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FOREIGN TECHNOLOGY DIVISION

IN THE RHYTHM OF THE SUN

by

A. L. Chuzhevskiy and Yu. G. Shishina

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

MACHINE TRANSLATION

FTD-ID(RS)T-1601-77 17 November 1977

FTD-77-C-001443

IN THE RHYTHM OF THE SUN

By: A. L. Chuzhevskiy and Yu. G. Shishina

English pages: 209

Source: V Ritme Solntsa, Izd-vo "Nauka", Moscow 1969, pp 1-112.

Country of origin: USSR

This document is a machine translation post edited by Marilyn Olaechea.

Requester: FTD/ETCK

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In the interest of economy and timeliness, the original graphics have been merged with the computer output and editing has been limited to that necessary for comprehension. No further processing is anticipated.

Page 4.

Similar to as large spacecraft, ~~wanders~~ our planet roams ~~in~~ the universe. "~~Sheathing~~ The/skin" of ship (atmosphere) is durable and reliable. Directly, without instruments, we do not ~~percept as~~ perceive how space storms from time to time "shake" the hull of ship. But the region of the Earth, in which we live, ~~the~~ biosphere, is not isolate~~d~~ & ~~insulated~~ from the storms, which are developed in ~~Kosmos~~ space. It is Especially affect ~~it~~ by the changes, which occur on the nearest star - on the Sun. They are immediately ~~answer~~ responsible ~~on~~ for all terrestrial processes, including on the processes of life. Attempting to understand the mysteries of terrestrial life, humanity since olden times ~~it~~ has turned "~~after~~ to for answer/~~response~~" to the Sun. The first random observations, and then the systematic study and the comparison of the periodic processes of solar activity and many biological phenomena on the Earth showed that between them there is a close connection. The manifestation, and also the mechanisms of the emergence of numerous sun-earth biological ~~communication~~/connections ~~investigates~~ is the object of a young scientific discipline - space biology, more precise~~ly~~ by ~~its~~ a separate ~~region~~ field - heliobiology. To The history of the emergence of heliobiology, ~~to~~ and to its first step~~s~~/~~pitches~~ is devoted this book.

Page 5.

The life of an individual organism is only a fragment of the life of the universe.

Claude Bernard.

From myths to science.

"I am your ~~born~~ our son, o Aton, bearing the sacred name to the ~~outer~~ greatest heights of the universe, where in songs you ~~is~~ are always sung. Grant to me forces, o Aton, with your sons good ~~by~~ road single to strive ~~for~~ in your always rejoicing world/light" [1].

FOOTNOTE [1] Ancient Egyptian hymn to the Sun, translated by A. L. Chizhevskiy. END FOOTNOTE

With such words they turned to the Sun in ancient Egypt.

"Bright, shine, ~~is~~ mighti~~er~~ing, the life-giving, ~~glaring~~ glowing heart of

world", ~~to~~ with such enthusiastic epithets poets always rewarded the Sun ~~the poets.~~

"~~Series~~ Another star in the system of Milky way, ~~usual~~ one more yellow dwarf ...", dryly ~~qualify~~ categorizes the Sun thus by contemporary astronomical ~~management~~/manuals and catalogs, emphasizing the resemblance of our heavenly body to the myriads ~~other~~ of others scattered in the boundless Universe stars behind. However, ~~after~~ behind the impassivity of scientific terms, just as ~~after~~ behind poetic metaphors, lie the same feelings: admiration, surprises, the appreciation: . ~~Since earlier~~ For both then and now ~~men~~ man realizes, that the role of the Sun in its life is ~~extreme~~ actually very great in truth.

If the Sun suddenly went out, the Earth and everything, which lives and is glad in its ray/beams, would be encompass ed by the killing interstellar cold. Without solar energy our planet forever would remain ~~the~~ a piece of dead slag, on it could ~~not~~ never have arisen and be developed ~~the~~ life, never would none appear of people.

Page 6.

But indeed ~~from~~ of the ~~which seems~~ seemingly inexhaustible riches of solar radiations ~~to us is obtained in all the~~ we get only half of its billions ~~worth~~ part. ~~But also~~ Get this energy completely ~~it~~ suffices ~~in order~~ to fill the Earth by all possible manifestations of vital activity.

The Biosphere, wrote academician V. I. Vernadskiy, actually can be considered as the region of the earth's crust, occupied by the transformers, which translate/transfer cosmic radiation into efficient terrestrial energy - electrical, chemical, mechanical, thermal and so forth. The cosmic radiation, coming from all celestial bodies, penetrates all of it and everything in it. We recover and realize only a negligible part of these radiations.... Their determination and understanding is a matter of the future. Yet indisputably not they, but Sun rays cause the main features of the mechanism of biosphere. Research on reflection on the terrestrial processes of solar radiations already is sufficient for obtaining the first, but precise and deep representation of biosphere as a terrestrial and space mechanism. The sun radically reworked and changed the face of the Earth, and penetrates and enveloped biosphere. To a considerable extent the biosphere is a manifestation of its emission/radiations" [1].

FOOTNOTE [1] V. I. Vernadskiy. The biosphere as a region of the conversion of cosmic energy. Selected works, vol. V. Moscow, Izdatel'stvo AN SSSR, 1960. END FOOTNOTE

This extreme role of the Sun in all manifestations of life on the Earth was indisputably intuitively understood by our distant predecessors - peoples of antiquity. Is noticeable that that among an enormous quantity of the gods created by human imagination ~~gods~~ the first place long time in all peoples belonged to the god of daylight - to the Sun. ~~Being occupied by~~ By studying the history of astronomy, which was conceived ~~itself~~ at the ~~twilight colors~~ dawn of human history, the English scholar Olcott gathered enormous material about the value of the sun in the ancient folklore of Assyria, Phoenecia, Egypt, Greece, Peru, Mexico, and also in the representations of contemporary American, African, and Oceanic peoples. Historical and comparative mythology attests to the fact that all peoples without exception/~~elimination~~ peoples in their ideology ~~returned~~ paid indispensable "tribute to the Sun". In the sagas, legends, myths, legends, superstitions, which arose on completely different soil, the historian ~~it strikes~~ is struck by the deep resemblance of the content.

Page 7.

If we trace the evolution of solar cult, it is possible to be convinced of that, it ~~lay as~~ was the basis not only of religious, but also scientific thinking. The Sun ~~read a little itself by~~ was considered the main deity ~~an additional of~~ even seven millenia back into ancient Egypt.

The climatic conditions made Egypt very dependent ~~from~~ on this wilful deity's whims (in Heliopolis they called it the god Ra, in Elfa - Aton). It first melted snow on the slopes of south mountains, causing the overflows of the Nile, waking up to life the turbulent vegetation of (the fine ~~sediment~~ alluvial plains, then periodically it dried up the richest granary. The Egyptians, who believed, that the sun created everything living on the Earth, attentively ~~controlled~~ monitored it. Research on the Sun led, for example, the Egyptians to the creation of chronology. They managed to determine the duration of year 365.25 days.

Persians, Babylonians, the Chinese, the Japanese, the slavs also ~~read a little~~ considered the Sun as source of life, fundamental principle entire real. (The Hellenes attributed An especially important role to the sun ~~abstract/removed~~ in their philosophical views ~~hellenes.~~ (From the representations of the Sun arose in Ancient Greek language such concepts and words as "law", "order", "harmony", "count". They all have "solar" roots). In the history of ~~antique~~ ancient world there was a period, when to the Sun as to the initial reason, were ~~elevated~~ attributed all phenomena of nature. "Only the sun by its shining ~~world~~/light gives life", said ~~label~~ inscription in Diana's temple in ~~sword hill~~ Ephesus. Idea about the supremacy of the Sun was designed ~~into the~~ into a ordered philosophical theory, which ~~put~~ left an indelible

~~press~~ imprint on the thinking of ~~antique person~~ the ancients.

Acquaintance with the history of the development of human knowledge leads to ~~persuasion,~~ the conviction that the main directions of natural sciences, including the science of the Sun, were conceived ~~themselves~~ in the very distant past. Into the philosophical studies of ionic school, into the beliefs of the Hindus, ~~to~~ in the sagas of Scandinavians depart we find the roots of many contemporary hypotheses about the structure of material and the nature of world.

~~Would~~ It would be to ~~absurdity~~ dispute the ~~grandiose~~ great successes of the science of our days, to preach return to ~~backwards~~ past or sing dithyrambs to the intuitive abilities of ancient person, but it is also difficult to agree with the opinion that ~~for the lived there is no time peoples could not be hit upon before the real representations of~~ people who lived once had no ideas about a the present concepts of charitable, creative life on the Earth, the creative force of the Sun, and that the countless myths - these are the only naive fairy tales.

Page 8.

They are the result of centuries-old collective ~~experiment~~ were, the result of the work of the generations inquisitive, ~~not tired~~ nonfolkloric, and ~~now and then~~ at times also ~~the~~ brilliant observers of the nature, whose names are almost lost. ~~So,~~ Thus, one of the greatest scientific generalizations -

heliocentricism - was born long before Copernicus, whom ~~it~~ is ~~accepted to~~ now consider ~~it~~ to be its creator. Heliocentricism was preached ~~an additional~~ for both as 2100 years ago by Aristark Samosskiy. ~~As~~ The impetus ~~jerk/impulse to~~ for the emergence of heliocentric representations indisputably ~~served~~ was the obtained from the ancestors ~~persuasion about~~ idea of the supremacy of the Sun in the Universe, which was so sympathetic "~~A~~pollini~~cosko~~-solar" ~~shower of~~ Greek. idea.

But the brilliant guesses of ancient thinkers subsequently were forgotten for a long time. ~~To replace to them came~~ Their replacement was the geocentric ideology, according to which the Earth is the "center of the Universe".

It is difficult completely to evaluate that great loss, ~~which~~ sustained ~~applied~~ by the creator of the scholastic theory, ~~of Klavdiy~~ Claudius Ptolemey's universe to the development of natural sciences.

The blinders of geocentric ~~representations~~ concepts narrowed in the consciousness of people ~~of the~~ their framework of world, they surrounded the Earth ~~by the~~ with an imaginary impenetrable wall, which always separate~~d~~/~~liberated~~ it from the ~~always being~~ eternally agitated element - ~~by~~ the Universe, they gave to the Earth ~~the~~ an aureole of ~~the~~ nonexistent exclusiveness, they directed scientific ~~searching along knowingly~~ research in a direction known to be fruitless ~~way. Pass~~ seventeen centuries passed before ~~how~~ was found

dare-devil and great thinker, Nicholas Copernicus, who dared to tear away from the Sun ~~its~~ his ~~wrapped~~ enveloping film of geocentric conjectures, to ~~scatter~~ disperse the darkness of superstitions. From Copernicus, according to of F. Engels, "begins ~~its~~ the chronology ~~of~~ the release of natural science from theology" [1].

FOOTNOTE [1] K. Marx and F. Engels. Collected works, vol. 20, p. 347.
END FOOTNOTE

The further course of developing ~~the~~ ment of knowledge ~~it is newly~~ irreversibly ~~inevitable to~~ turned science ~~facing~~ toward the Sun, ~~to~~ the Kosmos, beginnings ~~the~~ and there began a slow, and then ~~whole being~~ ever accelerated departure ~~withdrawal~~ from the idealistic geocentric views to the materialist ~~representations~~ concepts of universe, ~~exposed/persistent~~ contained in cosmic foreshortening. This complex process of the ~~release~~ liberation of science from geocentricism - the overestimation and the reconsiderations of geocentric representations in natural science, was successfully named ~~known~~ by the famous Soviet philosopher ~~by~~ Ye. T. Faddeyev the "cosmization of science", ~~that~~ which begun more than 300 years ago, did not end and until now.

"Our entire official physics, chemistry and biology ~~it is~~ are exclusively geocentric, and are calculated only for the Earth" [1], wrote F. Engels a total of one hundred years ago.

FOOTNOTE [1] K. Marx and F. Engels. Collected works, vol. 20, p. 553.
END FOOTNOTE

In many respects his ~~its~~ word are valid even today. Not ~~the~~ always is the recognized ~~realized~~ inertia of geocentric views still so great, and no one will ~~be~~ decided to relate geocentricism entirely ~~with pillar~~ to the past of science, ~~into~~ to its history.

But although the muffled ~~a nechoic~~ echo of geocentricism still resounds ~~is given~~ up in many ~~angle irons of~~ Corners natural science, occasionally preventing us ~~interfering to now and~~ from then "hearing" the new and obvious truths, it would seem, ~~truths, the~~ that the cosmization of science ~~are occurs~~ occurs at accelerated ~~by impetuous~~ rates, especially in the last/latter decade after the ~~having~~ emergence of man into outer space. ~~The~~ A Review of the (very rich) accumulated ~~richest luggage~~ cargo of scientific facts under the sign of ~~communication/~~connection of terrestrial phenomena with the ~~events~~ ~~which are accomplished~~ occurring in the Universe is also being done ~~goes also~~ in biology, and in chemistry, and in medicine. ~~On~~ Before our eyes are born new disciplines: space physics, aerospace biomedicine, space agrochemistry,

heliobiology, etc. And although the "process of the release of natural science" from the captivity of ~~the become~~ increasingly obsolete geocentric ideas is not finished, the ~~issue~~ outcome of the cruel ideological battle, initiated by the titans of the Renaissance - Copernicus, Galileo, Bruno, is decided beforehand.

Because of the rapid development of science and technology of observation ~~the sun, man~~ learned about this star during the last three centuries, especially ~~for~~ the latter two ~~of~~ decades (after the birth of radio astronomy, x-ray astronomy, gamma-astronomy) ~~are~~ more than for the preceding/~~previous~~ millenia.

But this all the same does not mean that the contemporary astronomers delete that enormous factual material, which was with ~~this~~ such work accumulated by their predecessors.

From the ~~torgue~~/moment of invention by Galileo in 1610 of the first telescope, ~~prepared~~ produced as many ~~following~~ which followed, by his ~~inherent~~ own hands, the sup was constantly observed by the inquisitive eyes of ~~the~~ researchers. From this time the facts of solar biography began to be supplemented with ~~whole by the~~ ever increasing speed. After the Second World War ~~was born~~ a new science was born - radio astronomy. An Event ~~not a bit not the~~ no less significant, than the invention of telescope).

Page 10.

Galileo presents his telescope to the doge of Venetian republic (from the picture of Luigi-Sabotelli).

Observations of the Sun until recently ~~they~~ were conducted only through the "optical window" of transparency in the atmosphere, i.e., in visible light. (Earth's atmosphere ~~passes the~~ admits electromagnetic waves of optical ~~s-band~~ range with wavelength more than 0.3 μ and shorter than several microns. But eye ~~recovers and that~~ captures even less - wave from 0.4 to 0.75 μ). The information, which ~~they~~ were brought from Kosmos by other forms of emission/radiations, in particular radio wave, ~~it~~ has remained ~~that which was~~ not deciphered. But the Universe, yes even Sun itself whispers, speaks and makes noise ~~to~~ in different voices on waves with a length of from ~~the~~ a negligible portion/fractions of any angstrom to ~~the~~ hundreds of meters and more !

~~After~~ After depriving ~~of~~ the optical method of a monopoly in Solar research, radio astronomy ~~unusually~~ greatly expanded ~~it moved apart~~ the boundaries of knowledge. To interpretation became available waves from several millimeters to several dozen meters. (Longer waves the earth's atmosphere barely ~~passes~~ admits). And if earlier the only ~~world~~/light told to us about, ~~that which is made in~~ what occurs distant worlds, ~~then~~ now "solar news" communicate to us the electromagnetic waves of any length: from the ~~most rigid~~ hardest - gamma-rays to the longest - radio waves.

Page 11.

~~Authentic~~ A real revolution in physics of the Sun produced contemporary

rocket engineering. Now man obtained possibility not only to follow the Sun from the Earth, but also to send into ~~space~~ the cosmic ocean flying laboratories - satellites, rockets and interplanetary space stations. The equipment, raised on satellites and rockets, made it possible to record the going ~~from~~ the Sun electromagnetic and corpuscular radiation, ~~by which the~~ (emitted by Sun whose path to Earth the atmosphere and geomagnetic field intercept ~~to~~ the ~~Earth~~. The contemporary researchers of the Sun already dream about that near future, when ~~about the~~ near Earth ~~begin to be on duty~~ there will be the constant "patrols of solar radiation", ~~that~~ which transmits with the aid of ~~the~~ telemetry ~~of~~ information about all oscillation/vibrations ~~of~~ in the activity of heavenly body. They assume also to take part in the work of observatory on the Moon, the plan/layout for building ~~of~~ which has already been discussed at the international congresses on astronautics.

Looking back on
Being ~~examined~~ to the passed by astronomy path, it is difficult to ~~still comprehend~~ even imagine entirely ~~that~~ the enormous jump, which it ~~completed~~ made ~~for~~ in the ~~latter~~ last three centuries ~~and~~, especially ~~for~~ over the ~~latter~~ last ~~of~~ 20 ~~summer~~/years.

From poetry of myths and solar hymns, to the contemporary study of the biological role of the Sun; from superstitious views and the dim guesses of ancient solar theory to the heliophysics of our days, from the ancient Egyptian and ancient Greek temples of the Sun to the

authentic temples of science, observatories and ~~grandiose~~ great radiotelescopes, ~~carrying~~ performing a special and constant service ~~of~~ to the Sun, - this is the way of the steady development of Solar theory. ~~The~~ Centuries of the ~~bright~~ brilliant development of science were required in order that the man could at least a little approach ~~itself the~~ an understanding of the complex physicochemical processes, occurring both in the solar substance and in the sphere of solar effect. From a deity the Sun in the consciousness of people gradually was converted into real space force - the ~~energy initial cause of~~ primary power behind many phenomena in the inorganic and organic life of the Earth.

The solar gods now rest in the cold halls of museums. Is long forgotten Sun worship! Contemporary person no lcnger emerges ~~to~~ from his house before dawn to ~~twilight colors from house in order, turning~~ facing the east, to greet the first ~~ray~~ beams of the ascending heavenly body. But, as before, humanity ~~nonseparably~~ constantly looks ~~himself~~ at and listens to the life of the sun. All events, which ~~are~~ developed on it, become the subject of scrupulous scientific investigation. And now no longer in superstitious fantasies, but in science the sun comes forward as source of life on the Earth. By (his) hard work ~~explains~~ men (has explained the place, which occupies our heavenly body in the Cosmos.

Page 12.

"Illuminating lamp of world".

~~Without doubt does answer~~ How does answer contemporary science the question, what Sun is and ~~whence are taken the~~ what is the source of the apparent inexhaustible supplies of energy (3×10^{33} cal. yearly), which ~~thus~~ for already about five billion ~~summer~~/years with ~~this~~ such generosity ~~does~~ has sent into the surrounding space?

Similar to other stars of Milky Way the Sun is ~~the~~ a giant (by diameter 1391 thous. km) rotating sphere of the incandescent gas, density and temperature of which they grow with depth. In the interiors of this cluster of the blazing material, where the temperature reaches 20 million degrees, pressure - 200 million atmospheres, and the density of substance ten time exceeds steel density, is realized nuclear reaction. In it participate ~~the~~ atomic nuclei, from which are stripped the electron shells. The base mass of the Sun - 60o/o ~~composes~~ is composed of the nuclei of hydrogen - the protons, which enter between themselves ~~in~~ into the so-called proton-proton reaction. In this case are formed the larger nuclei of helium, and are ~~separate~~/liberated colossal quantities of thermonuclear energy.

From the viewpoint of ~~p~~hysicist ~~Solntse~~ the Sun is, nothing else but the colossal natural nuclear reactor, moved away from the Earth up to a comparatively safe distance, which possesses a mass of 2.24x10²⁷ t. This reactor ~~du~~ring billions ~~summer~~/years continuously processes into energy its own substance: each second 4 million t of solar substance is scattered in space in the form of diverse emission/radiations. Besides electromagnetic radiations - the gamma-rays, X-ray, ultraviolet, light, infrared, radio waves - the Sun throws out into outer space ~~the~~ flows of ~~the~~ electrically charged and neutral particles of the different energies. However, overwhelming majority ~~entire~~ the emitted by the Sun ~~energy~~ falls on the fraction of light and infrared rays.

Page 13.

~~To the~~ Earth will ~~come along the~~ minute quantities of solar energy. ~~But also the~~ halves of ~~its~~ one billions ~~worth part as~~ has already been said, completely ~~are~~ sufficient in order to warm the Earth, constantly ~~invariably~~ accompanying the Sun together with the remaining large and small planets of the solar system in ~~his~~ space wanderings. The Sun is ~~a~~ center of ~~the~~ extremely harmonious, ordered system of planets. The "illuminating lamp of world, which reigns in center",

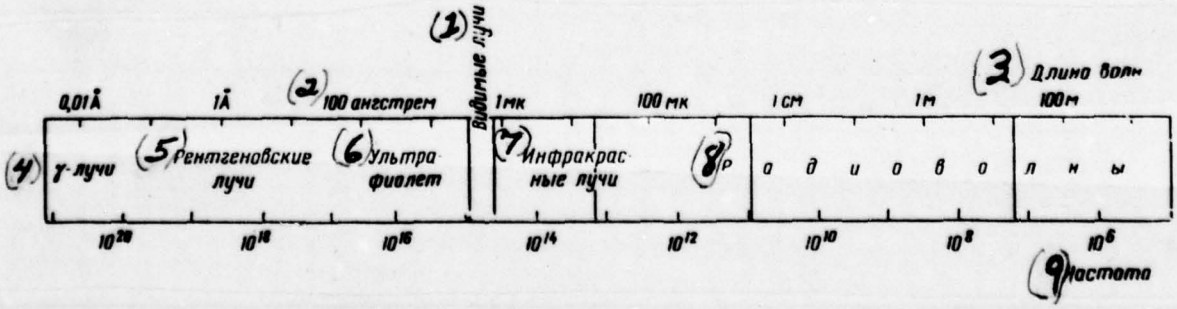
as Copernicus called it.
~~thus call~~ named it Copernicus.

The mass of the Sun is 750 times ~~is more~~ greater than the mass of its accompanying planets. And the Earth, and Neptune, and Pluton, which moves ~~along the~~ in a peripheral orbit of system, ~~with lightness~~ are easily ~~are~~ held by the forces of solar gravity, which subdue their gusts to fly away from each point ~~of~~ on their ~~way~~ path tangentially into the darkness of infinite space.

Us ~~disengage~~ get from the sun 149.5 million km. ~~Much this or is small~~ Is this much or little?

All terrestrial distances are negligible in comparison with this really/~~actually~~ colossal distance. Therefore ~~took root~~ we accustomed the habit ~~to~~ consider that the Sun is extremely ~~moved away~~ distant from the Earth.

However, everything becomes known in comparison. In order correctly to evaluate distance from the Earth to the Sun, ~~are most~~ it is ~~better used not~~ best not to use absolute unit of linear measures, but relative values. Then the Earth turns out to be ~~that which was moved away~~ from the Sun in all ~~to~~ only 107 solar diameters.



Key:

Scale of the electromagnetic waves emitted by the sun. 1. Visible ray/beams. 2. 100 angstroms. 3. Wavelength. 4. Gamma-rays. 5. X-rays. 6. Ultraviolet. 7. Infrared rays. 8. Radio wave. 9. Frequency.

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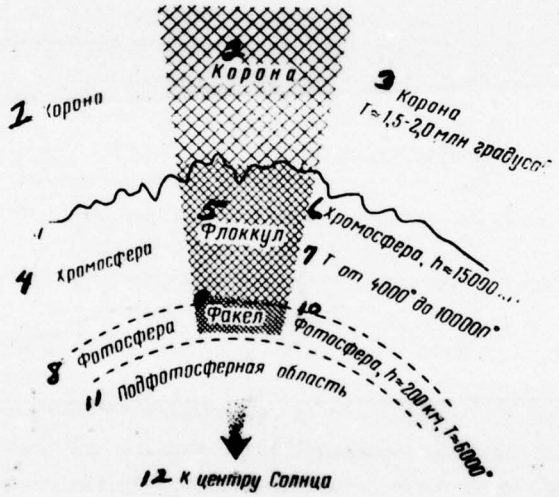

Diagram of the consecutive layers of the Sun atmosphere (its shaded active region).

Key: 1. Corona. 2. Corona. 3. Corona T=1,5-2,0 million degrees. 4. Chromosphere. 5. Flocculi. 6. Chromosphere, h=15000. 7. T from 4000° to 10,000° 8. Photosphere. 9. Flame. 10. Photosphere, h=200km, T=6000°. 11. Subphotospheric region. 12. To the center of the Sun.

After ~~accepting~~ taking into consideration the enormous power of the occurring on the Sun physicochemical processes, the value of diameter, the extent of atmosphere, we will be convinced of the fact that the terrestial globe falls into the zone of its direct effect. ~~According to the expression of the~~ As expressed by a noted researcher of the stars interiors Artur Eddington, "The Sun proves to be ~~in us~~ near us, at hand".

The rarefied exterior layers of solar atmosphere are spread to millions of kilometers in different directions. Our planet literally bathes in solar ray/beams. Moreover, in comparison with other stars the Sun is so close to us, that we even can scrutinize and study its surface directly from the Earth. With the aid of optical instruments to reveal/detect ~~wrapping~~ enveloping the Sun layers and it is possible to trace the occurring in its atmosphere processes in such details, as if the Sun was transferred into terrestrial laboratory, and we would begin "to remove/take" its wrapping shells.

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Conditionally the solar atmosphere ~~subdivide on~~ is broken down into several layers, which convert without sharp boundaries one ~~in another:~~ into the other: the external, most rarefied layer - the corona, the chromosphere which lies ~~hearth by~~ beneath it ~~chromosphere~~ and is of red color, colored layer and reversing layer. The latter composes the upper layer of photosphere - emitting layer

("photo-with" - in Greek world/light).

Photosphere - the layer of gas is not more than 200 km by thickness, the visible glaring surface of the Sun, light barrier, deeper which our eye penetrate cannot... .

The seething, mutinous solar element never remains calm. It that also matter furrow the mighty, glittering waves - granule, seen from the Earth as enormous rice grains. On glaring solar disk there appear and they move spot. luminesce themselves bright area/sites - flames, appear chromospheric flares. Upward take off the glowing fountains - protuberances. Even the corona of the Sun does not have permanent mold. It first is compressed, then widely it is straightened. All these manifestations of solar vital activity sometimes sharply are amplified. This means that the calm to that Sun entered the phase of the increased solar activity.

Two-faced Janus.

In star catalogs the Sun figures as as usual dwarfish weakly-alternating/variable star, because in some wave bands of its differs the surprising constancy of emission/radiation. If we began

draw conclusion about
to ~~conclude about~~ (the "mode/conditions of the work" of the Sun) little
more than ~~on~~ its light and thermal emission/radiations, then ~~they~~ we
would not doubt the fact that the Sun - [star ~~is~~ constant] ! (Change in
its luminous density does not exceed 2o/o). But in other wave bands,
short-wave and long-wave, solar intensity periodically sharply
varies. And if the solar activity ~~they~~ was judged only by ultraviolet,
X-ray gamma-radiations or by radio frequency emission, then the Sun
would ~~render~~/show ~~the~~ be a (star ~~of~~ variable)!

