts.

March 15, 2005

New Zinc Energy Storage Consortium (ZEST) to Target EVs for Asia

Formed earlier this month, the Zinc Energy Storage Technology (ZEST) Consortium is focused on developing the technology and the market for zinc-based energy storage devices. The Consortium is initially focusing on the electric vehicle market in Asia, with a push for the upcoming Olympic Games in Beijing in 2008.

The ZEST Consortium inauguration meeting was attended by Canadian zinc manufacturers Noranda and TeckCominco, Mexico's Penoles; battery manufacturers Electric Fuel Ltd (Arotech), PowerZinc and PowerGenix; and the International Zinc Association and ILZRO. The ZEST Consortium includes additional key zinc suppliers.

Arotech zinc-air technology is already implemented in a zinc-air hybrid bus. (Earlier post.)

In its bid for the 2008 Games, China declared it would host a "Green Olympics."

In partial support of that claim, China has committed to deploy a fleet of 1,000 environmentally clean buses for the transportation of athletes to and from sporting venues. Furthermore, the Chinese government and the municipal government of Shanghai (site of the Games) are expected to co-operate in the renovating or retrofitting Shanghai's 18,000 municipal buses.

ZEST Consortium members are bidding to supply at least part of this fleet.

We believe that our zinc air technology for electric transportation has great potential. Rising fuel costs and Electric Fuel's technology advancements can position our zinc-air system as a real alternative to hydrogen-based fuel cells for clean transportation in Asia. The 2008 Olympic Games would offer all of the members of the ZEST Consortium, including Electric Fuel, an unprecedented opportunity to demonstrate to the entire world the present-day capabilities of clean, zinc-air transportation, as exemplified by our electric bus.

Robert Ehrlich, Arotech Chairman and CEO

Arotech's prototype zinc-air hybrid bus uses Arotech's zinc-air fuel cells as the primary power source combined with a pack of ultracapacitors recharged through regenerative braking for boosting acceleration.

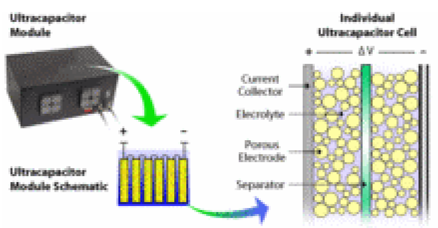
The bus, which uses a General Electric 200 hp liquid-cooled induction motor, has a range of 133 miles on a simulated city-cycle drive.

The Arotech zinc-air fuel cell modules contain 47 individual air-breathing zinc-air cells connected in series. The bus carries three trays of 6 modules each, for a combined on-board energy capacity of 312 kWh.

March 09, 2005

Maxwell Gets the Nod to Develop Ultracapacitors for Passenger Vehicles

The United States Advanced Battery Consortium (USABC) (earlier post) has selected Maxwell Technologies to begin development of a compact, low-cost, high-performance, 48-volt ultracapacitor-based electrical energy storage module for use in passenger vehicles.



Ultracapacitors, like batteries, are energy storage devices. Batteries store charges chemically, whereas ultracapacitors store them electrostatically. Currently, ultracapacitors are more expensive (per energy unit) than batteries.

However, ultracapacitors provide very quick bursts of energy with more power than batteries, and they can withstand hundreds of thousands of charge/discharge cycles without degrading.

The FreedomCAR requirements for ultracapacitors, for example, specify a cycle life of 750,000 (equivalent to 150,000 miles) and a calendar life of 15 years.

That capability makes them promising devices for the capture and discharge of energy captured by regenerative braking in a hybrid.

In a hybrid electric vehicle, an ultracapacitor-battery combination could significantly improve power management and extend battery life. The ultracapacitor would relieve the battery's load during high power times, such as initial acceleration and braking. Load-leveling these spikes would allow the batteries to last longer, saving both money and fuel.

USABC operates under the auspices of the United States Council for Automotive Research (USCAR), an umbrella organization formed by DaimlerChrysler, Ford and General Motors to strengthen the technology base of the domestic auto industry through cooperative research.

Maxwell is now eligible for more than $3 million in matching funds for the module development program from the U.S. Department of Energy (DOE) through the FreedomCAR initiative.

Maxwell has more than a little experience with hybrids. When ISE's ThunderVolt gasoline-electric hybrid bus completed a 15,000 mile test conducted by the Federal Transit Administration last fall, it was using Maxwell ultracapacitors for its electrical energy storage.

Resources:

- FreedomCAR Ultracapacitor Requirements
- NREL: Ultracapacitors
- Ultracapacitor-Assisted Electric Drives for Transportation

March 07, 2005

Bolloré Group Introduces BlueCar Lithium-Metal-Polymer EV Concept

The Bolloré Group, through its subsidiary BatScap, introduced an electric vehicle (EV) concept car using new its Lithium-Metal-Polymer batteries at the Geneva Motor Show.

The Bolloré group is not trying to become an automaker, but is eager to have its battery technology used in a vehicle.

The new BlueCar with its LMP batteries offers an operating range of 200–250 kilometers (124–155 miles) and a top speed of 135 kmh (84 mph).

A full recharge requires 6 hours; a two-hour rapid charge will recover 50% capacity.

BlueCar has three front seats, and an 810-liter (28.6 cubic feet) storage area in the rear. The vehicle is a mere 3.05 metres long, or exactly the same length as the old Mini. Two fold-up jump seats can also be installed in this area, making the BlueCar a five-seater.

The lithium-metal-polymer cell is a laminate of four ultra-thin materials:

- A metallic lithium foil anode that acts as both a lithium source and a current collector.
- A solid polymeric electrolyte created by dissolving a lithium salt in a solvating co-polymer (polyoxyethylene).
- A cathode composed of vanadium oxide, carbon and polymer to form a plastic composite.
- An aluminum foil current collector.

The ultra-thin films are layered, coiled, then compressed into a prismatic shape and assembled into cells, which are then assembled into modules.

LMP batteries offer advantages such as a much higher energy capacity per unit volume and unit weight, and a very predictable and stable charge/discharge characteristics over varying environmental conditions—all very good qualities for an electric vehicle battery.

BatScap is not alone in providing LMP technology for vehicles or in looking for automakers as partners. Avestor, a subsidiary of a Hydro-Québec, has put its LMP modules into the prototype CleanNova II delivery van for the French Post Office (earlier post).

Electric Vehicle Battery Technology

Technology	Specific Energy(Wh/Kg)	Energy Density (Wh/l)	Specific Power (W/kg)	Cycle Life (Cycles)
BatScap LMP	110	110	320	
Avestor Prototype LMP	121	143	241	300
Li-ion	138	210	430	550
NiMH	63	150	200	800
Ni-Cad	50	90	120	800
Lead-Acid	36	86	180	600

March 07, 2005 in Batteries, Electric (Battery) | Permalink | Comments (2) | TrackBack

EVAOSD Newsletter	Monthly, 6-10 pages, covering San Diego County and Southern California Subscription rates: $12.50 per year ($15 foreign, via sea mail)
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