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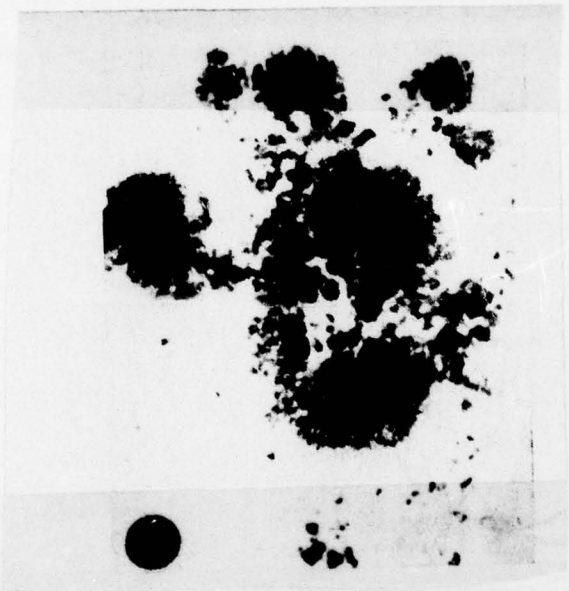

Comparative value of the sunspots and Earth (Earth is designated in small circle).

Violent protuberances. (to the right for a comparison is depicted the Earth).

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The intensity of corpuscular radiation of the Sun also varies. From time to time ~~for~~ on the protective shield of the Earth - the atmosphere - are brought down there arrive much more powerful, than usually, corpuscular fluxes. As ~~the~~ sh sign/criteria of the intensification of activity in the work of the Sun serves appearance on its surface of the so-called centers of the activity: ~~first~~ here, and ~~then~~ there near its equator are isolated bright area/~~sites~~ ~~are the~~ photospheric faculae, which are the cover/~~coated~~ ~~then~~ by with dark points. Points increase, they increase for the ~~extent/elongation of~~ over several days, and sometimes but ~~that~~ also hours, and ~~the clear to that~~ clear up to then is speckled surface of the Sun ~~is sowed~~ by ~~the~~ spots of irregular form. The spots, inclined to be grouped in pairs, are arrange/located along both sides of solar equator. They continously are modified and they move over solar surface, rotating together with the Sun ~~with~~ from west to the east.

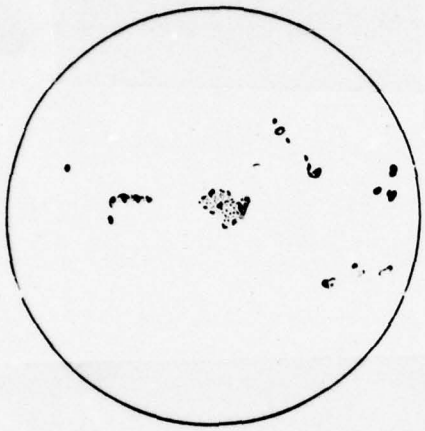
Separate spots and the groups of spots now and then reach enormous size/dimensions, occupying ~~the~~ an area, in which could be freely placed dozen terrestial globes. The spot usually "~~it~~ lives" from one day to several months (the longer it lives, the larger it grows ~~than it gore~~) and gradually comes to naught. ~~It is~~ Simultaneously with the spots or shortly before ~~that, as~~ these giant "freckles" ~~pour~~ dot the formerly out on the pure/clean ~~before~~ face of the Sun, above its disk rocket upwards ~~as if the~~ foreground

~~languages~~ as it were, of the raging flame of igneous protuberances, and the relative stability of solar chromosphere is disrupted by giant explosions - chromospheric flares. At this time is amplified the solar wind, and the continuous flow of gases, which goes from the Sun.

Of the numerous and variegated manifestations of the solar activity of ~~the~~ he spot by the first ~~they~~ drew the attention of ~~t~~he observers even in the very distant times. The references to them are encountered in Chinese chronicles already in 301 years B.C. In their descriptions the Chinese compared spots first with hen egg, then with ~~cleat/canard~~ duck egg, peach, plum they noticed, that the years of spotting out usually follow in a row one another, and then begins ~~the~~ en inexplicable interruption in their appearance on several ~~summer~~/years and even decades. ~~The~~ There most valuable observations of the Chinese, clothed in somewhat a florid form, ~~send the remainder to~~ reached the Europeans only twenty one century later. But by this time scholarly Europe itself ~~reveal~~/had detected spots on solar surface.

Page 18.

Sunspots. (Galileo's figure).



(Spots very convenient object for investigation; ~~therefore~~ their total area and number until recently they remain the criteria of solar activity). In the beginning the XVII century sunspots ~~anew~~ were discovered almost simultaneously and independently of each other immediately by four: Dutchman Johann Goldschmidt, known by the name of Fabricius, Italians Galileo Galilei and Christoph Scheiner, and also Englishman Thomas Harriot. Following ~~those~~ this Galileo, and with ~~it~~ him simultaneously Fabricius and Scheiner established that ~~full~~/total/~~complete~~ time of the inversion of spots and inversion of solar body around its axis, is equal to 27 days.

Hardly had Fabricius printed his work, ~~as~~ than Galileo and Scheiner stated ~~about~~ the fact that they had observed the spots ~~even to it~~ before him. There began ~~Was tied~~ a ~~the~~ bitter dispute for the priority, aggravated moreover by interference of church.

Priest and professor ~~the~~ of mathematicians, Scheiner, belonged to the order of the Jesuits, known ~~by a~~ for their strict discipline and blind adherence to Aristotle's ~~study~~ teachings, according to whom the Sun completely is constant/invariable. During March 1611, when Scheiner reported spots to the ~~chapter~~ head of the order, to an ardent peripatetic follower of Aristotle's ~~follower~~, he heard as ~~answer~~/response prohibition to proclaim

"heresy" and the rebuke: "Read Aristotle's transactions from ~~panel~~ Cover to ~~panel~~ Cover, my son.

Page 19.

Spots most likely were in your telescope or in your eye". Only after Fabricius published ~~its~~ his observations, to Scheiner they permitted to ~~make~~ do the same. It is significant, that, in every way possible contriving to preserve the "purity" of ~~the~~ an Sun ~~"of not stained"~~ unstarnished, Scheiner explained spotting out by ~~passage before the disk of~~ the appearance of spots dark bodies or planets passing in front of heavenly body ~~of dark bodies or planets.~~

Neither Galileo nor Fabricius shared Scheiner's opinion. They recognized that ~~spots~~ the spot's formation ~~education~~ were on the very surface of the Sun, which rotate together with it. Galileo thus demonstrated that the Sun rotates around its axis during a period of approximately one lunar month. ~~Was tied the~~ There arose a new dispute, which turned out to be fateful for Galileo. ~~Its~~ His caustic, sarcastic observations excited the hatred of the peripatetics, which consisted of Catholic clergy and Jesuits. In 1633 Galileo appeared before their law court on charge of heresy....

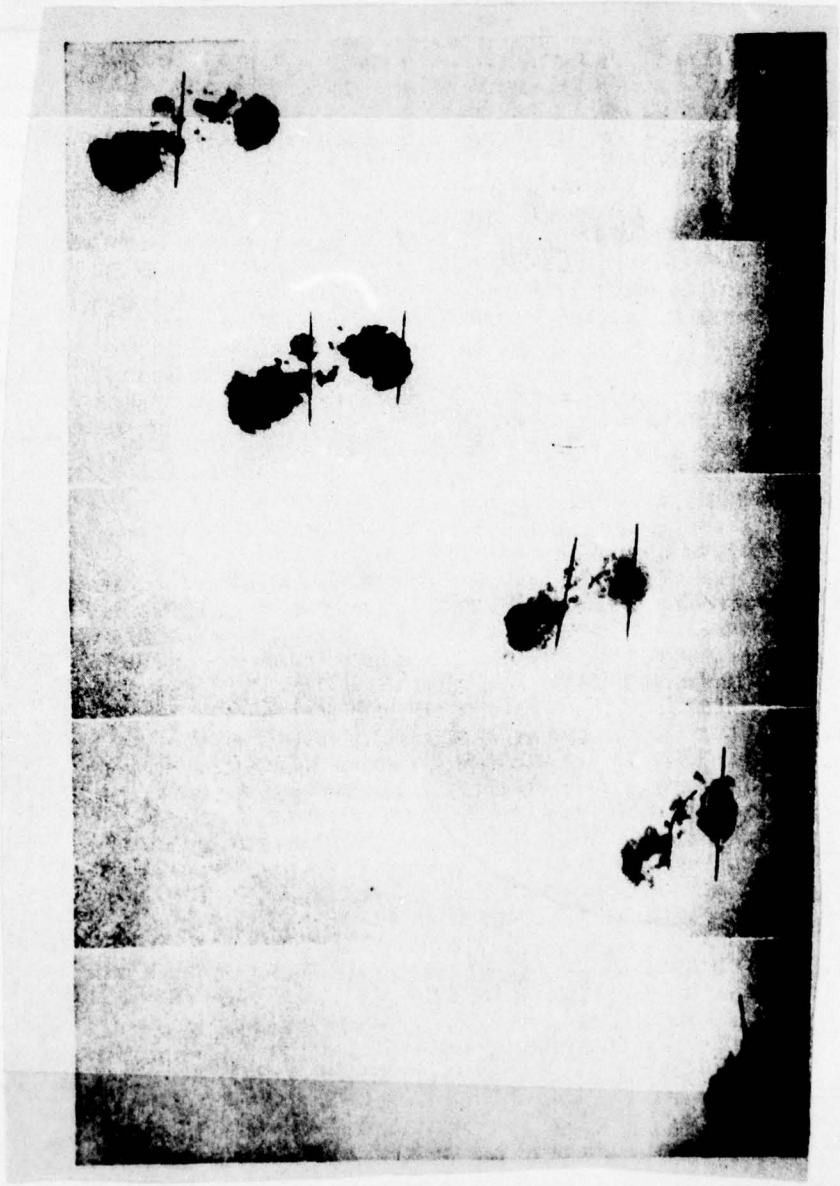
But nevertheless ~~that~~ what are such spot, these dark and comparatively cold formation/~~educations~~ on the surface of the Sun? ~~Is~~ Have we guessed

~~during~~ in our days their "great secret", ~~which~~ according to Galileo's ~~expression~~, ~~over which was~~ beaten ~~on~~ quite a few little outstanding minds? Assumptions of the first observers, that the spots, were planets, the nearest satellites of the Sun, was refuted by Galileo. But also Galileo in turn, erred. He inclined was to think that the spot - were ~~the~~ clouds, floating in solar atmosphere. Some scientists asserted that these clouds are formed after the ~~ejection~~ eruption of solar ~~is Vulcan~~ volcanos, others accepted them as the apex/vertexes of mountains, that rose above ~~the~~ an island, lying on a solid solar nucleus. Outstanding English astronomer U. Herschel assumed that the spots are ~~time~~/temporary opening/apertures in the clouds, through which is seen the central core of the Sun. ~~Its~~ His son, D. Herschel, considered them ~~the~~ to be immense eddy/vortices, descending through the atmosphere.

This argument was not ended in a day or two ~~On spots argued not day and not two.~~ The problem of the origin of spots ~~by~~ was relayed relay race transfer/~~converted~~ from one generation of the astronomers to the following. ~~Sufficiently for long popular remained~~ For a rather long time was popular the vortex conception of spots. According to this theory of spots - were the visible apex/vertexes of giant intra-solar eddy/vortices.

Page 20.

Five consecutive photographs of one and the same spot, which prove, that the spots rotate together with the Sun.



Vortex conception with all its plausibility did not explain, however, ~~to the~~ a characteristic and important distinctive special feature/peculiarity of the spots: their magnetic properties. (In 1908 Hale reveal/~~detected~~ ed that the spots possess ~~the~~ a magnetic field whose intensity/strength reaches 2000-4000 gauss, while the strength of overall magnetic pole of the Sun does not exceed one gauss).

It did remain incomprehensible, ~~without doubt~~ exactly how do appear on the surface of the Sun the magnetic islands, ~~here newly~~ which are again absorbed by igneous element? In accordance with the hypothesis of the Swedish physicists Alfven and Valen, ~~the~~ a magnetic field of high strength is located in the nucleus of the Sun. Spots appear when explosion ~~will carry~~ carries upward the "scraps" of this internal intense magnetic field. According to another hypothesis, they are the result of perturbation in the layer, which lies under solar surface. ~~How much we not were brought~~ No matter how many we have hypotheses, nevertheless they will not explain to us the nature of spots. Since the "great secret of spots", until now, has not been guessed ! On the nature of violent protuberances - this second essential index of the activity of the Sun - the astronomers ~~did~~ also guess ~~both for~~ el long ~~and about the~~ as nature of the spots: "~~It can be,~~ Perhaps ~~this mountain~~ it's and ~~it can be~~ or perhaps, solar clouds"? Only after the application/use of a photograph (in 1860) were for the first time

expressed the relatively probable judgments: ~~this~~ the colossal ejected ~~ejections~~ of the rarefied solar material. They are ~~discarded~~ to ~~the~~ immense height, which reaches sometimes hundreds thousand of kilometers. For example, on 7 October, 1880, was observable protuberance ~~by~~ with height of 560 thous. km, 29 May of 1919 the protuberance, observed in Cambridge, it reached height of 760 thous. km. In Yerkes observatory they observed ~~the~~ a protuberance, which achieved height of 831 thous. km. ~~(Hit randomly terrestial globe~~ If our globe were by this eddy/vortex, on its surface everything instantly would perish in flame, and oceans and seas would boil ~~as~~ like drops of water, ~~which fell to the~~ falling into a incandescent frying pan.

The protuberances ~~is accepted to~~ are subdivided into violent (eruptive), which strictly were considered ejections, and calm. The first are subjected to the very rapid changes: enormous igneous jets take off upward with a speed almost thousand times ~~of the~~ exceeding speed of artillery shell and immediately fall downward. Quiescent prominences sometimes for weeks at a time are twisted above one and the same place of solar surface without noticeable motion. In form they remind ~~clouds~~ us of, ~~the~~ columns of smokes, gigantic trees with massive crowns.

Being highly risen above chromosphere, frequently to 150-200 thous. km, calm all the same do not reach the height of violent protuberances.

Between both groups of protuberances there is one additional essential difference. Quiescent prominences are encountered in all regions of the Sun, violent protuberances - only in the middle and equatorial regions, i.e., in the zone of sunspots and often near the spots, with which they, apparently, have close connection.

In the periods of solar maximums sharply changes the corona of the Sun. To that flattened and compressed, it is straightened, it takes the rounded form. Its extent on all heliographic latitudes becomes approximately identical. The Sun as if breathes by full/total/complete breast. Is reduced activity - corona again shrinks, becomes narrower, especially in the regions of poles. The "maximum" form of corona is inferior place to its "minimum" form. (Electronic condensation in the regions of corona, which are arrange/located above the centers of activity, usually is twice as higher, than in calm).

Between the numerous phenomena of the solar activity: by spots, by flash/bursts, protuberances indisputably there is related communication/connection. And although the "formula of relationship"

yet derived, their diversity ~~it~~ cannot hide from the scientists ~~of~~ the remarkable unity of all solar manifestations. The two-faced deity of the ancients - the Sun appears before us first serene, then agitated, that ~~have two persons~~ with two faces, different from each other. ~~Done is the~~ One face is clear, ~~pure/clean~~, calm. Another spotty, lit up by "angry" chromospheric flares. And when "two-faced Janus" ~~opens slightly~~ reveals to us temporarily ~~its~~ his second face, then this means that the spectrum of the Sun becomes much harder, that grow/rises the intensity of the short-wave electromagnetic radiation of the Sun, that to the Earth are brought down the penetrating gusts of the solar wind, increases speed and is amplified the power of corpuscular fluxes, that the solar particles filled whole near-earth space.

How frequently is changed the expression of solar face? This question have long already assigned to themselves the researchers, realizing well that for us, the inhabitants of the Earth, it has ~~not only~~ more than just theoretical interest.

Page 23.

A ripple on the waves.

"The unusual regularity of the behavior of the sun, writes in his book "Our Sun" the director of Harvard observatory Donald H. Menzel, leads to the fact that we forget to focus on it considerable attention. The sun is just as frequently underestimated as the concern of a faithful husband.

FOOTNOTE 1 D. H. Menzel. Our Sun. Moscow, Fizmatgiz, 1963. END FOOTNOTE

We feel safe from any unforeseen "tricks" on the part of the Sun, guaranteed for life its even, invigorating care. Meanwhile the history preserved the memory of the surprising cases of the darkening of the sun, weakening of the solar radiation whose reasons

remain not entirely clear and until now. ~~So~~ Thus, in the year of the death of Julius Caesar (101-44 years B.C.) the historians Plutarch and Dio Cassia noted that long time the sun remained faded, simultaneously was observed ~~the comm~~a on/general/~~tota~~l ccoling of the earth's atmosphere and the underdevelopment of fruits.

The darkening of the sun occurred ~~in~~to years) 137 and ~~in~~ 360 years. It was noticed in all eastern provinces of roman empire. According to evidence of the historians of Prokopius and Kedren, in 526 year occurred a decrease and ~~the~~a fogging in the sunlight. "The sun, writes Prokopius, ~~it~~ lost its ~~flare~~shine, so that it resembled to the moon, and it remained without its radiant glow the whole year. For the most part it seemed ~~such, which it is~~as in an during eclipse; its ~~world~~/light was not pure/~~clean~~ and not ~~such as ever~~as usual".

In the year) 567 ~~year~~ the darkening of the sun and simultaneously continuous aurora borealis lasted approximately one year. Mikhail Siriyts's Armenian chronicle testifies that into 624 - 625 years "the sun darkened in autumn in the month of arecas to the summer of the month of Kagota and they thought that it ~~will~~would not return to the previous state". Into the first eight months of the following year) 626 ~~year the~~ half of solar disk still was darkened (according to Abul' Faragu). In the chronicle German physician Friedrich Schnurrer, published in XVIII century, mentions ~~herself~~is made of the darkening of the sun

the year A
into 733 ~~years.~~ (Report/~~communication~~, ~~under~~taked, apparently, from some earlier source).

Page 24.

In 1645 obscure Russian bibliophile wrote: "~~Into~~ the summer of 733 July during 12 days ... darkening Sun at midday....

ceased its usual and assumed the
~~The sun your usual glow plot and into unusual form realize or form~~
the bottom of ~~the~~ a boiler copper, sky to a cloud following ~~on~~ the sun ... not only in the city of Moscow, but also ~~in~~ our the entire country". ~~But the question is not the~~ Reference here is not to an eclipse of the sun. An Eclipse ~~really~~/actually occurred in 1645, but not during July, but only on 11 August. Many such Examples of such incomprehensible changes in the activity of the sun ~~was~~ have been preserved in history ~~set.~~

What did occur with it in actuality? ~~Are~~ Random or regular were the changes described by the historians ~~of change~~? And can we generally judge the behavior of the sun in the past?

The To sun is now approximately 4.5 - 6 billion ~~summer~~/years old. ~~To~~ Earth ~~so many~~ as old as old. Life on the planet, apparently, conceived itself about 3 billion years ago. Original people appeared about 1.5 million years ago, and ~~"~~person ~~reasonable"~~ reasoning exists altogether only 25 thous. ~~summer~~/years.

Observations of solar surface, as has already been ~~spoken~~ said, ~~they~~ were begun even ~~into~~ the ancient centuries of the history of humanity, but this were the ~~interrupted~~/fragmentary, separate observations. ~~To us send the remainder~~ Yet we have literally single evidence about the activity of the sun in the past.

The systematic observations of solar surface, initiated with Galileo, ~~are~~ have been conducted a little more than 300 ~~summer~~/years. The precise measurements of the visible radiation of the sun are conducted ~~in all~~ only some thirty ~~summer~~/years, but other forms of emission/radiation ~~and that~~ even are less ! Is created impression, that ~~the~~ science does not have data ~~in order~~ to judge the past of our star. Any attempt tc mentally recreate the yesterday of the sun is unavoidably connected with the representation of such intervals of time, which are almost incommensurable not only on the lifetime of man, but of entire humanity whose ~~experiment~~ experience and memory are capable of encompassing only ~~the~~ instants of thy infinitely long life of Sun.... And ~~all the same~~ nevertheless audacious human thought attempts to glance into the bottomless precipice of departed ~~summer~~/years.

The Earth is flesh from the flesh of the sun. Thus already more than 4 billion ~~summer~~/years they inseparably ~~travel on~~ have traveled through the universe.

The Sun and Earth have experienced much
~~Much it was necessary to survive Solntsa and Zemle~~ on galactic rotations. And ~~if~~ whereas on the incessantly changing face of star time could not leave any traces, then perturbation in the activity of the sun were reflected in the appearance of its ~~accurate~~ faithful companion. First there, then here science ~~it~~ finds and ~~it~~ deciphers the autographs, left there ~~is~~ at one no time on the face of planet by solar ray/beam.

Page 25.

Restoring the picture of the distant past of the Earth, the geologists, the paleoclimatologists, the geophysicists they recreate, after discarding the film of ~~summer~~/years, the features of its previous appearance, repeatedly of that changing to unrecognizability. The chief characteristic of the development of our planet proves to be the occurence of cycles: the Earth periodically was impregnated with water, ~~as if jaw,~~ just like a sponge then it dried, then it was cover/coated with glacial armor. On the nonuniformity of geological stratification, on variations in the annual precipitation on the ocean floor, on breaches, opened in rock/~~species~~ by the mighty breast of glaciers, ~~the~~ science attempts to restore/~~reduce~~ the curve of solar pulse in the distant past.

Occurence of cycles in the development of the Earth is an indication of occurence of cycles in the activity of the sun itself.

Both now and in the past, similar to many phenomena of nature, the activity of the sun occur/flow/lasted, apparently, cyclically, although we do not know, but we can only guess, which laws controlled and control hot solar respiration. ~~Why do occur the~~ why are there years, when on glaring disk ~~do~~ appear and ~~do~~ disappear large spots, ~~when~~ while the "radio service of the sun" ~~does~~ record intense radio frequency emission, and on the contrary, ~~are the~~ why there years, when the most attentive observer does not find on the sun even ~~of~~ small points?

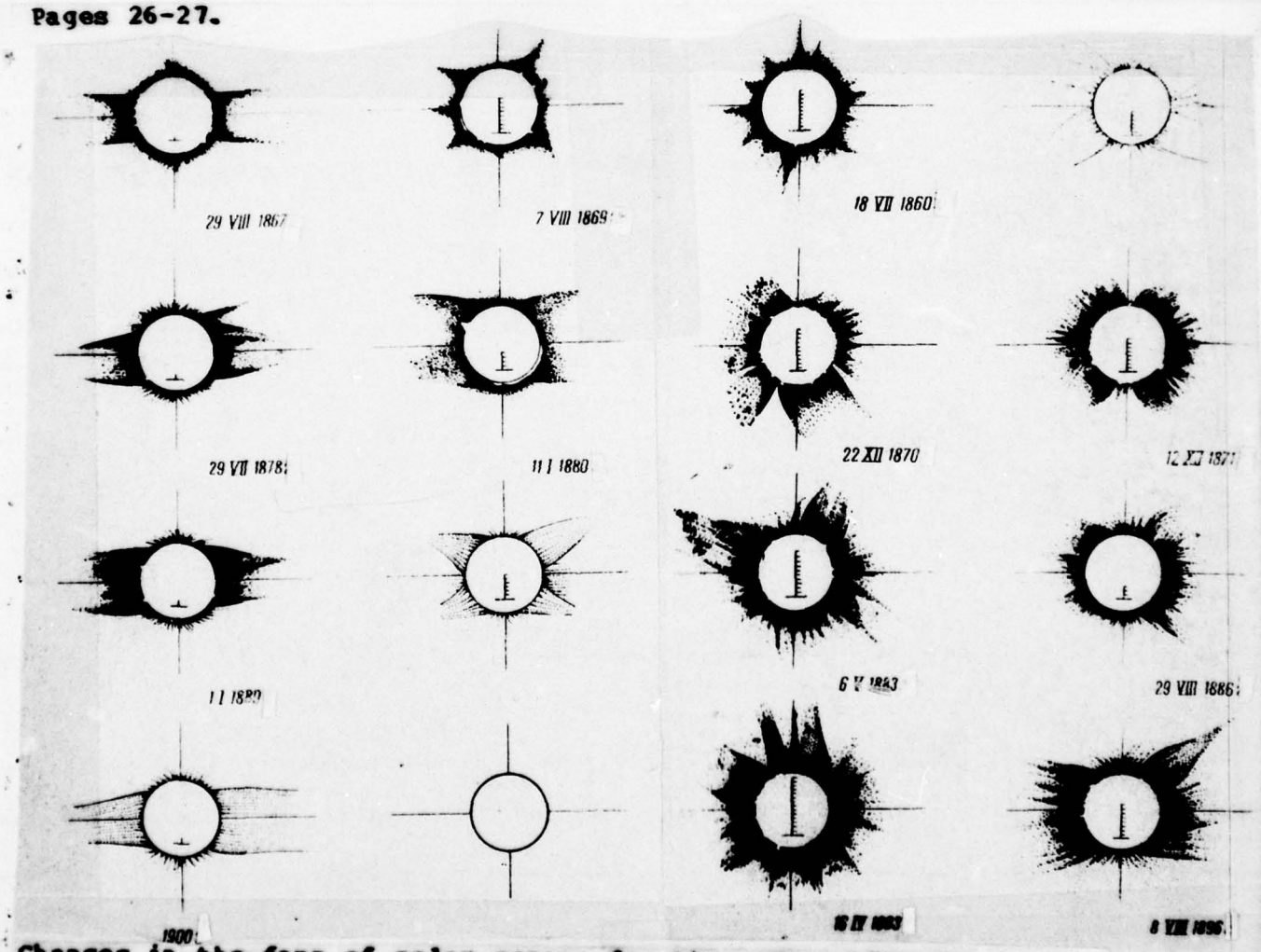
Why the activity of the sun little by little ~~does~~ grow gradually it does reach the maximum and then does weaken? How do appear the following after each other solar cycles?

The law of periodicity "in the work of the sun" was ~~opened~~ discovered in the past century by the canon Heinrich Schwabe from Dessau. ~~Disposing~~ With ~~of~~ a small, modest telescope, Schwabe systematically for 43 ~~summes~~/years daily ~~it~~ recorded the location of sunspots. And because of phenomenal purposefulness he knew how to notice ~~that~~ the fact that ~~slipred off from~~ missed the attention of the less scrupulous observers: changes in the number of sunspots begin periodically.

Following canon Schwabe the systematization of observations of

oscillation/vibrations in the manifestations of solar activity studied was by astronomer from Bern Rudolf Wolf. He gathered, verified and generalized ~~the~~ not published and unpublished previously materials on of the different observers of the sun. After processing these data, he ~~it~~ ~~it~~ established/~~installed~~ the landmarks of solar activity, its maximums and the minimums, beginning ~~with~~ in 1610, and derived a precise period of spot formation.

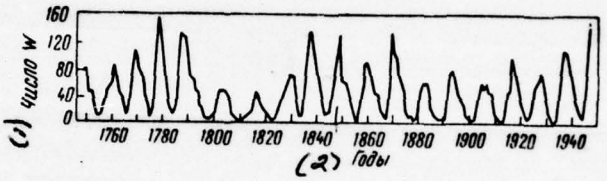
Pages 26-27.



Changes in the form of solar corona for the extent/elongation of 11-summer solar cycle (according to A. P. Ganskiy).

Page 28.

Graph, which illustrates rhythmics of solar cycles. Key: 1. Number W. 2. Years.



Works of Wolf, ~~were~~ continued after his death by Wolfer, led to the conclusion/derivation that the basic, most distinctly expressed period of solar activity was equal on the average 11 to years. (Deviations - a decrease or an increase in this period reach several ~~summer~~/years). Later ~~they were~~, furthermore, were described dozens of other cycles whose value varied from months to millions of ~~summer~~/years. Therefore more precise the activity of the sun one should call/~~name~~ not simply "cyclic", but "multicyclic".

If we depict solar activity in the form of a curve, (here after designating on the axis of abscissas time, and on the axis of ordinates - the level of activity, then the obtained curve will resemble not ~~to~~ sinusoid as it ~~was possible to~~ we might expect, but will turn out to be compound curve, pitted by large number everything smaller waves.

With the high degree of authenticity the epochs of the activity of the sun can be judged also from data of a series of the astronomers. D. I. Svyatskiy, ~~being~~ based on large historical material, composed a table of the epochs of solar maximums ~~with~~ from the II to the XVII century of our era. The degree of the probability of each date was determined by the totality of serious large historical material. If we attentively examine 49 intervals of this table, it will seem that in spite of large deviations from 11-summer period, intervals ~~to~~

11-12 ~~summer~~/years they are encountered 11 times, into 7-8 ~~summer~~/years - 12 times, ~~into~~ 13-15 ~~summer~~/years - 7 times and ~~into~~ 5-6 ~~summer~~/years - 3 times. Interval into 20 ~~summer~~/years ~~divides~~ two maximums ~~altogether~~ only one time. Arithmetic mean of all 49 intervals is equal to to 11 years. The points of maximums in curve are located one from another not at equal distances, the height of the ordinates of different maximums is different. From this and a ~~series~~ of other special feature/~~peculiarities~~ of the curves of solar activity, it follows that value determination of period - ~~matter~~ is complex matter.

Page 29.

~~On the same testifies~~ the contradiction in the judgments of the numerous and conscientious researchers of this question. They obtained ~~the~~ different values of time interval between the maximums: 10 ~~summer~~/years (Swabian), 10.43 years (Lamont), 11, with the ~~middle~~ variability plus or minus 2 years (Worlf), 12-14 ~~summer~~/years (Young), 11.124 plus or minus 0.03 years (Wolfer), 11.13 years (Newcomb), above 11.4 (Michaelson), 11.4 years (Turner).

Chester in the works of 1898-1906 subjected to analysis ~~assay~~ about spots ~~in~~ 150 ~~summer~~/years. According to his studies next to cycle ~~into~~ 11.25 years ~~goes the~~ series of the secondary periods -

4.38, 8.36, 13.5 ~~summer~~/years, consecutive ~~entrance~~ about of which is the reason for the different disturbance~~breakdowns~~, observed in the main period.

The basic cycle of solar activity only approximately is 11 ~~summer~~/years. In actuality, its duration reaches sometimes 16, and sometimes 17 ~~summer~~/years. The ripening of maximum, its duration and decline are not measured by ~~the~~ determined periods, but every time they vary, as a result of thus far also unknown reasons. Therefore with ~~the establish~~ment and the fact it ~~is more the attempts to~~ even more in attempts to predict ~~predict~~ the state of the sun, at some point of the period extreme discretion is necessary. Sudden changes in the activity of the sun which signify by itself the point of highest uplift and smallest incidence/drop, can be named with accuracy only ~~through~~ after several months, but and sometimes ~~also~~ years later after by way comparison with data of solar activity in for a are more or less prolonged period.

Besides the 11-year cycle Wolf allowed for the existence of a 22-23-year occurence of cycles in the work of the sun. In the opinion of Turner, two 11.5-~~summer~~ year-cycles, store/adding up, give one 23-~~summer~~ year cycle.
Investigating the signs of magnetic polarity of 2000 groups of spots from 1908 through 1926, Hale and his coworkers discovered that with the transition from one 11-year cycle to another groups change (with a few exception~~/elimination~~) the signs of magnetic polarity. Thus, the magnetic characteristics of two neighboring 11-~~summer~~ year cycles are not similar to each other and seemingly they confirm that it is more right Correct to measure the period of solar activity for twenty - two

years instead of eleven. 22-~~summer~~year period completely can be call~~ed~~/~~named~~ the "magnetic period" of sunspots.

Page 30.

After were reveal~~ed~~/d~~etected~~ 22-summer, 11-summer and even shorter cycles in the activity of the sun, logically were begun the searches for large periods.

In one hundred more summer/years before observations ~~of~~ Swabian noted French physicist, astronomer, ~~the~~ mathematician de Meran ~~allow~~/assumed the possibility of the existence of large periods in solar activity. Attempting to find this long period, Worlf ~~it~~ determined ~~his~~ duration ~~in~~ 55.5 years, others ~~into~~ 60 s~~ummer~~/years (Young), ~~in~~ 72 years (A. Ganskiy), 35 ~~summer~~/years (Lockier), 33.37 years - the "cycles of the third of century" (Schuster and Litsnar).

In 1889 Worlf on the basis of these Chinese and medieval chronicles calculated a series of ~~the~~ large periods, including 11-~~summer~~year periods, ~~into~~ 83.33 and 66.67 years [1].

FOOTNOTE [1] To calculate large periods Wolf used dates which could be dates of the "large" maxima in solar activity: 372, 840, 1078, 1133,

and 1373. He based this on the years of 372 and 1372, in which according to his hypothesis, there was particularly strong solar activity. END FOOTNOTE

These periods were compared by Wolf with dates from Chinese, Russian, West European and Armenian sources. As a result was obtained extremely interesting table. Everything in it speaks for the fact that the maximum of the activity of the sun is repeated approximately ~~through~~ every 83.33 years.

We have every reason to believe
"~~Are all foundations for considering~~ that the hierarchy of cycles of solar activity does not ~~conclude on~~ end with the cycle ~~with duration into~~ lasting 80-90 ~~summer~~/years" [2], writes B. M. Rubashev in the book "Problems of solar activity".

FOOTNOTE [2] B. M. Rubashev. Problems of solar activity. Moscow-Leningrad, "Nauka", 1964. END FOOTNOTE

~~So,~~ Then ~~into~~ 1954 arose assumption about the existence of period ~~into~~ of 169 ~~summer~~/years (Anderson) and ~~into~~ of 180 summer/years, including fifteen 11-~~summer~~ year cycles (Oppenheim). On the basis of the analysis of data on

the frequency of the aurora borealis of German scholarity Fritz was revealed 300-summer year cycle (Claff).

It is very curious is the law, noticed by the Soviet astronomer A. I. Olem. After connecting by straight lines on the curve/graph of the point of maximums and minimums of the 80-summer cycles of the XVIII-XIX centuries, it he obtained two the parallel lines, having cooking slight slant toward the axis of abscissas, and thus it he demonstrated the centuries-old increase in the solar activity !

Page 31.

B. M. Rubashev used the catalog of comets, comprised by Denning, where were introduced information for nineteen centuries (beginning from I centuries century A.D.). After processing it, it he was convinced of the fact that a greatest most quantity of comets appears/ regularly through each every 600 and even of 900 summer/years, it and he obtained the indirect proof of the existence of 900-summer year cycle.

Nonuniformity in the thickness of the growth rings of wood allowed geophysicist professor I. V. Maximov to reveal/detect not only 80- summer year, but also 600-summer year cycles.

To grope probe the cycles of an even larger duration help the are useful facts,

"pulled out" by science of entirely grey antiquity. The traces of glaciers "described" to Soviet researcher A. V. Shnitnikov the cycles of solar activity, equal to 1800 A. Villet and P. P. Predtechenskiy on the basis of paleoclimatological data, and also on the basis of the hypothetical cycle of the oscillation vibrations of solar luminous density, prove that there are cycles by duration into millions of summer/years...

Thus, to the large crests of the waves of activity is deposited ripple smaller ! Are found two-, three-, four- and six-year old cycles. Are well-known 11-summer cycles. Are clearly expressed cycles into 22, 33 and 80 summer/years. It is not possible to discount 169, 400 and the 600-summer and more prolonged cycles, which seem us by so/such long the components in the life of star only instant.

The question concerning periodicalness in the activity of the sun, as is evident, it is not permitted simply. It is not solved still finally, also, prior to this day. Is necessary the combination of prolonged observations and enormous efforts of human thought in order to approach itself its resolution.

But are such the reasons, which force the sun from time to time to change character and mode/conditions of their activity? They also thus far are unclear. In order not to leave to the side from the

basic theme, we will not begin to give the existing on this account numerous hypotheses and guesses. It is important ~~in order~~ that the reader would note for himself the fact of the existence of nonuniformity in the work of the sun.

Subsequently from many small, larger and extremely more prolonged cycles us will interest ~~in essence~~ basically the 11-~~summer~~ year cycle - the most pronounced and "demonstrative" cycle in the activity of the sun, most obvious for an observer. Although it is subjected to variations as all others, its existence is ~~more~~ most difficult ~~anything~~ of all to deny. Specifically, ~~It~~ we will ~~take~~ use it in order to illustrate the possibility of the fact that in the apparent randomness of terrestrial cataclysms ~~they~~ there hide ~~themselves~~, perhaps, strict space laws.

Page 32.

Solar fever on the Earth.

Without doubt agitations and storms on the sun do affect the planet? Does ~~continue~~ our spacecraft the "Earth" (Continue) to quietly and serenely ~~swim by~~ (navigate) its course or ~~it all the same~~ (is it) "does ~~rock~~" (rocked) on the waves of cycles of solar activity so that from time to time "is audible the ringing of beakers in ~~cabin-campaign~~"? (ward-room)

The witty tone of question does not diminish its importance. Despite the fact that co~~mmunication~~/connections between solar and terrestrial phenomena, ~~on~~ (according to) one French journalist's ingenious observation, ~~so/such~~ are (as) complex and tangled as relations between two heroes in (a) contemporary psychological novel, ~~the~~ contemporary science ~~on~~ doubts (does not) their validity.

The Earth as has already been ~~spoken~~ (said), ~~it~~ is located in the sphere of the direct effect of the sun. Its radiant energy is the main engine of all physicochemical processes, which take place on the

surface of the planet and its shells. It is understandable that each ~~takeoff~~ thrust of solar activity with echo rolls over all "terrestrial ~~floors/stages~~ steps". The mighty intermittent respiration of the sun incessantly agitates the stability of terrestrial magnetic field, it disrupts the stability of its encircling radiation belts, it agitates ~~that which was stretched out~~ the atmosphere extending to hundreds thousand kilometers around the Earth atmosphere, it is transferred to hydrosphere, to the surface layers of lithosphere, it manifests itself even in the velocity of the rotation of the Earth. If we ~~complete~~ make a mental descent from upper air to the rigid surface of the Earth, stepping ~~over~~ down ~~on~~ the layers ~~to~~ the exosphere, ~~to~~ the troposphere, as on steps/~~stages~~, then at each step/~~stage~~ without fail ~~they~~ there will be reveal/~~detect~~ed ~~the~~ numerous manifestations of sun-earth unity, which show that ~~us with~~ we can the sun ~~divides~~ share only ~~the~~ on imaginary boundary.

Page 33.

~~C~~Cosmos brings down to the earth ~~the~~ a continuous flow of ~~the~~ atomic nuclei, which fly at enormous velocities - cosmic rays. The intensity of space "bombardment" first is amplified, then it weakens, which is reflected in the state of the earth's atmosphere: pressure, temperature, ionization, conductivity. In ~~the~~ fluctuations of the intensity of cosmic radiation are reveal/~~detect~~ed clearly expressed the 27-day and 11-summer periodicities, caused by the sun. Cosmic

radiation comes ~~forward~~ presents itself as a ~~its~~ kind ~~as the~~ of conductor of the rhythmic effect of the sun ~~on~~ to the atmosphere.

~~Stopped up into~~ The "earth's" magnetic field, caught in the solar jaws ~~the magnetic field of the Earth~~ also receives and reproduces the rhythm of solar processes. The passage of the sunspots ~~through~~ over the central meridian of the sun, the appearance of powerful chromospheric flares will entail immediately, ~~through~~ within one-two days, the powerful shocks of terrestrial magnetic field - authentic magnetic storms. This dependence so is intimate and so clearly is outlined, that the indices of the magnetic field of the Earth now are utilized for determining solar activity. The ~~confusion~~ perturbation of magnetic field is repeated regularly, ~~after~~ agreeing with the 27-day period of the rotation of sunspots. The perturbance of magnetic field ~~detects~~ reveals furthermore clear 11-~~summer~~ year fluctuations. In the magnetic activity of the Earth are reflected ~~the~~ more prolonged cycles of the activity of the sun.

~~To uplifts~~ Increases and decreases in the solar activity ~~immediately~~ are immediately reflected in ~~respond~~ the upper air, in particular ionosphere. The sun changes the degree of ionization of atmosphere and thereby it affects its electrical conductivity, the density, the ability to reflect radio waves. The consequence of solar perturbation therefore frequently are the disorders of distant radio communication. On 9 May, 1959, in 1 hour ~~of~~, 3 minutes on Moscow time on solar disk appeared enormous

~~flash~~/burst. On 10 and on 11 May there followed still several ~~flash~~/bursts. On 11 May in the USA there was a breakdown in ~~left the system~~ of radio, telegraph, telephone. A day later, on 12 May, ~~when~~ to the earth receiving ~~was brought down~~ the main flow of charged particles, in sky glowed bright aurora borealis.

Page 34.

"Without ~~fluctuations~~ vacillation it is possible to say that the mode/conditions of the upper layers of the earth's atmosphere is determined by solar activity, writes B. M. Rubashev. - Whether we are talking about the state of ionosphere, various kinds the brightness of the upper layers (aurora, night glow) or about the state of geomagnetic field - everywhere is necessary to bear in mind solar radiation" [1].

FOOTNOTE [1] B. M. Rubashev. Problems of solar activity. Moscow-Leningrad, Izdatel'stvo "Nauka", 1964. END FOOTNOTE

Solar storms agitate not only upper air. Their echoes reach ~~to~~ by lower layers, ~~into~~ the troposphere. In the history of the investigation of sun-earth communication/connections the problem ~~is~~ of ~~the~~ the "sun ~~is the~~ troposphere" is one of the oldest. Already from the

~~torque~~/moment of discovery/o~~pening~~/sunspots some researchers began to connect climate variations in some regions of the Earth with solar activity. ~~The fugitive~~ A rapid enumeration of scientific investigations, dedicated ~~the only~~ to this problem alone, would engage ten pages. Nevertheless there is no full/total/complete clarity thus far ~~still~~.

Soviet geophysicist I. V. Maximov and its students approached completely in a new way the resolution of this complex problem. They decided initially to investigate ~~communication~~/connection of solar activity with the common/general/total circulation of the earth's atmosphere, and then with hydrometeorologic processes.

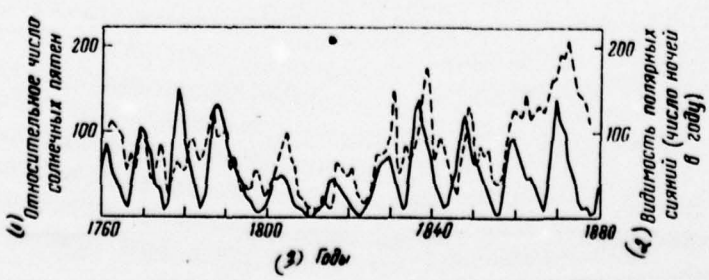
It turned out that all brightest cycles of the solar activity: separate f~~lash~~/bursts, 27-day variations, 11-~~summer~~ year and secular cycles - create ~~the appropriate~~ corresponding changes in atmosphere circulation. But general circulation transforms solar "~~jerk~~/impulses" into the occurence of cycles of ~~the~~ fluctuations of ~~the~~ temperature of air (warming of the arctic, the nonuniformity of precipitation, the regular frequency of typhoons, hurricanes, thunderstorm). It is possible that ~~the~~ a fundamentally new approach for the solution to this problem will turn out to be promising. "The physically correct statement of old problem, noted in one of his articles of the known Soviet heliophysics M. S. Eygenson, it is at the same time the ~~largest~~ greatest scientific news" [2].

FOOTNOTE 2 M. S. Eygenson. Notes on the physicogeographical manifestations of solar activity. Lvov, 1957. END FOOTNOTE

The atmosphere, which ~~we is~~ conditionally divide into ~~visible to~~ layers, is physically single. It is natural that the ~~disturbance~~/perturbations, which invade ~~to~~ it from without, are transferred from ~~its~~ one "~~floor/stage~~" ~~on~~ another, producing interrelated ~~coupled~~ effects. The effect of solar activity not simply "slightly ~~it~~ interferes upper air", but it penetrates depthward, it reaches the very floor of air ocean - atmospheric boundary layers. The ~~exchange~~ shift ~~of~~ in meteorological conditions on the Earth under the effect of solar activity in turn, is reflected in geophysical processes.

Page 35.

Graphic representation of ~~communication~~/connection between the frequency of aurora (dotted line) and the number of sunspots (per Tromholt). Key: 1. The relative number of sunspots. 2. Visibility of aurora (number of nights in year). 3. Years.



A. V. Shnitnikov noted the existence of the caused by the sun variations in changes in ~~altitude~~ height of the level of Scandinavian lakes. Many researchers reveal/~~detect~~ ~~communication~~/connection of solar activity with ~~the~~ fluctuations ~~of~~ in the level of Caspian Region, with the nonuniformity of the runoff of rivers.

The boundless mirror smooth surface of ocean, which occupies about 70o/o of entire surface of planet, also in its own way reacts to the whims of solar weather. The Soviet researchers I. V. Maximov and his students, ~~but to~~ and before them ~~to~~ Yu. Yu. Vize, demonstrated that the ~~different~~ most diverse indices of ocean change in accordance with solar indices. With ~~the~~ 11-~~summer~~ year and secular cycles of solar activity are connected the degree of the icy state of the arctic seas and northern Atlantic, fluctuation of the level of ocean, the pulsation of gulf stream, the thermal mode of Norwegian and Barents Sea, etc. The effect of solar activity on the hydrosphere of the Earth just as ~~is indisputable as~~ surely as its effect on atmosphere.

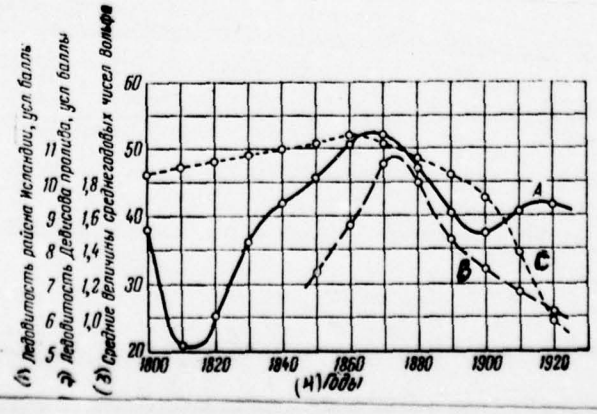
Rhythmics of solar activity is reflected also in the indices of geophysical processes. A series of the researchers they assert that the maximum values of energy of earthquakes fall ~~on~~ within the years of the maximums of the solar activity, and minimum - ~~for~~ within the years of the

minimums. Catastrophical earthquakes and volcanic eruptions also they occur ~~into~~ the years of uplifts of solar activity (ejection of the volcano of Krakatoa into 1883, the catastrophical earthquake of 1920 in China, the earthquake of 1966 in Tashkent).

I. V. Maximov reveal~~/detected~~ed distinct 11-summer occurence of cycles in the motion of the poles of the Earth.

Page 36.

Comparison of average annual Wolf numbers [1] (A) with oscillations of the icy state of the Davis straits (B) and of the adjacent to Iceland region of Atlantic Ocean (C) (according to I. V. Maximov). Key: 1. Icy state of the regions of Iceland, arbit. units. 2. Icy state of the Davis Straits, arbit. units. 3. The average values of Worlf's average annual numbers. 4. Years.



FOOTNOTE [1] The Wolf number - ω - is a value that characterizes solar activity. END FOOTNOTE

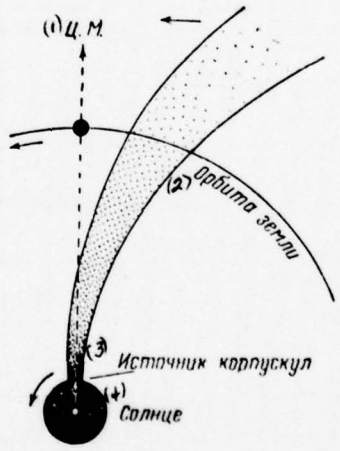
The rhythm of solar activity accelerates and retards (true, very insignificantly) the velocity of the rotation of the Earth. The French geophysicist Danjon comes to the conclusion that the "mode/conditions of the rotation" of our planet can change as a result of very powerful ~~flash~~/bursts on the sun. Thus, ~~entire~~/all available to study inanimate nature, all terrestrial shells from the upper layers of the earth's atmosphere to lower boundaries of lithosphere reproduce in their own way the rhythm of the sun.

The sun fluctuates, and the beat of the pulse of our daytime star is transferred to the Earth. With it ~~into cycle/stroke~~ time is changed the strength of terrestrial magnetism, the frequency of aurora, the radioactivity of air, the degree of ionization of upper air, change of the radio reception and audibility, the strength of atmospheric electricity, atmosphere circulation, the intensity of thunderstorm activity, ~~a~~ the quantity of ozone and of cosmic dust in air, the temperature of air, water of seas and oceans, air pressure, the frequency of storms, hurricanes, waters-spout, amount of precipitation, the degree and the abundance of droughts, the level of lakes, climate variation and earthquakes.... Moreover, is reveal~~/detected~~ed even communication/connection between the pulsations of the earth's crust and the solar activity. The Earth in the direct/~~straight~~ sense of word breathes in ~~the~~ rhythm with ~~of~~ the sun. "The sovereign of all elements" ~~comes forward it~~ makes its appearance in terrestrial life. But

this is understandable: radiant solar heat, as we know, is the basic source of energy of the majority of the physicochemical phenomena, which occur in all shells of planet.

Page 37.

Zone of the active region of the sun (~~is~~ shaded) periodically "illuminates" the Earth ~~accurately~~ like an enormous projector (according to E. R. Mustelyu). Key: 1. С. м. 2. Orbit of the earth/~~ground~~. 3. Source of corpuscles. 4. Sun.



Until now, we spoke about how changes in the activity of the sun they manifest themselves the inanimate nature. Well, and ~~do manifest themselves~~ do solar rhythms affect the state of biosphere and the current of the life, which exists within its limits?

We know that the sun is a source of terrestrial life. Life conceived itself, evolved, became adorned with thousands of hues only because of the life-giving force of the sun. Do ~~react~~ people, ~~the~~ plants, animals, microorganisms - whole "living substance" of planet (determination of V. I. Vernadskiy) - react to sclar storms and the produced by them shocks in entire ~~surrounding~~ medium life to ~~the medium~~? It is difficult to allow the thought that the life stands outside the laws, which are so ~~such~~, distinctly exhibited in the inanimate nature, from ~~with~~ which it composes authentic and indissoluble unity.

The New or the forgotten old?

Geophysicists, meteorologists, climatologists, oceanologists - ~~everything~~ all those, who are participating ~~to~~ in the science of the Earth, do not doubt the validity of sun-earth ~~communication~~/connections. But by no means all the biologists and the physicians share persuasion in the fact that the cyclic activity of the sun affects biosphere and

the course of life in it. Although no one of them disputes, that ~~precisely to~~ it is the sun ~~is due the~~ which is responsible for life by its origin/conception/initiation, the ~~thought about the fact~~ idea that it continues to ~~be add/interfered in the matter of the "hands of its"~~ interfere in the creation of its own hands, produces frequently ironic smile.

Page 38.

Idea ~~about the~~ of an intimate dependence between the activity of the sun and the state of biosphere is estimated frequently as "the fantasy of ~~separate too~~ individual hot heads" as very doubtful innovation. Is ~~justified~~ ~~similar~~ such skepticism justified?

In biology had long ago been affirmed the understanding of the fact that ~~the~~ on enormous role in development ~~entire~~ of everything living belongs to environment. Contemporary materialist natural science, overcoming the inertia of geocentric thinking, widely ~~moved apart~~ expanded this concept, rightfully ~~after~~ extending it to surrounding the Earth ~~the outer space~~ the outer space, saturated by completely material electromagnetic radiations and the powerful flows of the driving particles. Since material consists, ~~regarding~~ according to the twice Nobel prize winner chemist Linus Pauling, of substance and emission/radiations.

With this understanding of environment the sun must be

considered ~~by~~ one of its principal factors. It would seem, difficult to object to similar logic; however, many, until now, associate heliobiology with something like astrology or "black magic".

In connection with this is interesting the instructive case with encephalitis. Word "encephalitis" in physician's language indicates the inflammation of brain. ~~Hearth by it is implied~~ It implies not some disease, but ~~the~~ a vast group of cerebral illness/sickness/diseases. In our country sadly became famous spring-summer ~~forceps~~ tick-borne virus encephalitis.

In the period of the wide mastery/adoption of the Far East in the thirties on new constructions, lumbering enterprises, in taiga settlements flared up the heavy epidemic of unknown origin. Illness/sickness/disease striked ~~in essence of the~~ basically migrants, its ~~occur/flow/lasted~~ course was acutely and either killed patient or it left after itself irreparable, ~~life~~ for life mutilations. For ~~the~~ an explanation of the nature of disease into epidemic foci were sent for exploration scientific research biomedical expeditions. The names of the participants of these expeditions: L. I. Zil'bera, M. P. Chumakova, A. A. Smorodintseva, I. I. Rogozin et al. ~~(~~ were subsequently learned ~~entire/all~~ by country. Many of the participants of the first epidemiological taiga onslaughts paid by their health, and some even by life before it was possible ~~establishing~~ to establish that in the taiga rages one of the varieties of virus encephalitis and that ~~thef~~ blood-sucking Taiga ticks transfer exciter

from wood animals to people, ~~the blood-sucking taiga mites/tongs.~~

Page 39.

the
Virus, without causing harm to neither musk deer nor moose/elk nor
Manchurian ~~protein~~ rabbit -- the basic "provider" host of ~~mites/tongs~~ ticks, in man
often produces the irreversible damages of the nervous system. ~~To~~ Before the
~~flash/burst~~ outbreak of epidemic in the Far East the ~~mites/~~ticks tongs did not
produce suspicions ~~of~~ in parasitologists. No one assumed that they can
be the carriers of dangerous virus.

Since then ~~pass~~ 30 ~~summer~~/years have passed. For this time tick-borne
encephalitis, its exciter, the carriers of virus, way of the
propagation of illness/sickness/disease were thoroughly studied and
they entered in all textbooks.
On this basis, medicine worked out an entire system of measures for
prevention of the disease. But strange as it may seem, despite all the
measures undertaken, encephalitis was not disappeared.
Epidemic of this disease from time to
time again flashes, appearing with surprising regularity,
approximately ~~through each~~ every of 10-11 ~~summer~~/years, being spread from
the
("epicenter" to enormous distances. Exactly a/decades/ later after the
described case the virus of encephalitis suddenly appeared in the
European part of the country and in Omsk region. ~~An additional~~ One decade
~~decades after~~ later it ~~reveal~~ was/detected in such, it would seem,
inappropriate places as India, Canada, Malaya. In India from
encephalitis, besides people, suffered the monkeys. During epidemic
the whole herds bands **of animals perished** within **after several days. The**

flash/bursts of epidemic as has already been spoken, divided interval/gaps into ten-eleven summer/years. With each new wave the character of illness/sickness/disease was modified to such an extent, that at the first torque/moment the physicians even immediately did not distinguish already familiar infection, thus far laboratory checkings did not establish/install the nature of exciter.

Strange transformation of illness/sickness/disease, and, strange, incomprehensible periodicity !(Astonished other inexplicable agreements. So, shortly before the last/latter serious flash/burst of the epidemic of 1957 in Littoral in avalanche it gushed out the protein: for one year, preceding epidemic, squirrel sandpapers it was prepared 250 times more than for three following years. Little beasts went by avalanche, as if movable with some indomitable force. They moved ceaselessly, approximately at a rate of thirty kilometers in a 24 hour period, swam across rivers, they went even in villages, they carried along into their "great expedition" long getting accustomed in surrounding forest/scaffolding local protein. Each protein-traveler bore on itself the clouds of seeded by viruses mites/tongs (on their one little beast they counted about 1800 pieces).

In the searches of the scientific explanation of the wave nature of the encephalitis ~~of~~ two physicians - Yu. V. Aleksandrov and V. N. Yagodinskiy, ~~that~~ who served in the Far East, left into the taiga to hunt for ~~mites/tongs~~ ticks - the carriers of the virus. The armed by wafer (waffle) towels "hunters" catchhed and accumulated for day hundreds of parasites, and then was checked in laboratories the degree of their infection by the viruses of encephalitis. The yield of "little ticks" in different years was by no means identical. In some years the virus was found in almost ~~of the~~ half of the caught parasites. And then followed years, when ~~mites/tongs~~ ticks for some unclear reasons were free/released ~~from~~ of virus and ~~its~~ most persistent searches ~~to~~ for it came to nothing, ~~did not lead.~~ The morbidity of people corresponded to changes in the degree of infection by the viruses of ~~mites/tongs~~ ticks and wood animals.

~~The~~ A many-year hunt ~~of the~~ by physicians for ~~mites/tongs~~ ticks did not pass without benefit for the science: Yu. V. Aleksandrov found in the taiga ~~the~~ unknown varieties of ~~mites/tongs~~ ticks. But, ~~how much the~~ no matter how hard the physicians ~~not were beaten~~ tried, the ~~discontinuity~~ intermittent nature of morbidity by encephalitis in the Far East did not obtain the comprehensive explanation.

It can be ~~the~~ Perhaps unexpected ~~flash/bursts~~ outbreaks of epidemic/one connected with the mass migration ~~proceinst~~ of squirrels Acutually After the mass migrations of squirrel actually, there did as a rule, followed ~~necessary uplift of~~ an increase in morbidity by

encephalitis.

Were begun calculations, were traced curve/graphs. This assumption resembled ~~to~~ the truth. But when the physicians compared the course of morbidity by encephalitis in the Far East with morbidity in other regions of the USSR, then "squirrel hypothesis" ~~it~~ lost its attractiveness. The curves of morbidity in the different, even distant regions coincided for some reason. It ~~emerged~~ appeared so that the disease ~~by~~ of encephalitis in the Far East was only a particular example of some more ~~common/general~~/total law. But which? The degree of ~~the~~ infection of ~~mites/tongs~~ ticks by viruses was dissimilar in different years. ~~It is possible~~ Perhaps, it somehow depended on the number of ~~mites/tongs~~ ticks themselves.

The harvest of ~~mites/tongs~~ ticks in different years also oscillated and it was caused, probably by the number of animals, ~~on which~~ which are ~~developed~~ harbor the ~~mites/tongs~~ ticks. The ~~multiplication~~ reproductions of a squirrel, and other animals in turn, depends on the natural situation, dissimilar in different years.

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~~The~~ A similar line of reasoning led the epidemiologists to the conclusion that the epidemic of encephalitis appears when in the

constantly existing natural location of disease ~~store/adds up the~~ accumulates a combination of the factors, which are favorable to epidemic, i.e., it is created the approaching "epizootic situation".

But then why, were puzzled the physicians, in an immense territory from foothills of the Urals to the Sikhote-Alin taiga, a territory very diverse in its natural conditions, ~~they~~ do there appear simultaneous uplifts and decreases in the morbidity? ~~Is obvious,~~ It is obviously not a matter ~~not in~~ one virus alone and not only ~~in~~ of the number of ~~mites/~~ticks ~~tongs~~ or in ~~live-stock~~ squirrel protein, in weather or in a quantity of falling ~~out~~ precipitation. Here acts some more general, more main motive power. But ~~is which~~ what?

The Solution was somewhere closely, but was not thrust were not given into ~~hands. Misfortune to accurate trace aided the case.~~ the Fate helped to fall into the right track. ~~Someone~~ One of the tender-hearted associates, attempting to aid the friends in the solution to problem, recalled that A.L. Chizhevskiy with ~~By~~ studying the research ~~on~~ wavelike nature of the epidemics of different infectious diseases ~~was occupied A.~~ L. ~~Chizhevskiy~~, and it advised to read his monograph "epidemic catastrophes and the periodic activity of the sun". This book came into being in 1930 (in a quantity of 300 copies) and it was ~~into~~ criticized down ~~and~~ to dust ~~criticized severely~~; and since then of it did not republish.

The book ~~they~~ was found. The main thought, gotten from the book: the sun can be ~~add/interfered~~ play a part in the course of epidemics.

This thought seemed the physicians by at first strange to absurdity. ~~Before how it is final to discard~~ But before finally discarding it from ~~the counts of its reasonings~~ consideration, they decided all the same to verify it on their own small statistical material. For this they compared morbidity by encephalitis in the Far East for last/~~latter~~ several decades with the course of solar activity during the same period of time. ~~How was~~ Images the consternation of the epidemiologists, when the curve of morbidity and solar activity in many respects they coincided.

From the statistical theory of correlation it is known that, if the configurations of two curves are similar, then one of them ~~reflect~~/represents reason, and another - consequence. Or they both ~~reflect~~/represent the consequence of one reason. So answer/~~response~~ to question, what is the reason for the epidemic of encephalitis, was found. the/Sun !

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Thus the mysterious regulator, who reconstructed from time to time entire character of interrelations in wood biogeocenosis - these component parts of the biosphere, affecting, apparently, the epizootic situation, the number of providers of ~~mites/tongs~~ ticks, and the

number of carriers of virus - ~~mites~~/ticks, and mainly the activity of the very exciter of encephalitis, but possibly, also the resistivity of people in the relation to disease.

After a check conducted ~~the made~~ by epidemiologists ~~checking~~ their attitude ~~relation~~ to solar hypothesis radically changed. Now it could not merely be shrugged ~~Now from it already impossibly it was simply to brush~~ off. The idea of ~~Thought~~ about the interference of the sun in the dynamics of ~~the~~ illness/sickness/disease, which periodically damages the population of regions of the globe ~~the~~ different in their natural conditions ~~regions of terrestial globe~~, won ~~subjugated~~ them by its organic naturalness. From the skeptics ~~the~~ Lieutenant Colonel of the medical service V. A. Aleksandrov and the Major of the medical service V. N. Yagodinskiy "were converted" into ~~the~~ convinced ideological adherents of heliobiology and to this dav continues their ~~its~~ investigations in this direction. In their overpersuasion statisticians have played a far from minor role ~~the last/latter role of statistician~~. As the reader further will see, the method of mathematical analysis generally is applied very widely for the ~~development~~/detection of sun-earth biological ~~communication~~/connections.

As a rule, the physicians very do not grant much to ~~give the~~ medical statistics. It seems them dry and dull in comparison with the clinical disciplines: indifferently it record/fixes both sad and glad facts - morbidity, mortality, age indices, the abundance of certain ~~those or~~

other illness/sickness/diseases, etc. ~~On the very matter of~~ Yet, the fact is that statistician - ~~the~~ are very bread of medicine. The development of any science, including biology and medicines, is inseparably connected with accumulation and processing statistical data. Any scientist, ~~finding~~ seeking laws in chaos of phenomena, repeating many times one and the same experiment, is ~~occupied not than by different as~~ dealing with nothing less than an accumulation of statistical evidence. "Statistical work" produces involuntarily any practical physician, ~~record~~/fixing in the memory the similar cases of diseases.

Right was the ~~large~~ great Austrian physicist Ervin Schroedinger, ~~which~~ who ~~he~~ wrote: "The laws of physics and chemistry are thoroughly statistical". And in living nature many processes in the final analysis ~~is~~ are subordinated to statistical laws. Processing uniform data, obtained not in laboratory, but as a result of observations of the phenomena of the surrounding world, actually ~~had been~~ represent the processing the results of the grandiose experiment, ~~realized seemingly~~ performed, as it were, by nature ~~itself.~~ herself.

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In order correctly to select, to interpret and to process many facts, necessary to manage not only mathematical apparatus, but also scientific logic. Under these conditions of statistician it becomes

~~the~~ a powerful instrument of knowledge.

Its conclusions scientific statistics expresses in the form of curves, setting forth the essence of phenomenon in mathematical or graphic language. This made it possible seemingly immediately to see with own eyes phenomena in their complex interccnnection. ~~It is~~ Of course, ~~natural that than~~ the more data ~~it~~ is investigated in the study of one problem, ~~by those to~~ the more easily is solved the problem of the dependence between phenomena. The more the facts ~~it~~ covers the investigation, ~~facts~~ the more accurate and more precise the result.

In ~~the~~ searches for the explanations of the wave nature of the encephalitis ~~of~~ two physicians - V. A. Yagodinskiy and Yu. V. Aleksandrov - independently came to the conclusions, ~~at whom~~ arrived ~~for~~ at half a century ~~to~~ before them by one of the authors of this book - A. L. Chizhevskiy.

~~Give~~ Let us return to the past let us trace the first ~~steps pitches~~ steps of the science of sun-earth biological ~~communication~~/connections - heliobiology.

Page 43.

Black death.

..."Attention! ~~Diseases by~~ Cases of smallpox are recorded in provinces of Madagascar.... In the Italian port of Brindisi - death from smallpox.... In Turkey several cases of typhus" - similar radiotelegraph bulletins ~~fly away~~ are broadcast ~~during~~ in ten days out of Moscow ~~in~~ to all ends of the Soviet Union.

The epidemiologists and the physicians, who guard the sanitary boundary of our country, await report about epidemic danger ~~so, as~~ just like pilots await report about weather. Signals ~~prick up ears!~~ put them on guard the invisible "microsaboteurs" - the exciters of dangerous infections - can cross the state boundary. Cannot be let pass them !

On the Soviet side of the foreign guests, who arrive from the countries, where, ~~until now~~, there are still outbreaks still are the ~~flash/bursts~~ of especially dangerous infections, usually ~~encounters~~ meet the whole board: the customs officers, the frontier-guards and without fail

physician-epidemiologist.

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In the USSR there is a law, according to which no one has a right to obtain ~~resolution~~ permission for entrance into the country or ~~the~~ departure abroad, if ~~to it are not made~~ he has not received all the necessary inoculations against "especially dangerous infections" - plague, choleras, typhus, smallpox, yellow fever - and is ~~not given out certificate is~~ has not received a special certificate. If guest does not have a certificate, then an inoculation to him they will make here on boundary.

With difficulty does the efficient, hasty traveller forces ~~itself~~ himself to ~~fulfill~~ perform completely "excess formalities" in order that nothing it would ~~stir it to go~~ prevent him from going further. But meanwhile contemporary quarantine measures are very simple in comparison with the past.

...The year 1552. In Pskov appeared terrible guest - plague. The hum and the chime of church bells spread alarming news all over town. Information rapidly reached to Novgorod. Immediately, as testifies Novgorod chronicler, "Rapidly ~~call in~~ inform Novgorod about Pskov residents ~~in order that~~ so that they would go there ~~the hour of that of Novgorod~~ leave Novgorod immediately with ~~goods, by which not wake~~ any goods they might have. But ~~they will catch the guest~~ s of Pskov ~~on~~ tomorrow (are caught tomorrow) in Novgorod, ~~his vyvedshi for~~ they will be taken from the city ~~of szhechi and~~ and burned alive with

goods! And ~~to be to~~ erect a gate on Pskov road in ~~order that they would drive~~ to permit traffic to ~~into~~ Pskov, and not from Pskov into Novgorod". [Trans. note: the preceding passage is written in old-style Russian, and is therefore mostly untranslatable.]

Everywhere authorities ~~arranged~~ erected "~~gates/strong/firm~~ strong gate", where each visitor "they questioned ~~due to vinch from a distance~~ at a distance from the gate" and before letting him pass into city washed, fumigated his clothing. If ~~it~~ he arrived from the infected places, then they planted ~~it to~~ him in long quarantine. Even important state ~~certificates~~ (decrees) ~~on~~ at gates first "they copied through ~~the~~ fire/~~light~~" and only ~~then~~ a sent ~~away~~ copy ~~according to~~ to destination while the ~~designation/purpose, but~~ original they burned.

Antiplague and anti-choleric quarantines existed in Russia from XVI century. Still earlier them they instituted in Italy, where ~~swarm up commercial law court from the~~ trading shops arrived from different countries. By Creating quarantine, people ~~they~~ hoped to avoid the arrival of the terrible illness/sickness/diseases: plague, smallpox, choleras, which ~~into~~ short periods seized enormous territories, ~~transfer/converted~~ moved from the country to the country, from one continent to another. ~~But~~ Yet overcoming any obstructions, dangerous infections all the same periodically were spread on entire world and also suddenly disappeared. This fact, known from a deep antiquity, apparently, lay as the basis of Greek myth about Pandora, discharging

illness/sickness/diseases from the box, where they ~~are~~ were stored ~~up to a~~ up to a certain time ~~to is time~~/temporarily.

Page 45.

But whence nevertheless ~~were made smooth~~ came to humanity "pestilent infections" - epidemics and pandemias? What ~~did~~ contribute(d) to their appearance? How to explain the catastrophical rapidity, with which the pandemias from time to time did ~~understand~~ overtake planet?

The spontaneously catastrophical character of the propagation of epidemics long time did not yield to explanation. To guess the reasons for the periodicity of their appearance attempted half a century ~~back~~/ago (the) then also ~~entirely~~ (very) young researcher A. L. Chizhevskiy. First he attempted to find answer/~~response~~ to his agitated questions in vast historico-medical literature. From ~~the~~ books the scientist learned, that people have long already noticed strange ~~communication~~/connection between many terrestrial natural calamities, including infectious illness/sickness/diseases, and ~~together~~ (had) "celestial" phenomena.

On its to ~~century~~ (In its day) our planet ~~tested~~ (has experienced) numerous shocks. ~~By it fell~~ (It has) ~~out and~~ happy, relatively calm, ~~the~~ epochs, when nothing disrupted the peaceful current of life, and epochs ~~a~~gitated, when the whole

world came at once into the agitation: spontaneous/~~elemental~~ catastrophes, floods, droughts, earthquakes, volcanic eruptions, the mass ~~coatings of~~ inundations by insects, epidemic, epizootic disease and epiphytia, ~~the~~ hunger, which raged in many countries, even whole continents. ~~The~~ Centuries-old ~~experiment~~ experience of this type even gave rise to in Greeks idea about "mutual sympathy" - ~~thought about~~ the idea about the interconnection of all things, processes and phenomena in the universe. ~~Communication~~/Connection, since olden times realizeed by people, at ~~the determined~~ certain ~~torque~~/moments of history became maximally convincing, literally perceptible.

The Roman poet Ovid, narrating about the general illness/sickness/disease, which struck in I century B.C. ~~of~~ the inhabitants of the island of Aegina, notes that it "it overcame people, animal and plant simultaneously". Even earlier than Ovid Sophocles wrote in play "Tsar Edip" about the fact that "the illness/sickness/disease is transfer~~/converts~~ ed from field sowings ~~onto~~ to ~~the~~ animal/ and ~~uterine~~ unborn babies".

Because of Greek historian Thucydides to us it is known that the epidemics, which broke out in Attica between 436 and 427 for years B.C., were accompanied by earthquakes, maritime floods, droughts, bad harvests, ~~the~~ and an intensification ~~of~~ in the activity ~~was~~ of Vulcan (as). The mighty forces of the raging nature, ~~as if were combined~~ limited, as it were, against man during

"Attica" illness/sickness/disease. In Athens the earth tremors destroyed many buildings.

Page 46.

As an example of "common/general/~~total~~ excitation in nature", peculiar fever, if ~~then~~ it ~~is possible to be~~ might be so expressed, ca~~n serve~~ is the period from 251 to 226 years B.C. (epoch of Cyprian's pestilent ~~ulcer~~) plague). Vibrations of the ~~soil~~ earth were noted then in Europe (in Italy), Africa, Asia.

~~Are~~ No less valuable for the science ~~of~~ are the indication of the ancient manuscripts on the relationship/~~ratios~~ between weather and propagation of epizootic diseases and epiphytia. ~~So~~ Thus, the period of 1770-1775 was marked by the development of the natural calamities, ~~after which they~~ followed by epizootic disease, in particular the rinderpest, which went around all of Europe. The historians and the writers, the eyewitnesses of natural catastrophes, who lived in the different countries and in different time, unanimously noted that the powerful "fermentation" in inanimate nature almost without fail is combined with the revelry of pestilent infections among people. Most likely ~~precisely hence~~ it was from this that ancient medicine got persuasion, that also the unhealthy processes, taking place in living organism, are ~~located~~ under the direct effect of celestial, or, as we speak now, space forces,

because of their powerful mysterious influence. The observed agreements in time of celestial and terrestrial phenomena, for example, the emergence of sunspots or aurora in the years of natural catastrophes, were so/such frequent, that in many peoples arose even the faith in "~~signs~~ omens".

However, ~~noticed~~ ~~communication~~/connection of phenomena was not ~~the~~ a empty game of fantasy. It is interesting that the "systems of omens" ~~at~~ in all peoples and in all times were amazingly similar. For an ancient Chinese, a Russian chronicler, a Gaul and a Mongolian the strange coloration the firmament, herringbone (arrow-shaped) clouds, ray/beams, ~~the~~ columns and eddies of aurora, the earth tremor, spot on the sun or circles about it ~~constant~~/invariably preceded misfortune's onset. ~~So,~~ Thus

in the patriarch chronicles of 6874 years written following report/communication:

"There was a sign in the heavens. In the same year there was a great plague in Moscow. In the same year there was a very great plague in Vologda. In the same year there was a great plague in Lithwania. In the same year there was drought and great heat and great famine over the whole earth."

Science did not pass over these most interesting empirical observations. The scientists and the physicians of antiquity (Hippocrates, Celz) much reflected ~~above~~ the nature of celestial influences.

Later the epidemiologists and the hygienists made ~~the~~ repeated attempts to explain how (affects environment) propagation and (the) course of ~~the~~ illness/sickness/disease: they ~~were~~ investigated the influence of the pressure of atmosphere, air humidity, weather, temperature, etc. Beginning with the outstanding Italian hygienist Ramazzini, a whole pleiad of ~~the~~ scientists devoted ~~its~~ their works to the explanation of the interconnection between morbidity and meteorological phenomena. For example, in XIX century Faraday hotly defended the possibility of influence on the organism of the atmospheric electricity, ~~calling~~ causing the formation/~~education~~ of ozone. During the cholera epidemic of 1837-1838 the reason for the cholera many physicians (the) considered "electricity and magnetism" of the Earth.

"Every time, wrote later noted Russian physician F. Inozemtsev, with the advent of atmospheric thunderstorm (storms) we saw that the number of supply/~~delivered~~ ~~to~~ hospitals ~~cholera patients~~ (cholera patients entering the) suddenly considerably grow/rose, (and) the number ~~died~~ (that died) was ~~more~~ (greater than) rather ~~than as this it~~ (that which) occurred before the appearance of (thunder)storm" [1].

Another Russian researcher, N. A. Skalovskiy [2], in 1908 ~~appeared with~~ (presented) reports ~~about~~ (on) the role of meteorological phenomena, in particular atmospheric electricity, ~~to~~ (on) the course of cholera epidemic. Finally, ~~in~~ (on) English researcher, Moore, in ~~the~~ (a) publication ~~in~~ (gone) 1886, perhaps, ~~appeared~~ for the first time reference to the sunspots,

"which, in the opinion of some researchers, can have a known effect on the state of the environment, contributing tc the development of epidemics" [3].

FOOTNOTE [1] F. Inozemtsev. Using milk as a cure. Moscow, 1857.

[2] N. A. Skalovskiy. The microccsmos and the macrocosmos. St-Petersburg, 1913.

[3] B. J. Moore. A manual of diseases of India. London 1886.
END FOOTNOTES

After ~~the~~ a deepened or acquaintance with the most extensive historico-medical literature A. L. Chizhevskiy decided to verify with the aid of astronomical and statistical comparisons most probable in his opinion solar version ~~of~~ His "working hypothesis" was served the idea, ~~according to which~~ that in the ~~being~~ repeated ~~character~~ nature of epidemic catastrophes, apparently, is partially guilty the monitor of ~~the~~ life of planet - the sun !

This was preceded by this line of the reasoning: meteorological factors (temperature, pressure, humidity) undergo vibrations constant and even

in two closely lying ~~horizontal~~ points ~~items~~ give different readings. It is possible to immediately discount them.

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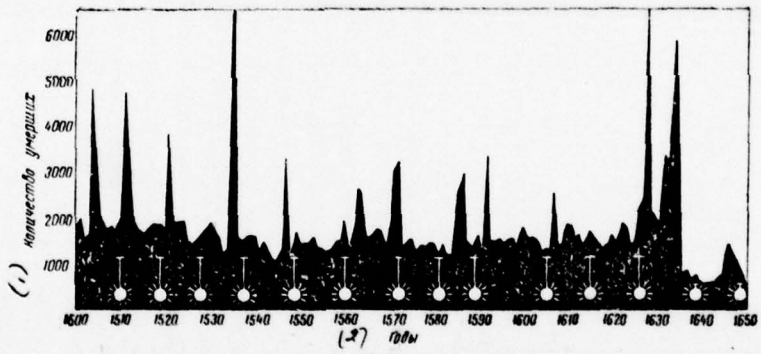
Mortality in Augsburg from pestilential epidemics from 1501 through 1650 and solar activity during the same period. The maximum of diseases is designated ~~in~~ by asterisk. (Curve/graph is comprised by A. L. Chizhevskiy according to data of Resle) (Key:) 1. Quantity of the dead persons. 2. years.



But there is a group of the phenomena, which simultaneously cover the enormous spaces: for example, the perturbation of terrestrial magnetic field or atmospheric electricity. But electrical, magnetic, electromagnetic phenomena in the earth's crust and the atmosphere in turn, depend on the phenomena space, mainly on the influence of the sun. But that means first of all ~~it is~~ we must to investigate the question concerning ~~relation in which are found~~ relationship of certain ~~those or other~~ epidemic diseases with solar activity.

In order to verify "solar hypothesis", one ~~ought not to have~~ should studied the most extensive statistics ~~long~~ long of passed epidemics. And then, after comparing chronological tables with data ~~of~~ on the activity of the sun in the corresponding periods, ~~to~~ obtain at least partial answer/~~response~~ to the ~~placed~~ posed questions.

After the "excavations", ~~produced~~ performed in a series of historical archives, was comprised ~~the~~ a detailed chronological table, which systematized the information about the largest epidemics and the pandemias of plague from 430 years on 1899.

~~To the present send the remainder evidence about~~ Evidence remains to this day on the pestilential epidemics of the Ancient Greek historians of Herodotus

and Thucydides, (the greatest physician of ~~the~~ antiquity, ~~of~~ Hippocrates, etc. Especially powerful epidemics of plague remained in history with the names of rulers and celebrities of that time.

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In ~~125 year~~ the year raged "plague of Oroziya", in 165-168 years - "plague of Antonina and Galenus", in 251-266 years - "Cyprian's plague", in VI century - "Justinian's plague". The historian Yevagriy, the eyewitness of Justinian's plague, ~~it~~ noted that its intensification and weakening were ~~accomplished~~ periodical~~ly,~~ ~~whereupon~~ with for each period ~~came on the average~~ averaging about 15 ~~summer~~/years and in each such ~~development~~ the development period of plague it was more powerful on the second year. ~~From the~~ With ~~VII on~~ to XIV century plague ~~was given a ride on~~ rolled across Byzantium, Italy, ~~it was~~ appeared in France and Germany. In IX century it produced devastation in Europe. In XI century the illness/sickness/disease appeared for the first time in Russia. In XII-XIII centuries it raged in Egypt, Syria, Greece, Italy and literally mowed down the troops of the crusaders. The bony hands of "black death" in XIV century embraced the whole world. From Central Asia the commercial caravans carried the plague ~~in~~ to the coast of the Caspian, Black and Mediterranean, from there it penetrated ~~to~~ the European continent, where ~~ruined the~~ did in a fourth of entire population.

The contemporaries of "black death" - the ~~grandiose~~ great pestilential epidemic of the XIV century, by ~~the very~~ the most powerful ~~from~~ of all, which ~~tested~~ has experienced humanity, left several detailed stories about this calamity, which devastated Europe ~~&~~ and Asia for some three years (1348-1351 years). And in these descriptions furthermore the appearance of an epidemic is compared with the ~~revelry~~ outbreak of the spontaneous/~~elemental~~ forces of nature. ~~"On the distant~~ In the Far ~~East~~, wrote de Mussi, in China black death was preceded by the signs: ~~went rain from~~ it rained snakes and the toads, which ~~began to~~ crawled ~~in~~ into dwellings, and they killed people. From sky flowed the ~~flows~~ torrents of ~~the~~ blood and fell stones".

Of course, to us it is difficult to ~~now retain~~ refrain/hold down from smile, reading these juicy, but naive chronicles. Nevertheless one should say that ~~(~~ even the Chinese chroniclers noted at this time exhausting heat, droughts, and then floods and ~~the~~ general illness/sickness/diseases, which destroyed up to five million people, ~~hunger strike~~ famine, the devastating ~~raids~~ hordes of locust. According to the noted German historian of general diseases Geser [1], similar events preceded "black death", also, in other parts of the world/~~light~~.

FOOTNOTE [1] H. Geser. The history of general diseases. St-Petersburg, 1866. END FOOTNOTE

During the year of its maximum propagation (1348) from south to north and from the east to west ~~on~~ in Europe were given a ride the waves of earthquakes, which destroyed ~~the~~ cities, causing ~~wood~~ forest fires and flooding of rivers.

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In ~~XV~~ the XV-XVIII centuries of the epidemic of plague they appeared in ~~the different~~ various parts of terrestial globe. In XIX century plague nested in Egypt, Persia, Armenia, periodically appearing in Europe. From India "black death" ~~it was fixed into~~ moved to Africa. Why so inscrutable and whimsical were its way? Epidemiology this question did not answer. Neither precipitation nor atmospheric pressure nor climate explained the dynamics of pestilential epidemics. At the end the XIX centuries in report about pestilential epidemic in Vetlyanka Stakhovskiy wrote: "Apparently, in the environment something occurred, which suddenly ended epidemic in Astrakhan province even prior to the arrival of antiplague board".

After all the possible information from contemporary sources about plague was assembled and ~~given~~ fed into system, A. L. Chizhevskiy compared two phenomena: solar activity and plague. What was obtained? found

The points of the maximums curve, depicting course of solar activity, were arranged/located just above uplifts curve, which reflected the dynamics of propagation of plague. We give here the diagram of mortality from plague in city Augsburg from 1501 through 1650. After glancing at figure, the reader can himself be convinced of the agreement of two curves. Thus, the first attempt to compare the vast, thoroughly assembled statistical data on morbidity with the "work" of the sun made it possible with sufficient authenticity to draw the conclusion that some interconnection of solar activity with propagation and activity of the epidemic of plague unconditionally existed !

Yet perhaps the whole matter lies within the special peculiarities of precisely this illness/sickness/disease? But other diseases the sun does not affect? This assumption also needed checking. For this it was necessary to examine the dynamics of other diseases, in order to as has already been said, "to fill the larger possible number of facts" and to obtain either negative answer/response or the new proofs of its rightness.

Through strong gates.

~~The~~ On the epoch of the unprecedented "b~~l~~oom" blossoming survived not only plague, but also such heavy diseases as leprosy, cholera, syphillis, smallpox....

Historical and paleopathological data show that ~~the separate~~ individual diseases can in their own way ~~grow sickly~~ decline and b~~l~~oom blossom, they first conquer, devastate and frighten the world, then ~~hardly~~ barely ~~they~~ glimmer in ~~its~~ their favorite foci. ~~There is no time~~ Hence terrible cholera, for example, since olden times got accustomed in India. ~~It can be therefore~~ Perhaps this is why the first descriptions of the powerful ~~flash/burst~~ outbreaks of the cholera epidemic, which pertain to the year 1031, are made by Hindu writers. Then the information about the epidemics of the cholera, which occurred during the years 1364-1367, we find ~~at~~ with the Persian writers. ~~At the erosion/climax~~ During full bloom of the cholera epidemic of those ~~summer~~/years the Chinese chroniclers noted the very large spots on the sun, seen with the naked eye.

The epidemic of cholera appeared in Constantinopol, Arabia and

Egypt shortly before the conquest of Byzantium by the Turks, ~~into~~ 1453. On the basis of some data it is possible to assume that in period ~~in~~ of 1445 ~~in~~ through 1447 the activity of the sun rose to maximum. Then during long time about the epidemics of cholera there are no precise information.

The French traveller Sonnerat, who visited in XVIII century India, left the description of the devastating epidemic of the cholera, which ~~took away~~ killed from 1768 through 1771 several tens thousand of ~~sacrifices~~ victims. In 1769, in the period of the propagation of cholera in India, Staudacher in Nuremberg and other observers they noted an increase in the solar activity.

Weighty data on the considerable epidemics of cholera on the Koromandel coast during the years 1774-1780 coincide with data on a maximum increase in the solar activity in 1778. Is known the epidemic of cholera in Trankvebar, Madras and other places of India during the years 1778-1790. The maximum ~~of~~ spot formation is noted by the astronomers in 1788....

The Beginning of the XIX century was marked by the epidemic of cholera in India ~~into~~ 1804. The maximum of solar activity falls during the years 1804-1805.

In the elapsing century the cholera in stages devastated humanity, accomplishing repeatedly round-the-world journey.

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Let us observe the sequence of cholera attacks and the behavior of the sun in the years of such pandemias. The first pandemia lasted from 1816 through 1823. In 1816, when spot-formation process reached ceiling ~~voltage~~, cholera flared up in India, after encompassing very large territory and after ruining (killing) hundreds thousand people. In 1817 it exceeded the limits of India, it penetrated ~~in~~ Indochina, ~~to~~ islands Ceylon, Borneo, Celebes and Philippines, costing hundred thousand human lives. Then it was extended to Persia, after devastating Shiraz and Tavriz. In the winter of 1882 cholera reached ~~to~~ the shore of Caspian Sea, and during June 1823 it was ~~reveal~~/detected in Astrakhan. Since 1822 the epidemic began to ~~step back~~ (needs). Everywhere they noted its weakening. 1823 ~~is an~~ (the) end of the first pandemia. Specifically, in this year occurred ~~the~~ (a) minimum of solar activity. Thus, ~~and~~ the beginning and the end of the first pandemia coincide precisely with ~~for~~ (the) years of maximum and minimum ~~of~~ solar activity.

The second pandemia of cholera lasted whole 10 ~~summer~~/years (1827-1837). In Bengal and in Indian archipelago in 1827 was recorded

the next ~~flash/burst~~ outbreak of cholera. In a year the cholera was extended to west and in 1829 (in the period of the maximum of solar activity) appeared in the Orenburg, where continued for three ~~summer~~/years, ~~nontame~~ unconquered even by winter colds. In the beginning of 1830 the epidemic seeped in many cities of south Russia and from there began to be spread to north. (It by the way, stirred A. S. Pushkin to return from Boldino into Moscow to ~~his~~ bride. Entrance into Moscow was forbidden). In the same 1830 the cholera penetrated ~~in~~ Western Europe and gave a series of extremely deadly ~~flash/bursts~~ outbreaks in Italy - in Rome, Palermo - and in other states, including in England.

From the winter of 1832 the epidemic in Russia ~~is banal for the loss/depreciation~~ began to decline: illness/sickness/disease ceased in winter months and gave only the small percentage of mortality. The same one should say, also, about Western Europe. ~~Into~~ 1834 in Russia ~~not at all~~ no cholera it was recorded ~~the diseases by cholera~~ at all. Only in autumn, when in abundance appeared fruits, ~~the~~ were relapses of cholera were noted in southeasterly provinces. In 1835 Russia was freed ~~from~~ of it completely. And, by the way, into 1833 occurred the minimum of solar activity.

The subsequent rapid approach/approximation of the maximum of solar activity and the very torque/moment of maximum (1837) coincided with the intensification of cholera epidemic both in Russia and outside boundary.

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The third pandemia of cholera arrived during the years 1844-1860. Similar to the preceding/~~previous~~ pandemias, cholera ~~and~~ ~~this time took~~ Covered the time interval, ~~engaged~~ occupied by the two maximums of solar activity during the years 1848 and 1860 ~~even~~ and one minimum in 1856. ~~Once into~~ As early as 1844, the activity of the sun ~~sharply~~ had increased, which was accompanied by the noticeable intensification of cholera in India. The epoch of the ripening of the maximum of 1846 was marked by ~~the~~ an extremely rapid development of the cholera: illness/sickness/disease was extended ~~on~~ to entire Arabian peninsula and appeared in the Caucasus. In 1847 the epidemic encompassed whole shore of Black Sea and partially Asia Minor, it penetrated in Constantinopol, which since 1848 was the main center of the propagation of cholera.

Into Russia the epidemic seeped in 1847 and immediately spread in the country, ~~accurately~~ just like a grease spot on a paper. To the spring 1848 it penetrated in all provinces. ~~To~~ By September ~~to month~~ entire/all of Russia was enveloped by ~~diseases~~ illness. At this time the epidemic raged in Austria and Germany. It began to weaken in 1849. During the years 1850-1851 in Russia the cholera almost completely disappeared. Thus ended the first destructive raid of cholera wave.

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However, in the following year, as if water in flood, its flows from India spilled far to northwest, after encompassing ~~the~~ a large part of Europe and after penetrating in America. ~~With~~ From 1852-1853 the activity of the sun begins to noticeably fall and its minimum ~~it~~ ~~falls on~~ coincides with 1856. Cholera in 1855 also begins gradually to weaken.

The fourth pandemia lasted from 1863 through 1875. From Bengal into 1864 it was extended ~~on~~ to entire Indian peninsula, it penetrated in ~~H~~edjaz, and then in Mecca and Medina. Hence the pilgrims carried it into Egypt, Turkey, Italy, France, Spain, and also into England and Germany. From the end of 1869 the pandemia suddenly acquired devastating nature. (In 1870 came the maximum of solar activity). The wave of cholera, ~~on~~ per official information, lasted of up to 1872, but for an additional year-two were the cases of cholera.

The division of cholera epidemics into ~~the~~ certain ~~determined~~ periods, naturally, is somewhat conditional~~ly~~. Cholera generally never disappeared with the face of the Earth. It only abated, from time to time after concentrating in any region of terrestial globe, and then again under the effect of ambient conditions with the unexpected force it covered enormous spaces.

A decade passed
~~Pass decades~~. Cholera no longer disturbed Europe, and it ~~ceased it,~~ also, in India. But during May 1883 (~~per annum~~ in the year of the maximum ~~voltage~~ strength of solar activity) were reveal~~/detected~~ed the first cases of the disease by cholera in Bombay. Thus were begun the fifth pandemia of cholera in XIX century. Hence, the ~~way~~ path of cholera li~~/rested~~ lay into Egypt, and then in~~/~~ to France, whence, after breaking through all quarantines, it moved in Italy, Spain, Switzerland and Germany. Beginning from 1886 the epidemic began to weaken. This weakening coincides in time with a decrease in the activity of the sun.

The latter, the sixth, pandemia ~~were~~ was begun into 1892. Crossing the border of Hindustan, cholera it moved tc north and to northwest, it penetrated in~~/~~ to Turkistan and from there in Russia, where it was ~~held up~~ contained until ~~to~~ 1896, after causing the outbreak during the years 1892-1895 (years of the maximum voltage of the activity of the sun).

Thus, the cholera pandemias, which ~~given a ride on~~ rolled the Earth in the past century, ~~the~~ which encompassed enormcus spaces, ~~detected~~ show conformity in all their fluctuations with fluctuations in the force of the spot-formation process on the sun. The years of the minimums of solar activity in the majority of cases corresponded to the disappearance of this disease. Frequently even separate incidental

intensifications or decreases in the activity of the sun ~~it is~~ very accurately coincided with the development of illness/sickness/disease. Thus, the famous ~~flash/burst~~ outbreak of cholera epidemic in Hamburg in~~to~~ 1892 accurately coincided with the sharp intensification of the activity of the sun during August of ~~this~~ that year. ~~To~~ By 20 August the morbidity increased to 1000 people during per day. In all in Hamburg were 17 thous. cases of the disease ~~by~~ of cholera, of them 8605 ~~were finished by~~ ended in death.

Wave after wave.

Who ~~did~~ has not had not ache ~~by~~ influenza? Find such a person!

Neither sanitary propaganda nor serum nor gauze bandages, even not even replacing from the ~~failure of~~ pleasure of a friendly handshake — ~~to be greeted in a friendly way for hand~~ - nothing shields us from the visits of this "innocent", but ~~the~~ ubiquitous disease.

Page 55.

Honesty and modesty force the physicians to recognize that they, until now, ~~above~~ have no control of over influenza. ~~the influenza thus far are not imperious~~. From it

~~save~~ neither medicine nor ~~grafts.~~ innoculations save us Influenza appears and disappears ~~in order~~ just to appear again.

The epidemiologists, the virusologists, the physicians explain this regularity by the facts that after each pandemia of influenza humanity ~~seemingly~~ seems to obtained ~~on~~ several ~~summer~~/years ~~forward~~ forward natural immunity to this virus. But then virus acquires some new properties, new possibilities for contamination. Post-influenza immunity weakens in the course of time, and appears the new wave of influenza, sometimes extremely disastrous. This explanation is close to truth. However, it is possible that the regular returns and the disappearances of influenza can ~~produce~~ be the result of some other reasons. It was noticed that the epidemics of cholera and influenza frequently accompany one another. For example, the flu epidemic of 1815-1816 preceded cholera pandemia. The ~~flash~~/~~bursts~~ outbreak of the second cholera pandemia were close in time of the epidemic of influenza 1828-1832 and 1836-1838. The third cholera pandemia also was accompanied by influenza epidemics. The fourth pandemia of the cholera of 1863-1875 coincided at the end with the epidemic of the influenza of 1873-1875. The termination of the influenza epidemic of 1889-1891 served as "signal" for the sixth pandemia of the cholera, ~~which~~ begun ~~since~~ since 1892.

It is necessary to say that neither bacteriologists ~~ists~~ nor

epidemiology long time had criteria for precise diagnosis of influenza, ~~but~~ while virology, as is known, exists ~~a total of~~ has only 70 summer/years. But since the descriptions of the clinical ~~sign~~/criteria of epidemics of XV and of the XVI centuries coincide with ~~the now taken~~ criteria for determining influenza (now used), A. L. Chizhevskiy decided to investigate the epidemics of influenza during this historical period on the basis of information, obtained mainly from the compositions of the German historians of general illness/sickness/diseases Geser [1] and Hirsch [2].

FOOTNOTE [1] H. Geser. The history of general diseases. St-Petersburg, 1866.

[2] Hirsch. Handbook of historical-geographical pathology. Vol. 1. Erlangen, 1860. END FOOTNOTES

Geser encountered the indications of the epidemic of influenza ~~into~~ 1403, 1411, 1414 and 1427. Hirsch begins the chronology of influenza epidemics with XVI century and notes the following epidemic years for the century: 1510, 1557, 1591 and 1593.

During ~~the~~ a period of time ~~into~~ of 340 ~~summer~~/years, according to Hirsch, ~~the~~ influenza epidemics ~~of~~ ten times covered entire Europe, nine times covered the large part of Western hemisphere, four times whole Western hemisphere and six times whole eastern hemisphere. Hirsch with large thoroughness gathered the materials, concerning not only more or less large epidemics, but even the insignificant ~~flash~~/outbreaks/bursts, which bore epidemic character. Since ~~a similar kind of~~ such the epidemics of influenza are not the phenomenon exceptional - they almost yearly ~~flash~~ break out in one, then in other country they bear the character of the mass seasonal catarrhs, ~~them~~ they have not been considered in did not accept into consideration ~~for~~ the comparison of the ~~flash~~/outbreaks/bursts of influenza and solar activity. Were considered ~~the~~ only those general cases of influenza ~~diseases~~, which undoubtedly bore the character of the mass and powerful infection, ~~they~~ that covered ~~the~~ whole countries, ~~the~~ continents, hemispheres and sometimes the large part of terrestial globe.

The first attempt at the comparison of the epidemics of influenza with data on the spot-formation process on the sun showed that between these two phenomena is a known relationship [1].

It was noticed that the epidemics first follow one after the other every one-three years, then ~~through~~ after several ~~summer~~/years.

In comparing During the ~~comparison of the~~ groups of the epidemics, have which ~~give~~ one, two or three waves and are isolate/~~insulated~~ with respect to the ~~on~~ time of the departure/~~withdrawal~~ of spot-formation process, it was ~~were~~ reveal/~~detected~~ that, while the groups of epidemics fall on one rise ~~uplift~~ in solar activity and they lie/~~rest~~ within the limits the "minimum", the isolated/~~insulated~~ in time epidemics lag behind the ~~nearest to them on time of~~ nearest to them in time groupings or isolated/~~insulated~~ epidemics ~~through one~~ by one ~~minimum either~~ or ~~the~~ maximum or ~~through~~ by several minimums and the maximums. Then it was decided ~~solved~~ the following one after another epidemics of influenza to consider as waves of the same epidemic, caused by some common/general/total reason. This assumption did not contradict information, gotten from epidemiological sources.

FOOTNOTE [1] With the intensification of spot-formation process on the sun coincide the following epidemic years: 1427, 1557, 1602, 1647, 1657-1658, 1756-1758, 1767, 1802-1803, 1826-1828, 1857-1858, and with the weakening of this process - 1591-1593, 1642-1643, 1688, 1709, 1712, 1732-1733, 1742-1743, 1850-1851, 1873-1875. To the epoch of the maximum of solar activity ~~come~~ coincide with the epidemic years: 1403, 1411-1414, 1580, 1626-1627, 1675-1676, 1693, 1728, 1737-1738, 1761-1762, 1779, 1788-1790, 1805-1807, 1815-1817, 1829-1830, 1836-1837, 1846, 1848, 1860, while to the epoch of the minimum coincide with - 1655, 1775-1776, 1798, 1843-1844, 1855, 1889-1891. END FOOTNOTE

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It turned out that the epidemics, close in time, ~~from~~ in their clinical ~~sign~~/criteria ~~detect~~ show much that is in common. As the beginning of epidemics (in cases two-three of adjacent waves of influenza) was accepted the date of the first wave after the minimum. Such groupings of from 1403 through 1928 ~~render~~/showed there were twelve. All periods of influenza epidemics ~~render~~/showed 30, that gave 83 epidemic years ~~during~~ over an entire 500- ~~sum~~ year period of time. Since 1557 the ~~circuit~~ chain of periods is continuous [1].

(1402 was the year) ~~the~~ a year of solar activity. The first influenza epidemic of the XV century according to Geser falls in 1403. ~~In~~ Into 1414 followed the intensification in the activity of the sun, and influenza epidemics were noted during the years 1411 and 1414. One of the following intensifications of solar activity was observed in 1431; influenza ~~it falls on~~ fell within 1427.

In XVI century are noted four epidemics of influenza; the predicted maximum of solar activity it was in 1510. Then follow the maximums, ~~the~~ whose degree of ~~the determination of~~ authenticity ~~of which~~ (was already considerably above higher because of the meteorological notations,

produced in Russia and Europe. The nearest maxima to the enumerated epidemics ~~maximums~~ fall on 1560, 1581 and 1588. Beginning from 1610 there is already more or less reliable material for judging ~~about~~ the activity of the sun because of the telescope, invented by Galileo.

From ~~the~~ comparison of the relationship ~~ratio~~ of the periods of solar activity and periods of influenza in XVII century it follows that eight uplifts ~~in~~ rises in spot formation were accompanied by epidemics. (Besides second ~~uplift~~ the first whose maximum falls ~~in~~ on 1615).

The Law in the sequence of the epidemics of influenza in accordance with the course of spot-formation process on the sun ~~with even larger brightness was~~ was even more markedly expressed in XVIII century, although two periods of solar activity (II and V) they turned out to be completely free ~~from~~ of epidemics. In XIX century eight periods of nine spot formations ~~they~~ were marked by influenza epidemics.

FOOTNOTE [1] The XV century - 1403-1411, 1411-1427,; XVI century ~~is~~ 1510-1557 (the fourth), 1557-1580 (dual), 1580-1591, 1591-1602; XVII century ~~is~~ 1802-1626 (dual), 1626-1642, 1642-1647, 1647-1655, 1655-1675, 1675-1688, 1688-1693, 1693-1709; XVIII century ~~is~~ 1709-1728 (dual), 1728-1737, 1737-1757 (dual), 1757-1767, 1767-1779, 1779-1788, 1788-1798; XIX century ~~is~~ 1798-1815, 1815-1826, 1826-1836,

1836-1843, 1843-1857, 1857-1878, 1878-1889 (dual), 1889-1912 (dual); XX century ~~is~~ 1918-1926. END FOOTNOTE

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After examining the position of influenza epidemics ~~in~~ on solar curve, it is possible to be convinced of the fact that the majority of epidemic epochs lie/~~rests~~ on ~~uplifts~~ rises and ~~incidence~~/drops in the curve. Is created impression, as if influenza epidemics (still have ~~all~~ the ~~same~~ tendency to appear between the minimum - maximum and maximum - the ~~minimum of~~ in solar activity. The beginning of the epidemic, ~~arrange~~/lies located within the limits of maximum - the minimum, ~~either~~ or it lags behind the nearest maximum or it ~~anticipate~~/leads it on the average by two or three years. Of course, from this it does not follow that all epidemics must be located ~~from maximum~~ to one side or the other ~~accurately on~~ of maximum by exactly two or three years, ~~but in~~ yet this conclusion (very ~~closely~~ less to truth.

It is necessary to say that the attempt to determine periodicity in the course of influenza epidemics in order to forecast them, they have (been carried out repeatedly. In the distribution of the epidemics of influenza in England for the ~~latter of~~ last 130 ~~summer~~/years it is possible to ~~reveal~~/detect 10-year period. The dates indicated

accurately fall ~~in~~ within the epochs of the maximums of solar activity or within the epochs of their ripenings and ~~incidence/drops~~ declines.

Epidemiologists ~~noted~~ have noted that approximately ~~through~~ every each of 35 ~~summer~~/years ~~the~~ influenza epidemics or pandemias accept take extremely rigid ~~dies~~ forms. (In the activity of the sun Chester also found a period close to 35 years ~~period~~, i.e., 33.375 years).

In summation, it is possible to arrive at the conclusion that on the average the period of influenza epidemics is equal to 11.3 years, ~~and~~ one that the duration of epidemics in each 11-summer solar period is equal on the average to four years, and finally, that the epidemics of influenza have a tendency to begin ~~for~~ two or three years ~~to~~ before maximum or ~~after~~ two or three years after maximum.

The intensity of the epidemics of influenza, apparently, ~~is found all the same known~~ still has a known dependence to depending on intensity in the activity of the sun. ~~Seasonal factor it approaches or it drives out the~~ the seasonal factor either brings nearer or moves back the outbreak ~~flash/burst~~ of epidemic. Taking into account all this, the physicians can make a forecast/~~prediction~~ about most probable arrangement/~~permutation~~ in time of the epidemics of influenza for certain ~~period forward~~ advance period. Forecast ~~of~~ in the epidemics of influenza ~~must be~~ is necessary since ~~to prevent its~~ physicians still ~~not~~ can. As concerns especially the dangerous infections: plague, choleras and smallpox, to forecast ~~can~~ can prevent it

them there is no need. Science have long tamed these illness/sickness/diseases.

In XIX century the "hunters after micro~~you~~bes" demonstrated that the medicine was not helpless before the mighty forces of nature.

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People learned to ~~be shielded~~ shield themselves from many pathogenic microorganisms by special ~~grafts~~ inoculations, creating nonsusceptibility to them - artificial immunity. To the full/total/complete conquest over especially dangerous infections in our country contributed also changes in the social living conditions, the organization of efficient sanitary-epidemiological service. Today the ~~number one~~ number one enemies of man ~~are~~ are no longer plague ~~and~~ or ~~not~~ cholera, but cardiovascular diseases, cancer, ~~street trauma.~~ ~~fat~~ highway accidents.

Infections ~~send away~~ have faded into the past and for the majority of people they have purely historical interest. For the biologists besides the historical interest, ~~of the dynamic loudspeaker~~ the dynamics of past epidemics today ~~it~~ serves as the richest actual basis for the construction of serious empirical generalizations. Analysis shows that in appearance and disappearance of epidemics ~~hid themselves~~ hide **the very important laws, which are also inherent**, apparently, ~~and~~ in other **phenomena, occurring in biosphere.**

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Transformations in the unseen
~~Conversions in invisible~~ world.

The biologists in recent years (experience a ~~the~~ feeling of unusual elevation. The turbulent flow of discovery/~~openings~~ brought with ~~itself~~ a ~~sincere~~ real uplift, and each witness of the ~~bright~~ brilliant scientific conquests with pride realizes himself ~~by the~~ to be a contemporary of ~~really~~ a scientific revolution.

Biology ~~was~~ has pulled out to the front lines of natural science. For a ~~long~~ time it had descriptive character, but after accumulating enormous experimental material, became stricterr and more precise in determinations and conclusions, gradually it mastered the new precise methods, which were utilized earlier only in the region of physics, the mathematicians, quantum mechanics.

The experimental study of life (today ~~was~~ has expand a ~~developed by~~ broad front ~~immediately~~ in in several "measure~~ments~~s": at the level of

entire biosphere, its parts (parts of it) - the separate (individual) associations of organisms, whole organism, organs (tissues), controls, fabrics, cage/cells, cell structures, molecules, even at molecular energy levels. In the opinion of Albert Saint-Georgy, noted biophysicist, Nobel prize winner, soon in biology will appear one additional change - subatomic.

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The young (new) sections (division) of biological science - magnetobiology, radiobiology, space biology - are occupied by research on influence on the processes of the life of the physical factors of the environment, against the background of which the processes are developed: radiation, magnetic field, etc. This led to the fact that (Because of this) the concept of "life", yes even the basic thesis of materialist biology of the unity of the life and medium (environment) (even ancient idea about "world sympathy") obtained the more concrete/specific/actual content.

But so is matter little more than in recent years ! But almost (look what has happened in just the last few And) half a century back/ago, when in (as) an example of epidemic catastrophes distinctly for the first time formulated hypothesis about the influence of the sun on the processes of life, society was not still prepared for its perception. By The first heliobiologists (was) required the stable independence of judgments, and also passionate conviction in their truth in order not to throw matter on halfway (give up half way)

and, disregarding ~~of~~ the silent and explicit ~~counteraction~~ opposition, all the same to study ~~the~~ in earnest experimental check of the obtained empirical generalizations, i.e., to ~~place~~ pose the first helicbiological experiments.

By the way, one of the first, who accepted ("~~closely-to~~ the-heart" thought about the possible effect of the sun and the cosmos on life and even participated in ~~the setting of~~ posing the first heliobiological and biospace experiments, was K. E. Tsiolkovskiy. (Kaluga dreamer and seer, absolutely ~~assured already~~ sure even then ~~in~~ of the validity of the future settling of humanity outside the Earth, (was very agitated and worried but the threat, ~~which~~ is concealed in solar radiation for ~~the~~ future astronauts. K. E. Tsiolkovskiy it ~~were distracted by possibility to~~ was carried away by experimentally ~~verify~~ verifying the action of penetrating emission/radiation to on living organisms ~~It~~ entered ~~in the~~ into discussion of all parts of future experiments.

How to carry out such an experiment in terrestrial laboratory? ~~Is possible whether this generally~~ Is it generally possible? (There were still no instruments for registering solar cosmic radiation ~~still not there were~~. It was necessary to utilize, probably the existing "biological detectors" of cosmic rays, although the scientific literature also nothing said about the responsiveness of living tissue ~~for~~ to cosmic radiation. What will occur, if we deprive ~~of~~ living tissue of secondary particles"? Will

change its normal functions? Judging by the comparisons of the development of epidemic process and solar activity the sun frequently it contributed to epidemic explosions.

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But did act it directly or indirectly through the changes, produced in biosphere? Did it affect it microorganisms, i.e., on pathogenic principle, or it did weaken the shielding forces of man?

All these and many other questions it was in prospect to solve had to be solved. They appeared one after another. From their circuit chain for a beginning it was necessary to snatch out at least one component/link. After long speculations the model of the experiment began little by little to be drawn. Most simply it is It would be simplest available, it seemed, to search for the proof of the existence of solar effect "from the contrary" opposite, i.e., to trace, as affects for how the living objectives are affected not an increase, but a sharp decrease in the intensity of penetrating radiation.

During the assistance With the cooperation of K. E. Tsiolkovskiy to and A. L. Chizhevskiy it was possible to mine acquire the lead necessary for experiments lead and to approach to the point matter. From thickened lead plate/platforms was constructed the a chamber - house in the form of cube. This form provided even braking damping in the thick layer of lead of the cosmic rays,

coming from directions vicinity of
going with different sides. In the neighborhood with lead they
a control a wooden house of the covered
constructed the same size/dimensions the control wooden house, filled
on
up from all sides by the layer of the earth/ground 75 cm. thickness.
Covered a
Both chambers were shut by the two-slope surface wooden shed, covered
with protecting it
roofing paper, preventing from rain and direct/straight sun rays.

The procedure of experiments was carefully developed. Experimental research on the effect of solar activity on the world of bacteria was carried out simultaneously on saprophytes - the harmless for a man microorganisms, driving in biosphere the harmless to man which lead a ("free" form of life, and the parasitic forms, which adapted to existence by because of multicellular organisms.

Furthermore, in experiments were utilized the culture of living tissue (small pieces of cancerous swellings in feed tumors nutrient solution/opening), the germinating seeds of plants. All these specimen/samples in different periods were placed inside the lead "shelter", shielding them from penetrating radiation, and the same specimen/samples were placed into wooden house. In lead and wooden houses were thus created different "space conditions". It was difficult was to assume, as will answer to the stay under unusual "space and solar conditions" the fabric of cancerous swelling. But the fact that the imagine how the tissue of the cancerous tumor would react to the experimenters did not doubt that the bacteria and plants under these conditions will bring themselves would act somehow otherwise, the experimenters barely doubted.

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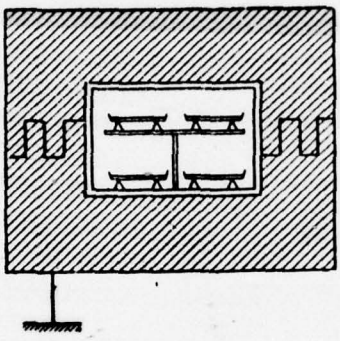
Schematic of the chamber, in which were carried out the first experiments on heliobiology by A. L. Chizhevskiy.



Almost all the numerous invisible bacterial population of our planet, as is known, the scientists are ~~related~~ classify in to the phytosphere - vegetable world. But by ~~that~~ at the same time already it was proved that the vegetable "microcosm" of planet undoubtedly was sensitive to changes ~~on~~ in the sun. By research on the effect of the fluctuations of solar activity on increase in the productivity, the flowering of plants thus far ~~was~~ has been occupied ~~the~~ a whole pleiad of the scientists: K. Flammarion, F. Nansen, A. Douglas, F. M. Shvedov et al. Douglas and Shvedov investigated the relationship/ratio between the degree of the strength of the spot-formation process on the sun and the ~~increase~~ growth of ~~wood~~ forests. Douglas measured with an accuracy to ~~the~~ within hundredths of millimeter the thickness of rings on cuts of the giant sequoias of south California, which ~~it is possible~~ could rightfully ~~to~~ be call/~~name~~ as the "earliest memory units", storing the information of 4000-year antiquity. On the cuts of sequoias clearly it was ~~drawn~~ outlined either eleven year cycle of solar activity or ~~its~~ of it. multiple values.

~~Being~~ Based on these and similar investigations, it was possible to foresee that the respiration of the sun sensitively/perceives entire/all phytosphere of planet, including invisible. Unlike the more complex heterotrophic organisms, which feed ~~by~~ on plants or animals and are/~~freed by~~ from evolution from "slavish solar dependence", the

autotrophic plants, which directly ~~master~~ assimilate solar energy, are located literally in solar ~~flaw~~ captivity

The result of three-month experiments turned out to be not only surprising, but also convincing !

Under the protection of thick lead walls noticeably was accelerated an increase and the multiplication in the ~~cage~~/cells of plants and microorganisms, even ~~swellings~~ tumors. An especially ~~bright~~ marked difference was ~~reveal~~/detected in the rate of growth of the colonies of a series of virulent and pathogenic microorganisms. The histological analysis of cancerous ~~cage~~/cells showed that under lead shield they increase faster than without it. The seeds of a ~~series~~ number of ~~cultural~~ cultivated plants (for example, pisolitic) also they showed high energy of intergrowth under lead walls.

Although the experimental conditions did not make it possible to distinguish, "where strictly solar, ~~but~~ and where other space effects", it was solid ~~establish/installed~~ established that, in the first place, penetrating ~~or the emission~~/radiation reaches directly the biosphere ! And, in the second place, that it produces ~~the~~ a suppressing action on increase and multiplication of living ~~cage~~/cells.

So, experimentally it was possible for the first time to explain the degree of sensitivity of different living ~~cage~~/cells to space and solar effect in the biosphere of the Earth.

The described experiment in our time seems primitive, just as the ~~applied~~ used in it chambers in comparison with the chambers, used in radiobiology today. But indeed since then ~~pass~~ have passed forty ~~summer~~/years... Unfortunately, the experiments, ~~about~~ which ~~it~~ is here described, they continued for a short time. But as ~~their~~ a natural continuation later, in the 40's, served the observations of Sergey Timofeyevich Vel'khover, a physician, who ~~led into~~ was the director in those years the clinic of infectious illness/sickness/diseases in Kazan.

S. T. Vel'khover interested himself in the effect of the sun on the course of infections and ~~it~~ he decided to verify itself "solar hypothesis". For this purpose ~~it~~ he selected the exciters of diphtheria - Loeffler's ~~rod~~ bacillus - and ~~similar on~~ bacilli as to them, "as two drops of water", but completely harmless ~~diphtheroid~~ the diphtheroid Corynebacteria. ~~Dangerous~~ The and inoffensive bacteria differed under microscope only one special feature/peculiarity - different coloring. The contained in Corynebacteria volute ~~grains~~ granules gave special color reaction - "metachromasis". Grains reddened under the effect of methylene blue.

This phenomenon first was amplified, then it weakened depending on the state of Corynebacteria.

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To distinguish diphtheroids and dangerous diphtheria rods is possible only with the aid of coloration. In other respects they are si~~milar~~ as alike as ~~the~~ twin ~~counterparts~~. This is explained by the facts that pathogenic microbes and saprophytes - the "native brothers", they indisputably have the common/general/total ancestors. Furthermore, one and the same microbial ~~cage~~/cell behaves completely differently under different conditions of the medium....

We ~~constantly neighbor~~ are in constant with the world of bacteria, but infectious illness/sickness/disease is only a very unpleasant episode in our life. How to explain that the countless armies of dangerous microbes do not devour us alive? Apparently, by the ability of our organism to resist contamination, and also by the facts that the pathogenicity and other properties of bacteria are changed under the effect of many ~~reasons~~ factors, majority of which, for sure, to us are still unknown. For example, it is possible to introduce under the skin of guinea pig the most dangerous bacteria, ~~calling~~ which causes gas gangrene, and ... no gangrene ~~there~~ will be ! But if conditions somehow change, the same microbe will kill mouse or ~~(~~guinea pig~~)~~ !

S. T. Vel'khover establish/~~installed~~ ~~the~~ important fact: the redder volute ~~grains~~ of diphtheroids, ~~thereby~~ ~~they are~~ less toxic, "more saprophytic". After learning about the conclusions of the statistic studies of A. L. Chizhevskiy, S. T. Vel'khover began to search for the dependence between the degree of their colorability and the cyclic activity of the sun. It turned out that the diphtheroids in the years of the maximums of solar activity sharply redden, they become seemingly still "more saprophytic", ~~sharply~~ they differ from the dangerous exciters of illness/sickness/disease. (Diphtheria ~~rod of~~ generally volute ~~grains~~ ~~does not contain~~). ~~Naprotiv~~/ ~~in order that~~ the activity of the sun would decrease, ~~as~~ immediately Corynebacteria turn pale, i.e., ~~everything more~~ begin to resemble ~~or~~ the exciters of illness/sickness/disease. This resemblance directly is dictated by the sun ! At the same time ~~the~~ physicians and the statisticians everywhere noted in the periods of the minimums of solar activity an increase in the diseases ~~by~~ diphtheria. ~~So~~ under microscope ~~was~~ reveal/detected that which initially was revealed statistically.

This is what wrote S. T. Vel'khover in one of his letters to A. L. Chizhevskiy: "... I conduct systematic bacteriological observations of diphtheria.... During ~~the~~ treatment ~~of~~ material I

arrived at many ~~struck me~~ striking conclusions.

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In your interpretation of diphtheria as epidemics, there are two torque/~~moments~~ factors: ~~specularity~~ mirror image phenomenon (i.e. a decrease in diphtheria during uplifts of solar activity and vice versa -. author's note) and the ~~of~~ lag in diphtheria maximum in comparison with solar maximum. Your "principle of ~~specularity~~ mirror image", obtained statistically, completely unexpectedly was confirmed ~~to~~ by me directly under microscope. I decided to search for "this ~~specularity~~ mirror image and through three experiments understood that I deal with surprisingly precise phenomenon".

It is unusually interesting that the reaction of metachromasis, ~~about which goes the speech~~ we are referring to here, is observed in Corynebacteria for 4-6 days before the appearance of bright flash/bursts and spots on the surface of the sun. Thus, microorganisms ~~seemingly~~ forecast, as it were, ~~previously changes~~ in the "solar weather ...".

How often historians of some field of science, analyzing half-obliterated rough drafts or leafing through the yellowed pages of a manuscript, are amazed by the almost enigmatic coincidense with which one fact or another or one idea or another came to the minds of different people.

~~Without~~ Knowing nothing about professor A. L. Chizhevskiy's experiments, one additional researcher - ~~the~~ an instructor of Tomsk Medical Institute physician Peter Mikhaylovich Nagorskiy - approximately in the same years began to perform an experiment, which very ~~resembled to~~ resembled the experiments of Chizhevskiy.

Lead armor this time hid from solar and cosmic rays not only microorganisms. Nagorskiy ~~verified~~ established how a, ~~as acts the~~ stay in the chamber ~~on~~ affect the growth of young rats, ~~on~~ the intergrowth of the tubers of potatoes, the regeneration of tail in tadpoles, the healing of wounds. ~~It cut~~ He dissected hydromedusae, planaria, Daphniae, tadpoles. Every day ~~it~~ he followed the processes of regeneration - restoration/~~reduction~~, the damaged ~~fabrics~~ tissues. P. M. Nagorskiy obtained independent of A. L. Chizhevskiy ~~the~~ results, similar ~~on~~ to those, ~~about~~ which ~~it was~~ home already described. In lead chamber the tails in tadpoles increased considerably faster than under normal conditions, ~~on~~ in freedom. The colonies of microbes under screen grew, it was amplified the pigmentation of bacterium-saprophytes. P. M. Nagorskiy, just as A. L. Chizhevskiy, drew the conclusion that even ~~the~~ partial limitation of the inflow of solar or cosmic radiation amplifies the vital activity of microbes and ~~simplest~~ Protozoa. In other words, that the ~~space living~~ cosmic conditions on the Earth for them hardly ever optimum.

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But if this ~~probably~~ were true, then it means medicine could find and reproduce on the Earth in biosphere ~~and the changed~~ altered and unusual for us space conditions, ~~also~~ and with their aid to accelerate, let us say, the

healing of wounds.

His doubts, dreams, searches, and experiments P. M. Nagorskiy removed to the ~~law court~~ judgement of the associates. "Professor physicist Sokolov and professor of astronomy Gorachev they aided me to create the drawings of the biotrons, required for this work," recalls in a letter Peter Mikhaylovich Nagorskiy -. But, unfortunately as early as in 1930 with the ~~first my appearance in regard to this~~ with my first presentation on this subject opponents Holberg, Peyzner, Toroptseva and others groundlessly call~~ed~~ named the most obvious facts "empty fabrications". I assumed that my opponents ~~led~~ had not the ~~evil~~ ill will, but simply lack of understanding, and therefore I ~~left after~~ went for support ~~reinforcement~~ ~~in~~to Moscow to biophysicist academician Peter Petrovich Lazarev. ~~It~~ He willingly became acquainted with the abstract of my work and proposed ~~to visit it after~~ that I come to him in two days, but the abstract ~~it~~ he kept.

When I ~~was to it, it~~ returned to him, instead of ~~advising~~ a consultation, he seated me ~~into~~ an automobile and ~~it brought into~~ drove to the spacious, ~~set by the books the~~ book-lined working office of the scientist, with whom I was not ~~sign~~ acquainted. ~~Master~~ The latter accepted us very affabley, attentively listened, ~~found~~ ascertained that I stand ~~in accurate~~ was on the ~~way~~ right track and persistently ~~it~~ recommended to continue work. "It can lead to great discovery/openings" ! - said he. This person literally stupefied me with his great knowledge, the his latitude of view. I left ~~from it by the clear~~ with bright and winged large hopes.

- who ~~it~~ he? - asked I in Lazarev.

- yes this Vladimir Ivanovich Vernadskiy, ~~followed~~ came by answer/response.

Only then I learned, who gave me in this relatively small time, so much" [1].

FOOTNOTE [1] From letter of P. M. Nagorskiy to Yu. G. Shishina (1965).
END FOOTNOTE

What was obtained finally from these experiments? The ~~a~~uthoritative board, which consisted of the serious scientists noted: "under conditions of lead chamber P. M. Nagorskiy observed the intensification of regeneration in tadpoles, the intensification of ~~the~~ pigmentation of bacterium-saprophytes, the acceleration of the healing of wounds, an increase in the virulence of the rod of Grigoryev-Shig (exciter of dysentery). But in connection with the fact that the chamber does not have measurement-~~supervisory~~ and monitoring equipment, ~~it~~ we cannot ~~be said~~ say, ~~because of what~~ why occurred ~~note by~~ the

~~author of change~~ Changes noted by the author.

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Board recommends to docent P. M. Nagorskiy mission in Pulkovo for a consultation with B. M. Rubashev et al. regarding improvement of chamber" [1].

FOOTNOTE [1] Ibid. END FOOTNOTE

Nagorskiy fulfilled the wishes of board. He ~~It~~ discussed possibility to improve work with many well-known scholars. They all approvingly answered ~~about~~ Responded to the direction of the investigations: the astrophysicists V. A. Krat and biochemist S. Ye. Severin, biophysicist G. M. Frank and many others. "In spite of this," with bitterness ~~consists~~ concludes P. M. Nagorskiy, "I ~~so and it~~ nevertheless could not continue my experiments. Tomsk Medical Institute refused to help me. And so much could have been accomplished if ~~But as much could already be made~~, ~~it~~ Tomsk opponents ~~did not find possible~~ had not been able to call/~~name~~ ~~the~~ established/~~installed~~ and reliable facts "my empty fabrications". Previous ~~already mine by~~ obtained information ~~the~~ medicine ~~of the information about~~ determined by organism in many respects are created on the basis of idealistic representations. Concepts They frequently reduce the concept of "environment" to temperature, humidity,

pressure.... But this not thus.

Are necessary ~~the~~ experiments, which would reveal/detect/expose all complex ~~communication~~/connections of living organism with external world" [2].

FOOTNOTE [2] Ibid. END FOOTNOTE

In the photographs, ~~conducted~~ taken many years ago by P. M. Nagorskiy in the course of experiments, ~~is~~ way observable the surprising result of the first biospace investigations, which now is of scientific interest! ~~If~~ whereas 40-50 years ago the question concerning ~~communication~~/connection between the microorganisms and the sun seemed to many ~~that which was torn from~~ abstract practice, and purely theoretical, ~~but now~~ now ~~this~~ it is the problem of the day. When man is prepared for flight into Cosmos, where a living being at each step/~~pitch~~ ~~are~~ must be on ~~the~~ watch guard for unforeseen dangers, it is first of all necessary to explain, ~~in~~ to what extent ~~measure~~ does shield astronaut from the penetrating emission/radiation the armor of spacecraft, under which conditions ~~it~~ he can emerge from the ship, etc? ~~To answer~~ helpful in answering all these questions ~~help~~ are experiments on unicellular and multicellular living organisms.

In 1960 the collective of the Soviet scientists, led by N. N. Zhukov ~~Jukovym~~-Varejniko, studied ~~the~~ complex of ~~works,~~ studies connected with preparation for the space flight of the "microastronauts" - living microorganisms.

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Before sending them into kosmos, ~~them~~ they subjected them to ~~the~~ preliminary tests: they ~~shought~~ shook them on vibration tables, they irradiated them in order to explain the degree of the effect on ~~of the~~ bacteria of ~~those~~ physical effects, which ~~they will be met~~ are encountered in kosmos. These experiments establish/~~installed~~ that the sensitivity of bacterial ~~cage~~/cells to ~~the~~ penetrating emission/radiation varies ~~between~~ over very wide limits: from ~~the~~ tenths of a roentgen to tens of thousand of roentgen. From microorganisms ~~with wish~~ when desired it is possible to create whole living measuring system - the scale, which more precise than any instrument will record variations at radiation doses.

Indirectly experiments on the microastronauts confirmed conclusions of A. L. Chizhevskiy and P. M. Nagorskiy. - Microorganisms are so/~~such~~ sensitive, that, even ~~being~~ on the Earth, they ~~there is also~~ no doubt ~~answer the~~ respond to fluctuations ~~of~~ in space conditions, perceive all hues of "solar weather". These experiments were carried out half a century ~~back~~/ago. But it would be all the

same wrong to lose them in the flow of later discovery/~~openings~~s and to ~~betray~~ lose to oblivion those modest investigations, which marked the ~~quite~~ very beginning of space biology.

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Living clouds.

The member of VASKhNIL (All-Union Academy of Agricultural Sciences im. V. I. Lenin) entomologist Nicholas Sergeyevich Shcherbinovskiy loved and knew the east ~~not worse, but~~ at least as well and perhaps ~~it is~~ better than many specialist-orientalists. ~~It freely managed~~ He was fluent in several eastern languages, he spoke and he wrote in ~~Pharsi~~ Pharsi [Farsi] a quatrain, ~~exposed/persistent~~ couched in the ~~better~~/best canons of classical eastern poetry.

Asia was for ~~it~~ he/his the "native ~~house~~" home. ~~It it very~~ He loved and knew it very much, because more than thirty ~~summer~~/years of life ~~it~~ he dedicated to research on the most evil and dangerous ~~wrecker~~ destroyer - locust, for which ~~the~~ his associates ~~into~~ so joke called Shcherbinovskiy the "king of locust".

~~Beginning~~ The to N. S. Shcherbinovskiy's scientific work ~~placed the~~ was an extraordinary accident, which ~~played~~ occured on 4 May, 1929, in the region of

Kushki - the ~~quite~~ extreme south point of the Soviet boundary. ~~During~~ On this day unexpectedly ~~sky~~ the sky ~~shut the~~ was covered by dark clouds of many kilometers. They were born from Afghanistan at a high speed, eclipsing the sun and entire horizon~~level~~.

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N. S. Shcherbinovskiy (1950's)

When clouds approached ~~themselves, of them began to pour the~~ it began to "rain" of large yellow, long-legged insects. The unexpected "invaders" ~~non~~quickly ~~lingering~~ attacked fields and gardens, eliminating by their powerful jaws entire vegetation. Sowings and trees perished after several hours. The deposited insects ~~skipred,~~ jumped crawled up ~~to~~ trees, the walls of houses, ~~to~~ each other. Females infected the soils with eggs for ~~by~~ ~~to~~ thousands of hectares around. This was the invasion of locust.

The Alarming cry "locust" ! since olden times throws ~~downplunge~~ people into ~~the~~ horror: "And here moved mighty army. It can cover entire earth/~~ground~~ and devour everything that there is on the Earth. When it ~~is~~ ~~dug in~~ takes off, grows dim the sun and star; they lose their shine ~~its flare~~. ~~In it~~ It has the head of lion, the neck of bull, the breast of horse, the wings of eagle, the belly of scorpion, thigh of camel, the head of ostrich, the tail of snake", so is described the locust in ancient Arab manuscript. Similar to the ~~flash/bursts~~ outbreaks of epidemic the ~~coatings~~ hordes of locust since ancient times bore the character of authentic spontaneous/elemental catastrophes.

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From Argentina to Canada, from Australia to Mongolia, from China

to Portugal periodically spread impinging unexpectedly from the unknown distances ~~of the~~ hordes of the different types of this insect. The enormous flocks of locust suddenly ~~were omitted to the there is~~ descended on the area ~~no time~~ magnificent oases of Egypt and Palestine, after which from date palms and green ~~sowings~~ plants on the Earth remained only the gnawed shafts and stems. The efflorescent valleys of the Nile and Tigris, the Ephrates and Indus locust periodically converted into lifeless deserts. Flying hundred of kilometers above fields and seas African locust periodically it invaded ~~into~~ Russia.

Of ten thousand different contemporary forms of locust insects - the earliest inhabitants of the Earth, the impressions of ancestors of which ~~find~~ have been found in the clay ~~partings~~ strata of coal, ~~which were being~~ formed more than 250 million years ago, only 481 forms is encountered within the limits of our country. ~~From~~ Of the locusts are especially dangerous so-called gregarious forms, whose larvas form enormous accumulations - swarms, and the winged individuals form innumerable flocks.

Voracious swarms by "~~foot course~~" on foot ~~are moved~~ move from place to place ~~by~~ in multimillion masses, and ~~after inspiring~~ taking wing, ~~leave into~~ embark on hyperdistant flights ~~passages~~, sometimes more than two thousand kilometers. The gregarious locusts include the Asian migratory locust, that is encountered in the Soviet Union as well as the desert locust, the native of Asia and Africa, who flew in 1929 ~~against~~ to Kushku. ~~Thus far~~ Before this

coaling the flight Soviet scientists about African locust knew only by hearsay, on the dried museum specimens/samples and information made of from foreign scientific literature. In Russia was known another gregarious form of locust - Asian. Asian locust since olden times nested in cane brushwood — the fluxes marshes, bordering Balkhash and other lakes of Kazakhstan, in the lower reaches of the river of Syr-Dar'ya, Amu-Dar'ya, in the coast of Aral sea, in the swampy mouths of the Volga, Terek, Kuban and the lower reaches of the river Manycha.

Its life is connected with the reed - the favorite food of larvas and adult locust. But with the deficiency of forage locust does not shun and by the straw roofs of rural cottages, even by the dried clothes drying on cords linen clothes line. When fluxes marshes are inundated by it poured powerful flood, locust was held stayed on during islands and elevations.

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Into arid years the fluxes marshes were converted into the efflorescent meadows and before insects it was open/disclosed the possibility or were able to reproduce abundantly and resettle abundant multiplication and settling. Sometimes locust came out to fields and, having only destroyed thousands of hectares of sowings plants, again returned to the native places.

The mass multiplication of Asian locust in tsarist Russia was

considered phenomenon usual. Its hungry armies flew so far even to Kazan and Tula, the lichen of the peasants of the last/latter piece of bread. In 1859 only in four provinces of south Russia the locust destroyed grain crops to a million of rubles. This is how describes eyewitness one of the coatings of locust to station to the Makar'yevku of Kharkov province in 1880: "First August from locust literally faded the sun and they came twilight. The powerful hiss of the specially open steam-locomotive whistle forced it somewhat to stand aside, but it all the same was dropomitted to the earth and covered with itself the space of dessiatines into five hundred, by layer to fourth. Its mass was so was great and dense, that where it was necessary it to cross by crew, horse with difficulty they conveyed accurately on large deep contamination. Almost the same occurred in village Meadow. The vicinities of village, village itself, all living creatures in it appeared in the pitch-dark dark. Were not possibilities to see, where who was located and that it made. Population soon it realized, that arrived the new misfortune and necessary to save as and how it hil, the scanty harvest of rich in the calamities of 1880. Into one instant was formed the militia, in which took part horse, and foot, old and small, with weapon like bells, spits, basins, cast iron, in a word, entire metallic, that published noise and sound. It did not manage without shooting. Breakage lasted until night itself ...".

But by such primitive methods as ~~clapper~~ clapping, by ~~the besoms~~ broom and the ~~buzzing~~ Swarming of insects, by the digging of ~~multi~~ many-verst furrows, to attempt to conquer locust, of course, was thoughtless.

The ~~last~~/~~latter~~ most terrible ~~flash/burst~~ outbreak of the multiplication of Asian locust, which took Kuban, Stavropol'ye, Lower Povolzh'ye, occurred in 1921. If locust ~~was~~ had not then ~~here was~~ been destroyed, then it ~~into one~~ would in one sitting have appearance ~~it would~~ destroy of 96 million t of green forage.

The first in the world extensive work on the destruction of Asian locust with the aid of aviation were ~~expand~~/developed in 1925 in our country. Poisons were ~~sputtered~~ sprayed above the ~~impervious~~/impassable swampy ~~fluxes~~ marshes of the river Kum'.

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~~More complexly it render/showed to manage~~ It was more difficult to cope with the African desert locust, that arrived flying from Indian, Arabian and African deserts.

The Soviet scientists clashed for the first time with it in Kushke/a in 1929. It was assumed earlier that the locust dwells in Africa, partly in India and that its constant foci are found in south Iran. When the ~~flash~~/burst outbreak of the mass multiplication of locust did encompass ten ~~states~~ countries, it turned out that the scientists plainly ~~do~~ did

not know even, where ~~she~~ it constantly does dwell, how ~~much~~ many it does give generations per annum, why does appear the spontaneous/elemental dispersion/~~divergence~~ of its flocks? The intrusion of the "sharp-toothed army" of locusts into the Soviet Union in 1929 (it ~~achieved~~ reached Aral Sea and the thresholds of Fergana valley, after ~~infecting~~ striking one and one-half million ~~of the~~ hectares of the earth/~~ground~~) required deeper research on this form of locust.

~~Went~~ At that time ~~the~~ Soviet specialists went to ~~in~~ Iran, whence began locust invasions. ~~In the number of~~ Among the scientists was young Soviet entomologist Nicholas Sergeyevich Shcherbinovskiy. ~~Then~~ At that time the scientist ~~did not think~~ never dreamed that (subsequently for him it would be ~~is~~ necessary to dedicate to the locust ~~of~~ decades of life, to travel all over ~~in~~ on camels and ~~machines~~ cars thousand of kilometers in the deserts of Iran, India, Arabia, Iraq, Pakistan and the countries of South America.

The Soviet researchers first of all ~~placed~~ posed before themselves number of questions. Whence and why did occur the intrusion of the flocks of locust to the territory of the Soviet Union? Can locust be based in south Turkmenia and for a long time? Is it possible to await the repetition of ~~its coatings~~ the attacks? Where it generally does dwell? How many generations are developed in it during one year? ~~Which reasons~~ what factors are ~~responsible for~~ to produce its mass multiplication and the dispersion/~~divergences~~ of flocks ~~to~~ thousands of kilometers to north?

English entomologists asserted that the locust in Iran was not migratory, but constantly dwells and multiplies in south provinces and in Kermanskikh deserts. N. S. Shcherbinovskiy expressed entirely another opinion. According to him in Iran there are no constant foci of the inhabiting ~~of~~ locusts - this is a typical tropical insect. In the years of the mass ~~flash/bursts~~ outbreaks there can be located only ~~time~~/temporary the active foci of its multiplication.

~~The~~ A checking of on the spot showed that in Iran ~~really~~/actually there are no foci of the constant inhabiting ~~of~~ locust. This country serves for it only as ~~time~~/temporary refuge in spring. The flocks, which ~~inspired~~ took wing from March until May in the western provinces of Iran, fly away in May-June to the east, into India, into the zone of precipitation of summer monsoon rain.

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N. S. Shcher~~[redacted]~~binovskiy was absolutely right ~~render/showed completely rights.~~ Desert Dzhaz-Murian erroneously was called the place of the constant inhabiting of locust. Furthermore, Shcherbinovskiy noticed ~~the~~ a most important fact. ~~It~~ He focused attention on the fact that ~~grandiose~~ great "crusades" of locust occur periodically, after definite intervals of

time.

Occurence of cycles in the multiplication of locust exists, of course, from immemorial times, but, however it is strange, that this earlier was not noted. But meanwhile, for example in XIX century, locust outbreaks there were exactly nine. And in our century already we have counted six outbreaks: into 1900-1904, 1912-1916, 1926-1931, 1940-1944, 1950-1958. In 1958 were begun the sixth, that was being amplified yearly, including 1962, when locust "filled up" according to of N. S. Shcherbinovskiy, Iran and Afghanistan, having slightly touched South Turkmenia.

In XX century, as in past centuries, these outbreaks are distinguished by surprising regularity. The invasions of locusts are repeated on the average of every eleven years. And it is precisely at such intervals that are repeated in south deserts the years with abundant rain. And this in turn, is connected with cyclic variations in the activity of the sun.

After comparing the life cycles of the African locust with the periodic activity of the sun, N. S. Shcherbinovskiy established that in the reproduction of the desert locust there also occurs the sufficiently strict occurence of cycles. Each reproductive proliferation cycle of the multiplication of locust covers on the average 10-13 years.

The maximum of the ~~multiplication~~ repro-d/proliferation of locusts comes, as a rule, ~~to~~ on the fourth - ~~the~~ sixth year after the beginning of cycle of solar activity, ~~then flash~~ after which the/burst ~~goes out.~~ dies down Gradually is reduced the territory, colonized by flocks, ~~fade~~ the ~~time~~/temporary foci of multiplication, fade out disappears gregarious form. Somewhere only glimmer ~~the~~ small, scattered foci ~~from~~ of separate insects. ~~The~~ Gradually the biological activity of insects again ~~grow~~/rises. Foci are converted into ~~flocks~~ hordes. Abundant small ~~herds~~ flocks and ~~flocks~~ hords begin to plot/deposit the masses of the ~~money boxes~~ [eggs?], from which appear the larvas of already typical gregarious form. In locust occurs sharp uplift ~~of~~ in vital curve.

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Finally, the formed enormous, voracious, impetuous flocks, which reach weight ~~in~~ of tens of millions of tons they fly ~~so far~~ to the northern limits of the ~~time~~/temporary multiplication of locust in Asia or Europe, to zone of the equatorial forest/~~scaffolding~~ in Africa and southeasterly India. There locust multiply cannot, natural conditions do not correspond to its necessities. Cycle concludes with specific quantitative depression. Its duration it is approximately three - five ~~summer~~/years. Then begins new wave....

N. S. Shcherbinovskiy wrote that in a deep antiquity, for centuries prior to the beginning of our chronology, in the Chinese, Mongolian and Tursk peoples, who populated steppes and deserts of Eastern Asia, there was a 12-~~sum~~year cycle of chronology. ~~Its~~ Each of its years was called one animal or the other: the year of cow, horse, ram, panther, hare, even mouse. Therefore the historians and the ethnographers correctly consider that the cycle of "mushel'" must have the material basis, connected with economics and mode of life of the ancient nomads, ~~which~~ who passed o~~ver~~ from ~~the~~ a hunting structure of life to nomad cattle breeding. Cattle was the basis of the existence of these peoples, pasture - immense and inexhaustible. ~~Mode~~/conditions of weather, ~~a quantity~~ the amount of winter and summer precipitation and temperature were extremely unstable. At times hot droughts were burned out from the early spring of grass and ~~it~~ there began "~~[illegible]~~" - ~~the~~ a "dzhut" a mass case of ~~the being~~ famished animals. Centuries ~~back~~/ago nomads established that especially powerful ~~jutes~~ "dzhute", were repeated ~~each of~~ every 11-12 ~~summer~~/years. Hence conceived itself the idea of/an animal calendar cycle. The most severe year was considered ~~(~~the "koyan" - the year of hare. Especially disastrous were the koyan~~X~~s" ~~through~~ every ~~each of~~ 36 ~~summer~~/years. (Recall ~~about~~ the 36-summer cycle of solar activity). People called them "ul'kun-dzhut". In such years ~~disastrous~~ 60o/o of horses, the half of the live-stock of sheep,

97o/o of goats, 50o/o of camels perished. Almost half died out of many camps of nomads. And since during "ul'kun-dzhut" in steppes died out ~~saygaki~~ saigas, kulans (wild donkeys), Gasella subgutturosa, argalis, bustards, partridges, pheasants, the foxes and other representatives of animal kingdom, the starving population began to catch ~~trap~~ with hands fish in the shalloved steppe lakes. Perhaps this is the reason that ~~Not therefore whether~~ one of the years of mushelya is called "ryba" (fish)? ...A century agc nomads knew how to foresee heavy "~~koya-~~ny" ("koyaus") and disastrous "ul'kun-dzhuts". But contemporary science proves to be still ~~is~~ powerless to foresee the possibility of the mass multiplications of locusts, water rat, ~~granular~~ rustic shoulder-knot moth scoops, shield bug.

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Meanwhile the expedition of the Western-Siberian branch of the Academy of Sciences of the USSR they established that the multiplication of these wreckers in Barabinskaya steppe has marked ~~ccedrence of cycles~~ cyclical nature" [1].

FCOTNOTE [1] From a report by N. S. Shchbinovskiy at the All-Union conference on the problem of solar activity (1964). END FOOTNOTE

The tasks of science are reduced at present ~~in order~~ to ~~previously foresee~~ predicting, when can be begun the new multiplication of locusts and other insects in their native foci.

Thus, it proves to be that the occurence of cycles exists not only in the multiplication of locust. To similar cycles of specific depression and violent multiplications are also subject~~ed~~ other insects. In the cotton belt/zone of the USA, for example, spontaneously multiply sheet the bollworm of Alabama ~~through~~ by the time every 22 years eliminated destroying ~~sowings~~ crops in many states, since ~~to time~~ of its new mass invasion if had been usually ~~they~~ forgotten.

But in the beginning of the 50's of our century American entomologists, ~~being~~ based on timely forecast~~predictions~~, met the next takeoff of multiplication ~~scoops~~ boll weevils fully armed with chemical agents. Harvest was rescued. ~~So~~ Thus the biologists ~~knew how~~ were able to predict ~~after~~ several ~~summer~~/years ~~forward~~ ahead the next ~~flash~~/burst.

The Soviet entomologist P. I. Marikovskiy, whose thoughtful observations and stories about insects are well known to many naturalists, ~~it~~ established that in the steppes of Kazakhstan and Western Siberia the toxic spider-karakurta [Kirghizian 'black death' spider] multiply periodically. Minor cycles in this case ~~are~~ alternated with large twenty-five year ~~old~~ cycles. The occurence of cycles ~~of~~ in life "vital curve", apparently, exists in

other insects.

Entomologists in their ~~region~~ field of science irrefutably demonstrated that precisely the sun - ~~that~~ to the "general", who ~~conducts~~ leads into attack ~~to~~ fields locust hordes, that the flash/bursts of the multiplication of the locust and other insects - ~~these~~ one these "biological protuberances" as ~~call/named their~~ called them N. S. Shcherbinovskiy, actually, ~~they~~ reflect in the terrestrial life of ~~the flash~~/bursts of solar activity. The sun, apparently, affects also number more ~~complicated~~ complex organized living beings.

The epidemics, about which we spoke in the preceding/~~previous~~ chapters, now became history. As ~~concerns~~ for locust, ~~then~~ locust raids are not only the matter of the distant past.

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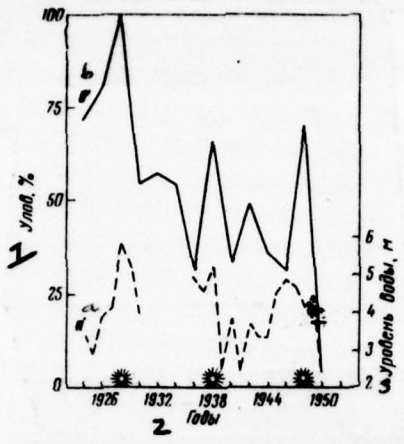

Dependence of the level of water in Amur and of catch of ~~humpback~~ salmon from the dynamics of solar activity (according to I. B. Birman).

a) the highest water level in Amur of Khabarovsk during August;

b) the catches of humpback salmon in percentages (to the catch of 1928).

Key:
1. Catch. o/o. 2. Years. 3. Water level, m.

This riddle ~~with~~ by scientists still one must be solve ~~the~~ Ah understanding of the law governing the appearance of locust catastrophes, as can be seen from N. A. Shcherbinovskiy's works, apparently, will be aided by research on the periodically changing activity of the sun.

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Reaction F.

In our time physician does not visualize work without X-ray apparatus or clinical laboratory. Acquaintance with patient begins often from ~~his direction in~~ with analyses, ~~because~~ since any, even insignificant, deviations in the vital activity of organism first of all are reflected as in mirror, in ~~its~~ his blood.

An increase in the quantity of leukocytes - white blood corpuscle/bodies - immediately prompts thought about fester, about inflammatory process. An ~~incidence~~/drop in hemoglobin. a decrease in the number of erythrocytes (red blood ~~ball~~/corpuscles ~~spheres~~) - signals ~~about~~ the beginning of anemia. A change in the ~~settling~~ sedimentation velocity of erythrocytes, an increase in ESR [РОЭ - erythrocyte sedimentation test], frequently proves to be the almost only identification mark, which forces ~~wiser by the experiment~~ experienced of therapeutist to suspect the growth of a malignant ailment in a seemingly ~~to form~~ healthy person.

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Professor Maki Takata.

The blood of the different types of animals and man differs in terms of constancy, not only in the relation to the norms of the content of regular cell regular/prescribed cell/elements, but also in composition of simple and complex chemical substances. The level of sugar in the blood is the direct index of the state of the pancreas, and an increase in the cholesterol is a sign/criterion of arteriosclerosis. Early diagnostics, timely beginning, and therefore, and also the success of treatment in many respects depend on the skill to end to exhaust the riches of the diagnostic palette of the blood, which are concealed in it extreme great diagnostic possibilities.

The Physicians/, the hematologists say that the blood can describe the illness/sickness/diseases, the tastes, the habits, the age and the past of man more than patient himself, if we only necessary to know how to read analysis.

This art has been completely mastered by the professor at Tokyo university Maki Takata, whose name it is long known to the hematologists of entire world. This scientist was made famous Glorified scientist opened by it in 1935 by an ingenious diagnostic reaction of the blood, discovered by him in 1935 which was through several summer/years Standard customary in all world.

Using simple chemical reagents, Takata ~~it~~ learned to find the quantitative indices of the process of the flocculation (subsidence) of the proteins of the blood - albumins, and with the aid of this reaction to determine the stage of the development of the ovarial cycle in woman. Albumins are present in the blood in the form of colloid. In test tube they fall out into flakes, "flocculate"; therefore the newly ~~open~~ discovered reaction Takata ~~it~~ call/~~named~~ ed reaction F. Since reaction F depends on the activity of ovaries, even in healthy woman it gives ~~in~~ at different times different indices. In man these indices are much more constant.

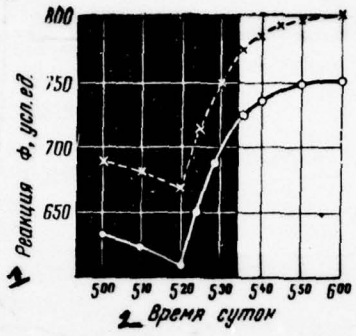
The organic colloids of the blood - formation ~~/educati~~ are on/which are unstable. They are destroyed even from ~~weak~~ slight physical effects, and reaction F belongs therefore to the complex, sensitive tests, which require most severe satisfaction of stable experimental conditions. Before daring to recommend this fine/thin such a precise reaction for ~~the~~ mass medical practice, ~~pedantic~~ Takata and scrupulous in scientific work ~~Naki Takata~~ decided to preliminarily verify, ~~as will~~ how is influence of the course of reaction F/ has different effects.

In 1936 the scientist ~~of beginnings~~ began to daily conduct research of the blood for the reaction ~~of~~ F. Donors in experiments ~~agreed to be~~ were volunteers

among his
the nearest associates and the colleagues. Among them the doctor Hatashita. No one could foresee then, that Hatashita in voluntary donor's role it is necessary ~~to~~ would remain not a day ~~and not~~ or month, but ~~whole~~ nineteen ~~summer~~ whole years! "Without ~~its~~ his selflessness, ~~it speaks~~ now
soup
Maki Takata, I would not know how to bring ~~its~~ my research to successful result".

What did occur? Why ~~thus~~ did ~~tighten itself~~ the checking of one diagnostic reaction of the blood? But happened unforeseen! During take so long?
January 1938 with the reaction of flocculation ~~were~~ was connected ~~the~~ a strange incident: suddenly, without ~~the~~ any visible reasons it began to ~~grow~~/rise in the completely healthy men. Mass asymptomatic epidemic
there was and no
in Japan? Reliable basis/~~bases~~ for such suspicions ~~were not~~, and Takata ~~it~~ was lost in guesses.... But meanwhile the blood serum of the men behaved in laboratory in the manner that earlier behaved ~~the~~ only serum of the female blood.

Changes in the blood never are causeless, already in this Maki Takata ~~it~~ was confident. But if reason lies not in the organism itself, then it means that is it outside it. Somewhere in the environment?



Dependence of reaction F on rise and sunset, i.e., on the position of the Earth relative to the sun (per Takata).

Key:
1. Reaction F, conv. units. 2. Time of day.

And Takata began ~~the~~ searches for the mysterious reason, which suddenly destroyed the ~~quiet run~~ smooth course of reaction F. Beginning ~~from~~ on May 1938 ~~it~~ he in Tokyo, and its colleague Muratsugi in the city of Kobe several times during day, beginning with sunrise ~~placed~~ Raw the reaction F (they followed ~~those~~ how test and), ~~as~~ it changes during entire day.

It is easy to say "external reason". But (~~as it~~ is it easy) to find? From what to begin searches? Finally ~~to~~ the organism can (be influenced ~~by~~ of a) everything ~~anything~~: ~~fever~~ heat, ~~the~~ cold, rain, ~~the~~ illumination, ~~the~~ elevated pressure of atmosphere and so forth, not to mention changes in the mood, agitations, etc. Any disturbance/~~breakdowns~~ in the course of experiment also can change the final readings.

It was necessary somehow to narrow (~~a~~ down the) quantity of the possible reasons, to exclude immediately from suspicions everything, ~~that~~ possible be ~~managed~~. Maki Takata developed ~~the~~ a plan/~~layout~~ for experimentation. The blood is taken daily ~~at~~ at the same hours. The donor and the laboratory assistant, which takes the blood, electrically are insulated from the Earth by glass or porcelain insulators (these conditions it had to be observe~~d~~ and by the ~~experimenters~~ themselves).

For ~~checking~~ a control the blood ~~took~~ was taken on the Earth, underground and,

finally, above the Earth: in laboratory, in pressure chamber, in shaft/mine, on aircraft.

When after a lapse of the half a year Takata and Muratsugi compared ~~its~~ readings, to their mutual surprise, the curves of the course of reaction ~~f~~ in different cities simultaneously they turned out to be similar ! First, reaction ~~f~~ had well ~~expressed~~ defined daily variation. For 6-8 minutes to sunrise it suddenly increased approximately by 20o/o !

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(We are speaking about the astronomically calculated ~~torque~~/moment of sunrise, and even if the eastern part of the horizon/~~level~~ is ~~enclosed~~ covered, for example, by mountains, due to which the sun shows only ~~in the~~ an hour after its rise above the ~~geometrical~~ mathematical horizon, then matter is not changed). During day the reaction ~~f~~ continued to ~~grow~~/rise, but soon after sunset it gradually decelerated. The daily variation of reaction ~~f~~ did not depend on ~~that~~ whether man was located ~~man~~ on street or within stone house, ~~did pass~~ whether there was a thunderstorm or ~~it stood~~ fog.

Uplift ~~on~~ Ascent in aircraft increased reaction ~~f~~ with an increase in the height, at which is taken the blood. Takata ~~solved~~ decided, that here manifests itself not the action of the ~~lowered~~/reduced atmospheric

pressure, but the effect of the sun, since in pressure chamber decompression did not produce change in the reaction f.

During solar eclipses both full/total/complete and partial, decreased the reaction f. In this case the blood almost instantly reacted to eclipse, to changes in the intensity of flow of solar radiation.

The passage of the large groups of the sunspots ~~through~~ over the central meridian of the sun almost always was accompanied by ~~of~~ an uplift in reaction f.

Thus, again the culprit of the biological disturbance/~~breakdowns~~ in the human organism this time ~~render/showed~~ was the sun !

Changes ~~of~~ in the reaction f with sun rise and sunset, and also depending on geographic latitude indicated that the effect on blood flows directly from the sun.

Repeated experiments ever more fastened confidence of Maki Takata in the fact that the blood reacts ~~on~~ to the sun uncommonly sensitively. "It feels" not only ~~flash~~/bursts, explosions, appearance on its surface of new spots, the passage of the spots through the central meridian, but immediately ~~answers~~ responds in its own way even ~~on~~ to each appearance and

the disappearance of heavenly body.

Which part of the solar spectrum is bioactive? - asked itself wondered the scientist. The blood is "perceived" the presence of the sun even when its world/light did not reach into laboratory. Penetrating emission/radiations? - In the conventional opinion, them blocks there are blocked by atmosphere. Corpuscular radiation? - It is scattered and is lost to the atmosphere. Radiowaves?...

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In order not to guess to infinity, in what here matter what was behind this, professor Takata started the new study of reaction a. He began to check, as affects how its course separately world/light is affected by individually by, the ultraviolet rays, the radio waves, and also soft and hard x-rays with wavelength from 0.1 to 0.07 Angstrom, gamma-rays and neutrons. to

This is how it itself he himself formulates conclusions from its his almost twenty-year old investigations in letter to the authors of this book: "We investigated the "reviving radiation" of the sun for 19 summer/years every day. There are no doubts, that this radiation satisfies all requirements in order to be that which was described as newly open discovered effect of solar radiation. the

There are no doubts, that solar radiation contains ~~the~~ a new component, characterized by the powerful penetrating power and the powerful ionizing effect on human body, i.e., by ~~the~~ an expressed biological effect.

All living on the Earth people without exception/~~elimination~~ are subjected to the influence of this form of radiation, ~~by~~ the source of which ~~are~~ is the sun. This radiation cannot be revealed by purely physical methods. It ~~is~~ can be is possible to measure only with the aid of reaction in blood serum.

By the ~~way of~~ the irradiation of man by this form of radiation - the "fourth form of solar radiations" - occurs ~~the~~ a noticeable "vital ionization", which can be measured by reaction ~~f~~. Measurement of this vital ionization became possible with the aid of the irradiation of body by ~~rigid~~ hard x-ray/beams (X-rays), by gamma-rays, neutrons, even neutrino from atomic reactor. Therefore it was so~~lved~~ decided, that the nature of this mysterious emission/radiation must be similar to the neutrino emission/radiation of the active sun ... ! ~~The~~ Man actually is (living sundials". As peculiar scientific commentary to conclusions of Takata ~~served~~ (was provided by) the investigation of another hematologist - Soviet physician N. A. Shul'ts. Independent of Takata, Shul'ts arrived at very similar conclusions.

In the physicians as has already been spoken, it is customary to assume that the blood was constant by its cell composition. The norms of the content of cell cell/elements in the cubic millimeter of the blood for a convenience even print out on the laboratory forms. Deviation from these norms is estimated as the alarming symptom of the appearance of some disease.

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This is what wrote in journal "laboratory matter" N. A. Shul'ts in 1960: "Recently on the pages of journals increasingly more frequently is noted the discontinuity/interruption between the taken normal indices of the blood and observational data. Changes in the picture of the blood in essence concern the cage/cells of a white series, absolute number and the percentage of their forms. Unfortunately, special research on this phenomenon is conducted altogether only for the extent/elongation several dozen plumb bob. On data, that relate toward the end the XIX, centuries, one leukocyte came in norm on 350-500 erythrocytes. Since a quantity of latter in healthy man was 5000000, the norm of a quantity of leukocytes were considered 8 000 - 12 000. Through twenty summer/years this numeral decreased to 6000-10 000. Before the Second World War norm were considered 6 000-8000, and now we frequently encounter completely healthy persons from 4 000 and even 2 000 leukocytes" [1].

[Laboratory Science]

FOOTNOTE 1 N. A. Shul'ts. Laboratornoye delo, No. 2, 1960. END FOOTNOTE

What is the reason for such unexpected shifts? In order to explain it, N. A. Shul'ts, who lives and who works in Sochi, for the extent of several years daily took the blood analyses of the blood of the "basic" inhabitants of city. In the period of the maximum of solar activity in 1957 the content of the leukocytes of the blood in different people began to decrease. N. A. Schulz gathered and processed 300 thous. analyses of the blood of different persons, carried out in the laboratories, which were frequently located at a distance of thousands of kilometers one from another.

After generalizing data of several countries (USSR, Italy, France, Belgium, England, etc.), N. A. Shul'ts reveal of that an increase in the number of chromospheric flares on the sun and the appearance of violent protuberances almost everywhere lead to a characteristic change in the picture of the blood, to a decrease in the leukocytes with a simultaneous increase in the content of lymphocytes. In the period of solar ejections the state of the blood

(very distantly ~~reminds~~ is reminiscent of that, that is observed after radioactive or nuclear irradiation. The degree of these changes is dissimilar in ~~the~~ blood of people and animals in different geographic latitudes. With approach/~~approximation~~ to poles it is ~~brighter~~ sharper, i.e., the blood more powerfully reacts to an increase in the solar activity. In ~~its~~ the equatorial zones ~~completely they do not note~~ it is not observed at all. This is completely explainable: ~~than~~ the nearer to (poles, ~~facts sharper~~ the sharper and more distinct are exhibited the influences of cosmic and corpuscular radiation and magnetic perturbation[3].

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It is known that in the region of poles ("terrestrial sheathing/skin" - the atmosphere - becomes especially ~~fine~~/thin and (penetrated ~~for~~ by cosmic radiation. Most sensitive to changes in the solar radiation turned out to be precisely leukocytes, the ~~very~~ most "~~jet~~/reactive" ~~cage~~/cells of the blood. Erythrocytes, ~~as~~ which ensuring the constancy of the internal medium of organism and supply of ~~cage~~/cells, are less sensitive to perturbation on the sun.

~~Being~~ Based on the observations of N. A. Shul'ts, hematologists they decided to reexamine the existing norms of the cell composition of the blood. However, N. A. Shul'ts was opposed to this reform. He asserted that this question is ~~so~~ so complex ~~which solved it~~ that it must be ~~in~~

solved in close
~~intimate~~ collaboration with ~~the~~ geophysicists. In order to reexamine norms, would be required several ~~summer~~/years. And finally, when it would be completed, leukocytosis again would ~~crawl~~ creep either upward or downward.

N. A. Shul'ts is convinced, that the blood of healthy people is ~~subjected~~ to ~~the~~ continuous changes, which depend not only on the internal state of organism and influence of environment. In the ~~common~~/general/~~total~~ complex of the influences of environment the change ~~of~~ in ~~the~~ solar activity is indisputably capable of having a daily, hourly, even second-by-second effect on the processes, which take place in the blood and the hemopoietic organs/~~controls~~.

Weather No. 4.

On one of the populous beaches of Sochi almost ~~near~~ by the blue sea was arranged a white ~~imperceptible by sight~~ outwardly unnoticeable ~~of~~ house. Its only inhabitant is a magnetograph. The instrument, which records the fluctuations of the strength of terrestrial magnetism, arrived here recently from Pulkovo observatory. The Pulkovites acquired ~~by the~~ new, more advanced equipment, and the old magnetograph, which little ~~worked on~~ during its ~~to century~~ time, lives now out its ~~century~~ term in a health resort ~~control~~ administration.

The large part of the time it leisurely ~~inks~~ prints on the ~~driving~~ moving paper tape ~~the~~ an even line, not causing anyone any special alarms. But from time to time instead of the straight line on tape appear zigzags, which gradually increase. These signals ~~about~~ the approach/~~approximation~~ of weather No. 4.

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And although from beach reach the merry exclamations ~~resting~~ of vacationers, sea glitters by solar ghost images and the surf almost noiselessly licks the edge of shore, the physicians already know; ~~it is moved~~ a magnetic storm is moving in. All cores, hypertonics and heart patients and neurotics must immediately ~~pass~~ go to ~~the sparing mode/conditions~~ a slower pace: to obtain in advance medicines, not to be overloaded by water and solar procedures, in a word, to avoid completely probable within the next few days angiospasm.

Several years ago Sochi health resort ~~control but to~~ administration on the initiative of N. A. Schulz and N. V. Romenskiy's main therapeutist began for the first time in our country ~~beginning~~ the mass preventive maintenance ~~of~~ for vascular crises, infarctions and other aggravations, connected with solar flares. The medical service of the sun in advance ~~prevent~~/warns all sanatoriums about the solar storms, conditionally ~~named~~ called weather No. 4. After obtaining ~~prevention~~/warning, the physicians ~~previously they~~ manage to be

prepared for solar attacks. in advance.

However, the medical service of the sun arose for the first time not in the Caucasus, but in France, in the efflorescent health resort (city ~~to~~ of Nice, long before the Second World War. (It happened ~~this~~ thus.

The physicians have long already noticed one law, ~~for~~ long ~~not~~ ~~obtained the explanation~~ remained unexplained: ~~the~~ patients with acute diseases appear in office, as a rule, ~~during~~ for two-three days in a row. It was noticed also, that the assaults of severe pains, different kind of indispositions in the patients begin approximately simultaneously, regardless of the ~~fact, under which~~ conditions under which they live. When the physicians ~~passed~~ began taking into consideration ~~of~~ the ~~assaults~~ attacks of stenocardia, aggravations of the neuralgic pains and other symptoms, it was reveal~~/detect/exposed~~ed, that they are observed during two-three days and then suddenly cease for some period of time.

The same picture ~~it~~ was demonstrated to ~~the~~ physicians and ~~the~~ statistician, of sudden deaths. ~~This~~ The periodicity of diseases, aggravations and mortality had long ~~ago been~~ before has already been discussed in the scientific medical corporations of the different countries. ~~The~~ Attempts to find ~~the~~ a relationship~~/ratio~~ between unhealthy series of illness and meteorological changes: ~~by~~ temperature, ~~by the~~ fluctuations of air humidity, ~~by~~ the velocity and direction of the

wind, ~~by~~ lightning discharges - they turned out to be unsuccessful.

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These phenomena rarely ~~were coordinated~~ coincided and in no way covered the enormous number of ~~agreements~~ coincidences, which were synchronously noted on ~~the large~~ vast ~~spaces~~ expanses of the earth/~~ground~~, in the places distant from each other, where the weather was completely different. It was necessary to search for some other reason for strange "~~unhealth~~hy series" of illnesses. The case in Nice aided ~~to~~ in an approach ~~itself~~ to the explanation of riddle.

Unexpectedly in operation of urban automatic telephone exchange they began to appear breakdowns. With careful technical inspection it was not ~~im~~possible to ~~reveal~~/detect any troubles. ~~Through~~ Within a certain time the physicians focused attention on the fact that the interruptions in the work of telephone exchange systematically coincided with an increase in the cases of the aggravations of diseases in many patients.

~~The~~ A greements ~~of~~ in the disturbances in the work of electrical equipment and physiological disorders in people were so obvious that arose the assumption about ~~generation~~ that they were generated here by ~~their~~ one common/~~general/total~~ reason.

The disturbance in the work of automatic devices on telephone exchanges and in radio communication very frequently they are the result of a sharp increase in the solar activity. If interruptions in the operation of communication ~~connection~~ then so impressively ~~do~~ coincide with the aggravations of diseases, ~~it~~ does it not mean that the sun is guilty ~~in~~ for the sufferings of the patients?

To solve this question again ~~aided~~ came to aid statistics. Utilizing vast statistical materials, A. L. Chizhevskiy in a series of works ~~it~~ showed that ~~the~~ fluctuations of mortality follow more or less frequently curved spot-formation process on the sun. In the years of the maximums of solar activity on diagrams jump out ominous peaks; mortality ~~it~~ increases, In the years of the minimums - it decreases.[1]

Alas, Koz'ma Prutkov erred when he said: "Death and the Sun cannot fixedly look at each other" !

FOOTNOTE [1] A. L. Chizhevskiy also devoted his attention to the 27-day periodicity of a series of statistical data, associating them with the period of synodic rotation of the sun. Later, this dependence was confirmed. END FOOTNOTE

By the 1930's the French scientists M. Faure, G. Sardu and G.

Vallo gathered the vast material, confirming, that the passage of the spots through our the central meridian of the sun into 84o/o of cases coincides with sudden deaths, infarctions, strokes and the aggravations of the symptoms of chronic diseases. It is necessary to return proper to give these scientists, who almost during twenty their due since for summer/years, from 1922 on 1942, in a most careful manner many studied this question.

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They organized in France the "International institute on for research on solar, terrestrial and cosmic radiation" - the first in the world medical service of the sun, which sent in to many hospitals and clinics bulletins about on the state of solar surface.

The new direction of investigations found among the physicians numerous supporters. In dozens of hospitals and clinics the physicians daily recorded the course of illness/sickness/disease and aggravations in the patients, record/fixed the least deterioration: excitation and insomnia, decline of forces in strength, pain in the heart, the joints, the liver, the nodules, the pressure of the blood faintness swoon, shortness of breath, vertigoes, etc. Simultaneously in astronomical observatory on Mont Blanc and at meteorological station in Nice were conducted the daily notations of solar activity.

Information from the medical institutions ~~entered~~ was received by Doctor ~~conduct odds~~ Faure, who ~~guided~~ sent the tables, ~~communicating~~ giving data on the frequency of the cases of infarctions and strokes ~~after~~ for several ~~summer~~/years to A. L. Chizhevskiy. Somewhat previously remarkable Soviet physician- statistician P. I. Kurkin, after generalizing data on infarctions and strokes after several ~~summer~~/years, collected in our country, also ~~granted~~ gave them to ~~their~~ A. L. Chizhevskiy. Graphic comparison of the materials of P. I. Kurkin and M. Faure again confirmed that the character of the curve of solar activity and course of vascular diseases are extremely similar. In such cases of statistics ~~they~~ say: "The closeness of ~~communication~~/connection of the two empirical curves turned out to be very ~~large~~ great".

Subsequently the brothers Duell examined 200 thous. cases of death from the diseases of brain and nervous system in a series of the cities of Europe. As heliogeophysical index they selected the world result of magnetic perturbation. (Geomagnetic activity follows the basic solar disturbances). With it they collated data on mortality. As a result of the calculations of the brothers Duell again was confirmed the fact, that in the days of the passage of the sunspots ~~through~~ over the central meridian of the sun the mortality reaches maximum. Are especially sensitive to

disturbance/perturbations on the sun the vascular patients, ~~the~~ ~~cores~~ heart patient ~~sick~~ patients suffering heavy infectious diseases and ~~the~~ weakened chronics. This is understandable. Healthy viable organism is "system in equilibrium state". The stability of sick organism is much lower.

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In certain cases of small external effect ~~from without~~ it is sufficient ~~in order~~ to play during illness/sickness/disease the role of "starting gear". This is why by the or earth/~~ground~~ periodically ~~grow~~/rises the mortality.

Experiments with chemical tests in an underground grotto.

Of course, it is necessary to be specified. Mortality first of all depends on social reasons. War, poverty, hunger, anti-sanitation, exhausting work - here are the reasons for premature mortality. But illness/sickness/disease and death is phenomena not only of social, but also biological order. By investigating them, it is not possible to discount the biological reasons: influence on the human organism of environment and ~~this~~ study powerful energy factor as solar radiation. There is no doubt that the medicine of the future will focus attention on modest, ~~on the~~ but convincing curves/~~graphs~~, constructed by the specialists, who studied the "Sun-Earth" interconnection.

For the extent/~~elongation~~ of last/~~latter~~ 17 ~~summer~~/years Vladimir Pavlovich Desyatov, docent of Tomsk medical institute, daily compared ~~the~~ cases of sudden death with the state of ionosphere, with changes in the solar activity. V. P. Desyatov showed that ~~the~~ mortality substantially increases into the first three days after chromospheric flare on the sun. The "fateful day" V. P. Desyatov considers to be the second day after the appearance of a ~~flash~~/burst.

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Infarcts, strokes and magnetic storms on the Earth appear not immediately at the onset of spots or ~~flash~~/bursts on the sun. Magnetic storm is developed develops on the average of 26 hours later. The

intensity of storms varies within the limits of 27 days, i.e., is equal to the period of the rotation of the sun. Magnetic storm begins only ~~in~~ at one ~~determined~~ certain place and ~~is spread during~~ propagates within 4-7 minutes ~~on~~ to the entire Earth.

The appearance of "u~~nhealthy~~ series" illnesses and the origin of the "fateful days", about which speaks V. P. Desyatov, will become clearer, if we visualize ~~visually~~ the picture of the motion of corpuscular flux from sunspot. Let us compare the ~~driving~~ moving around its axis sun with the rotating lamp/~~canopy~~ of beacon or ~~projector~~ searchlight. In the same way as the narrow and pencil beam of ~~world~~/light accomplishes circular motion ~~along~~ through dark space, it ~~passes~~ there occurs in outer space a comparatively narrow directed radiant flux, emitted ~~as~~ by a sunspot or ~~the~~ a region of chromospheric flare. ~~Into the~~ within determined time intervals, when spot it passes ~~through~~ over the plane of the central meridian of the sun, its emission/radiation, falling perpendicular to the surface of the Earth, ~~they~~ bombards it with its corpuscles. The Earth again is immersed in the electric flux, which moves from the sun. This it lasts a day or two, not more ! Then spots or protuberances together with the sun are moved ~~further~~ on and, thus, flow is deflect~~/diverted~~ed to the side. The action of surplus radiation ~~to~~ on the earth ceases, and planet again obtains its usual portion of radiant energy. But ~~thus~~ then the spots of ejection again fall into the plane of the central meridian of the sun, and the Earth ~~they begin to fire~~ is again bombarded by corpuscular

fluxes. By such irregularly is realized the influence of the active sun on planet. It is not surprising that its living world answers these effects by intermittent reactions.

Letter from Kiev.

Fates of scientific problems and the fate of people are different. "Not it is important what you search for, it is important what you find", wrote Pascal. Some are fortunate, for others it is necessary to overcome barriers whose origins are unknown. Heliobiology has not been so fortunate.

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Its development was hindered by the Second World War. It inhibited the rate of investigations, it destroyed scientific contacts, it interrupted communication between the scientists of the different countries.

In the USSR after war little few were occupied by searches for the theoretical proofs of the influence of solar activity on

biosphere, ~~but by the~~ while with experimental ~~searches~~ research for such proofs and ~~completely~~ absolutely no one ~~it~~ was occupied. Solar interferences have ~~themselves~~ announced themselves "~~declared about itself~~" ~~by~~ to scientist. For example, in the experiment of ~~the~~ Doctor of the Medical Sciences Anatole Kuz'mich Podshibyakin the sun ~~was mixed~~ became involved unexpectedly.

Podshibyakin is an electrophysiologist. The ~~object~~/subject of ~~its~~ his investigations is skin (according to him - ~~the~~ a forgotten by the physiologists organ/control). Skin ~~will~~ bears in organism many physiological loads. It picks up signal out of external world, it regulates the temperature of body, shields organism from traumas and microorganisms. Through skin are discarded ~~the~~ waste substances, in it are formed the hormones, the skin protects organism from drying out finally it is the organ/~~control~~ of electroregulation.

Changes in environment affect us through skin coverings. Skin is developed from the same ~~incipient leaflet~~ germinal layer, from which are formed the sense organs: smell, view, audition, interorgan nervous ~~communication~~/connections ~~are~~ and represents an apparatus of "contact reception". During the damage of internal organs/~~controls~~ without fail begins the damage of the skin coverings: each of them ~~had~~ has in skin ~~as their~~ a representation. (~~People~~ Folk medicine ~~have~~ has already have long utilized as it were stimulation of ~~the determined~~ certain point~~s~~/~~items~~ of skin for therapeutic ~~target~~/purposes). But the reflexes of internal organs/~~controls,~~ which

cause, in the opinion of I. P. Pavlov, skin disturbances, unfortunately are not utilized, until now, in diagnostics. It ~~is~~ more precisely, ~~the~~ physicians ~~did not learn to still recover~~ have not yet learned to capture those signals, which the skin sends during illness/sickness/disease. If the physiologists master the methodology of determining skin changes, then the arsenal of diagnostic agents considerably will be enriched. I. P. Pavlov with regret state~~/established~~d that in this field of knowledge ~~is an even~~ there is also an enormous gap/~~spacing~~.

Attempting to decipher skin signals, A. K. Podshibyakin ~~it~~ began to investigate the static electric potentials of skin, in abbreviated form STEP. In 1950 ~~it~~ he published ~~the~~ a work, in which ~~it~~ he showed that in the places of the entrance of the nerves into skin, which it call~~/named~~ed the "active points of skin", skin processes they ~~go~~ occur at completely different physiological level.

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In ~~the~~ a healthy person the interrelations between the active points are completely ~~specified~~ determined. At the active points ~~of~~ the values of STEP they have approximately identical value. But intense processes (normal or unhealthy) in organism change picture. One or several point~~/items~~s they begin to differ in the value of STEP. The definition of changes varies depending on the ~~sharpness~~ acuteness of unhealthy process.

Scientist proved, that the STEP ~~is possible and it is necessary to~~ can and should be utilized for the setting of diagnosis. ~~During the~~ With the damages of the heart, for example, ~~of a~~ change in the STEP ~~they~~ are observed ~~completely~~ quite distinctly ~~in~~ at the second and fifth intercostal points, at four points on the ~~angles~~ corner of blade. There is a definite dependence between the skin and the liver, the brain, the spleen, the appendix, the womb, etc. During hypertonic illness/sickness/disease, for example, with the sclerosis of the ~~containers~~ vessels of the brain ~~of~~ STEP noticeably it changes at the points, connected with the right temporoparietal division of brain. A. K. Podshibyakin ~~it~~ was ~~possible~~ able, but using his own procedure, to establish/~~instal~~l diagnosis even before the appearance of explicit ~~sign~~/criteria of illness/sickness/disease. So, in This a twelve month child STEP ~~they~~ signaled the beginning of pneumonia ~~for~~ four days ~~to the~~ before fluorescopy of ~~light~~/lungs. But scientist tortured by a thought, which remained incomprehensible, - Why in different years average value of STEP varies ~~at the~~ for whole contingents of the people: ~~first above~~ first becomes higher, then ~~below~~ lower than the "norm". Solution was arrived at almost "randomly". On how this occurred, A. K. Podshibyakin wrote in his letter to the authors of this book: "... ~~In to~~ 1954 experimental-design shops with my participation for the first time, and in 1960 for second time they constructed for me instruments for ~~the~~ measurement of static electric potentials. During checking it was ~~explained~~ determined that with the full/total/complete conformity of calibration the instrument of 1960 ~~gives as if the~~ appears to give higher values of electric

potentials, than the instrument of model 1954. Without producing the comparison of instruments, I came forward during collection and, embittered to the fact that the shops inaccurately fulfilled my order, asked special checking of each and every instrument.... By 1960 I finished the monograph to eighteen of printed sheets. It returned it. It was accepted for press under the condition of the correction of some small imperfections.

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Having before itself a material about the values of static electric potentials I it noted that their value during the years 1947-1949 were above in comparison with I it noted that their values during the years 1947-1949 were above in comparison with 1953-1954. During the years 1957-1958 of the value of potentials they were above than into 1954. Affected by this revolution of events I removed took monograph from press. Into 1962, even into 1963 all my thoughts were directed toward the explanation of the reasons for this incomprehensible phenomenon. In 1960 it was revealed also, that the positive effect on therapeutic stimulation by banks, mustard plasters, novocaine block one should expect at the values of STEP more than 25 mV. My recommendations also turned out to be unsuccessful. The negative results during the years 1957-1960 were observed with values in 30-50 mV.

It was necessary to again repeat the series of observations

where I conducted ~~their~~ them ten years ago. On the students of ~~sanitation~~ health camp it was possible to explain that STEP can rise, also, without weather changes. As early as in 1949 I noted that the appearance of ~~the~~ girls and women causes sharp ~~shift~~/shears in the value of STEP. I ~~solved~~ decided, that this is connected with ~~the~~ electrification, which ~~it~~ is creates ~~the~~ a key female silk ~~linen~~ underwear, which leads to ~~focusing~~/inductions. ~~It~~ I ~~render~~/showed was right correctly. Elimination of the ~~women~~ female students, ~~the~~ nurses, ~~the~~ and female physicians - gave calmer background with measurements.... [What did he do with them? What price progress!]

~~Its~~ My observations I carried out in to the pine forest, where there is neither radio nor electrical interference. However, even, this did not bring the desired results. STEP continued to change with incomprehensibly ~~form~~ and outside ~~any communication~~/connection with ~~something~~ anything known to me known. Especially in separate persons. ~~Cont~~ Arrived ~~the~~ autumn or ~~the~~ winter of 1963. ~~Accurately~~ Exactly I do not remember. In library completely randomly to me to eyes caught Yu. Vitinskiy's book: ~~the~~ "~~F~~forecast/predictions of solar activity". Randomly I focused attention on series of ~~the~~ numbers, which there were registered as Wolf's numbers. It looked and estimated, that my potentials changed analogously. Immediately ~~were extracted~~ I checked out all the available in library monographs about the activity of the sun. Among them ~~caught~~ was professor A. L. Chizhevskiy's book. Gladdened, I began to compare values. The mathematicians from the institute of cybernetics

of the Academy of Sciences of UkrSSR aided me in this. They calculated the coefficient of correlation, which turned out to be equal to 0.86. It was necessary to apologize ~~itself before~~ to the engineers and to study completely new for me question.

So high a degree of correlation caused in me natural biological skepticism. What this does mean?

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~~The really manufactured by millenia medical diagnostic methods~~ Could it be that medical diagnostic methods developed over milenia are subject to review? What, which means, any medical procedure must be ~~given~~ into conformity with the state of the sun? It does ~~emerge~~ turns out, that those ~~designation~~ instruction/purposes and the recommendations, which ~~do befit~~ are suitable in the years of quiet sun they can even ~~injure~~ damage or strengthen pathological reaction in the years of the maximum of solar activity?

~~Skepticism is my~~ My skepticism however, became ~~to~~ very rapidly ~~be scattered~~ dispelled during the study of question. It proves to be that there is ~~communication~~/connection not only between STEP ~~by~~ and Wolf's numbers, but also between sun and quantity of hydrochloric acid, ~~isolated~~ produced by the ~~by~~ stomach of dog for six hours. ~~A~~ Also the quantity of mineral substances, ~~concluded~~ produced by bile, ~~also proves to be~~, yes, ~~yes~~ indeed - it depends on the state of the sun.

True, all these facts must be still verified, but in their authenticity I am convinced. This is supported by To this by bail other observations. Wolf's numbers, in particular, although they satisfied the astronomers, reflecting ~~a quantity~~ the number of spots on the sun, i. e., ~~a~~ the degree of ~~his~~ its physical activity, do not reflect the density of energy flux both radiant and corpuscular. But indeed they in turn, exert a substantial influence on biosphere. Therefore I compared the acidity of the gastric juice of dog with the state of the magnetic field of the Earth, depending on the sun. ~~A~~ the quantity of acid, which ~~it~~ was ~~developed~~ produced by the stomach of dog, changed depending on the degree of the perturbance of the magnetic field of the Earth.

And finally here are the completely ~~improbable~~ unreliable facts. It was possible to reveal/~~detect/expose~~, that the value of conditicnal food reflex in dogs depends on the values, which determine the state of the magnetic field of the Earth. From vertical and hcrizontal components and declination. [slant] In healthy dogs during ~~blurred~~ nonacute disturbance/perturbations and even magnetic storms with ~~smooth~~ gradual beginning the value of the conditioned reflex increases depending on ~~an~~ increase in the value of magnetic components. During powerful magnetic storms with sudden beginning, as a rule, the value of conditicned reflexes is reduced. This in healthy dogs. In sick animals under conditions of ~~the~~ an

experimental disruption/separation of higher nervous activity any increase in the indices of geomagnetic field brakes conditioned-reflex activity, i.e., the value of conditional food reflex.

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But very, perhaps, improbable turns out to be the fact, that ~~of~~ in old "most reasonable and circumspect" dogs during magnetic storms ~~was~~ in improved the so-called differentiation. You remember ~~that~~ this ~~such~~? I.e. ~~trying~~ an old dog during geomagnetic disturbances obtained seemingly supplementary energy effect, which ~~it~~ makes it possible for ~~it~~ him to make a correct selection.

Thus ~~and entire~~/all of history. ~~Everything, history~~. Everything ~~that made~~ done by humanity in biology, medicine, chemistry, the rise in productivity of work, ~~it~~ is necessary to connect with the activity of the sun. And ~~these are~~ this is a not paradox, but a need. Without taking into account ~~of~~ its effect on the life of the Earth there cannot be ~~the~~ successful progress in science and engineering. These are my solid persuasions. ~~Hearth by them~~ I will sign my name to them at any time of days. Unfortunately, I ~~is still small by sign~~ am not still not well acquainted with this problem and to me as physician and physiologist, to ~~complicatedly be dismantle/selected~~ it is difficult to get my bearings in ~~at~~ problem No. 1 "~~solntse — Zemlya~~" Sun-Earth. But fact remains fact.

Everything, ~~mined~~ achieved in science until recently, must be reexamined and connected with intensity in the work of the sun" !

Here, perhaps, it is worth mentioning that even in the 20's A. L. Chizhevskiy with the support of academicians P. P. Lazarev and A. V. Leontovich produced about three thousand measurements of the electric potentials of skin in man. He establish~~ed~~/~~installed~~ ed the dependence of these potentials on Wolf's daily numbers.

In conclusion let us add, that recently many special journals reported the discovery/~~opening~~ by American scholarly R. Becker, who agrees with with the works of the Soviet researchers. R. Becker reveal~~ed~~/~~detected~~ ed that on the body surface of ~~the~~ man, and also other vertebrates the electric potentials were distributed in a specific manner. The reason for their emergence he considers the activity of ~~the~~ a special electrical system, which, in his opinion, controls the velocity of propagation of biocurrents, and furthermore, it ~~transfers~~ transmits ~~the~~ information about pain. It is possible to assume that precisely this system reacts to solar effects. ~~After being formed at twilight~~ Forming at the dawn ~~colors~~ of evolution as control system in the highly organized organisms, it plays, obviously, only auxiliary role, but in the life of primitive animals to it still belongs role of one of the primary control circuits. In the process of evolution, gradually becoming more complicated, living organisms went away from direct

dependence on the sun.

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(It suffices to recall that the pigment of the blood - is the brother of chlorophyll; although however, we do not become green and ~~do not~~ redden with ~~during~~ the appearance of a ~~solar~~ sun's ray ~~beam~~). In the highly organized animals the dependence on the sun became less intimate, although ~~however~~, it in no way disappeared. In later ~~adaptable~~ adaptation stratification's the physiologist can find a ~~grope~~ basis - the old evolutionary mechanisms whose existence does not cause doubts.

From molecules to stars.

In Italy, in the ancient city of Florence, where there ~~is no time~~ once bloomed the genius of Galileo Galileo, lives and works professor Georgio Piccardi. In the summer of 1964 professor Piccardi stayed in Leningrad and at conference in Pulkovo observatory ~~announced~~ reported on his works.

How ~~did~~ was interest the Italian chemist ~~of~~ interested in the astronomers and astrophysicists? Guest described ~~the~~ simple water - H_2O, to research

on which he dedicated more than thirty ~~summer~~/years of work, and about how with the aid of this ordinary substance were ~~opened the~~ discovered surprising ~~facts~~ gems, far ~~emerging~~ beyond the framework of chemistry....

Brussels, Tuebingen, Vienna, Trieste, Florence, Kumamoto, Antarctica, Madagascar, whole world during recently the past international geophysical year, literally was converted into one chemical laboratory. The scientists of all specialties on the initiative of professor Piccardi on different meridians and parallels ~~were~~ placed daily ~~in~~ at the same hours, ~~the~~ identical chemical experiments: they followed the precipitation reaction, taking place in the inorganic colloidal solution of oxychloride of bismuth in water. With maniacal persistence the people every day ~~of~~ hundred, thousand times repeated at the isolated points of planet ~~one and~~ the same ~~simplest~~ very simple experiment.

In order to clarify which important problems tried to solve science with the aid of these experiments, let us describe simple experiment. In two glass test tubes simultaneously ~~is~~ mixed ~~to~~ with water an identical quantity of substance. It slowly deposits on the bottom.

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Precipitation is ~~formed~~ faster either in right or in the left test

tube, although reaction conditions are identical - this change, ~~is~~ not more ! Now one of the test tubes they cover by ~~fine~~/thin metal ~~screen~~ shield. Picture is changed. Approximately in seventy cases of one hundred reaction rate of precipitation increases in enclosed test tube. This irrefutable proof of the fact that ~~the~~ chance has yielded ~~place of~~ to regularity....

Which conclusions can be drawn from this experiment? First of all, that on rate of deposition act some external effects, from effects of which, apparently, shields metallic ~~screen~~ shield.

What are the
Which ~~these are~~ reasons for it? ~~World~~/light, temperature, pressure, humidity remain constant/~~invariable~~. It is necessary to assume that the reaction rate does depend on some other, supplementary ambient conditions, for example, on magnetic field strength? Indeed it is known that the metal ~~screens~~ shields electromagnetic waves. The state of the magnetic field of the Earth in turn, depends on space conditions, in particular on the activity of the sun. By comparing data of chemical experiments ~~on~~ with the observations of the astrophysicists and astronomers during the prolonged period of time, it is possible, ~~that means~~ to obtain an answer/~~response~~, ~~as~~ to the question of: how is perceived on the Earth the ~~highly~~ all- penetrating respiration of Kosmos. But ~~in order~~ to approach ~~itself~~ these "simple" conclusions, it took professor Piccardi ~~they were required~~ decades. .

has existed and even before

Since ~~there is a~~ chemistry, ~~also, prior to this day,~~ it was considered that one and the same chemical experiments under identical conditions, at any time gives identical result - constant. Insignificant deviations from constants the chemists, as a rule, ~~were related because of~~ ascribed to errors in experiment itself. But Piccardi once ~~it~~ doubted the reason for "annoying inaccuracies". ~~It~~ He doubted the fact that one and the same reaction ~~was due~~ must, other conditions being equal, ~~to~~ give identical result, if it is carried out ~~in~~ at different time. However, for ~~similar~~ such doubts in ~~it were~~ he had accumulated a sufficient~~ly~~ ~~many~~ basis/bases.

Violently developing in the last/latter decades physics and astrophysics forever put an end to the representations of Kosmos as of speechless void, they showed that ~~the~~ outer space is literally saturated by material in all its infinitely diverse manifestations. But between the Earth and Kosmos there is no barrier/~~obstacle~~ ! In order to appear in Kosmos not only ~~there is no need~~ is it unnecessary to become astronaut, ~~but~~ You don't have even to emerge ~~his~~ your own house.

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Universe everywhere ! But for an experimenter this means that in the

strictest experiment we monitor ~~the~~ only a part of the physical experimental conditions: temperature, illumination, pressure. The remaining effects, which ~~go~~ come from without, are not controlled ~~to~~ by experimenter. From them ~~it cannot~~ nothing can be ~~been~~ insulated, but at the same time of ~~them it is not possible~~ they cannot be to adjust, by the rotation of disconnection switch or by rheostat slider. That means that just as everything, that occurs on the Earth, simple chemical reactions undergo the effect of space forces and depend on ~~the~~ events, which occur in space, on the sun....

Piccardi repeatedly did ~~ask himself~~ wondered why ~~the~~ chemists, knowing that one and the same reactions under "one and the same conditions" often does differ from constant, ~~blamed in this~~ why blame only ~~the case~~ chance? Who ~~did~~ has demonstrated, that ~~the~~ identical result must be obtained at different time? Indeed time - one of the experimental conditions - ~~value~~ is a variable (value). But ~~that~~ what, if we from these positions examine, not as knowingly erroneous, but as corresponding to the real state of affairs, deviation in readings of one and the same of the reaction, made in different time? The line of reasoning ~~as if was translated from head to feet~~ seems to turn upside down. Piccardi literally ~~it~~ suffered from (the thought, that the generations of the researchers discarded the results of the most valuable experimental work - the gold fund of science - only because the obtained numbers did not ~~converge~~ coincide with constants. Not one of them ~~recalled about~~ mentioned time. It never occurred to the chemists simply to

place above the columns of formulas and numerals the date: year, month, number, hour, minute. But instants differ from each other just as person, trees, ~~pattern~~ fingerprints by ~~finger/pins.~~ this is Because the properties of "space - time" continously change. Piccardi mourned the forever buried in the graves of the refuse baskets of calculations, notations, ~~the~~ and formulas, which thus would prove useful precisely now.

Everything it was necessary to begin anew... It was necessary to find the chemical reaction, which ~~would answer for~~ reflect the least fluctuations ~~of~~ in environment, to create its kind "weathercock for determining space weather". Piccardi thoroughly sorted out all possible chemical elements, substances, solutions, discovering among them those, that could answer the expressed goal. Selection fell ~~on to~~ the quite ~~usual,~~ ordinary from our point of view, and the [redacted] unusual, from the viewpoint of chemist, substance - water.

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Piccardi knew well from long engineering practice the surprising properties of this substance, which for a long time ~~did not obtain~~ was not explained ~~explanation.~~.

He, for example, knew that the aqueous solutions, pre-processed by magnetic field - "activated" by it, behave differently from

solutions of ordinary water: precipitation reactions in activated water ~~go~~ occur much faster ! This unstable effect Piccardi decided to utilize. Scientist prepared from the processed water the colloidal solutions, which turned out to be extremely sensitive and immediately answered for the least fluctuations ~~of~~ ü the physical conditions. This effect subsequently was substantiated in the "pseudocrystalline" theory of the water, created by the English physicists Bernal and Fowler.

A/Chemical test, according to the project of scientist, had to be not only sensitive, but also cheap, simple in preparation - not to require expensive equipment, scarce reagents. In order that reactions would ~~pass~~ occur simultaneously in dozens of test tubes, Piccardi devised special mechanical mixer.

After all these preparations in 1951 the scientist undertook ~~the~~ as experiment, which ~~lasts the already second~~ has already lasted two decade.... Daily in Florence "~~in~~ at the assigned hour" is ~~placed~~ posed one and the same chemical precipitation reaction. And thus ~~already~~ for decades it gives different results. As has already ~~been spoken~~ mentioned above, in the work, initiated by Piccardi, were include~~connected~~d the chemists ~~of entire~~ from all over world. Chemical tests "~~earned~~ were run" in all parts of the Earth. And in all points of terrestial globe they gave mutually similar ~~between themselves~~ readings.

The curve/graphs, which reflect rate of deposition, resembled to each other ~~as~~ like brothers. A simple reaction, ~~as~~ like space weathercock, error-free reacted to solar weather, it recorded the ~~raged in~~ near-earth ~~space~~ magnetic storms, ~~sensitively~~ raging in space it responded to solar flares. Then ~~an~~ impartial judge - (electronic computer) - estimates curve/~~graphs~~.

The calculations showed that the intricate peaks and the waves of curve/graphs coincide not only ~~between themselves~~ with one another, but also with the curve of solar activity during the same period. Solar radiation, penetrating through the walls of laboratories, first amplifies, then it attenuate/weakens the motion of molecules in the perpetual rotation of substance, subordinating the rhythm of its motion to the rhythm of stars.

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Strange manipulations and the even more unusual reasonings of the Italian scientist have long already interested heliobiologists. Water, which composed the basis of the chemical tests of Piccardi, ~~is~~ the blood of planet, the juice of life. Life, ~~as they set~~ we assume, was born ~~there is no time~~ once in ancient ocean, and prior to ~~this~~ this day all vital processes ~~proceed~~ occur in the aqueous solution: 70o/o body of man comprises water. Life is saturated with water and therefore

frequently it they call by the mirror of natural science. The ~~expansion~~/disclosure of some ~~also~~ still unknown secrets of water always indicates simultaneously ~~and the expansion~~/disclosure of the new laws of biology !

Understanding well that water - is the main ~~cell~~/element of life, Piccardi very attentively followed the searching of heliobiologists. ~~It~~ He had long ~~ago~~ been ~~was already been copied~~ corresponding with A. L. Chizhevskiy, ~~it~~ was ~~sign~~ familiar with ~~its~~ his works, repeatedly ~~it~~ met with professor Maki Takata, discussed solar problems with N. S. Shcherbinovskiy, and regularly ~~it~~ ~~copied~~ corresponded with N. A. Shul'ts, and knew well M. S. Eygensen.

"Long before me, ~~spoke~~ he said in a report in Pulkovo, ~~on your Russian scientists to the~~ Scientists conclusions about the effect of the sun on biological processes, very close to my conclusions about the effect of the sun on the course of chemical and biochemical reactions, ~~arrived your Russian scientists~~. I completely ~~divide~~ share the persuasion of heliobiologists ~~in the fact~~ that the biological indices of solar activity are only particular manifestations of more ~~common~~/general/~~total~~ for ~~an~~ entire planet physical dependence on the sun. Solar phenomena, of course, act not on some colloid, not on some disease, not on ~~separate~~ an individual man.... They affect everything that ~~which~~ occurs on the planet, and tests are chemical symptoms of the occurring changes".

The sensitive colloids ~~of~~ Piccardi ~~are~~ recorded not only the appearance of ~~flash~~/bursts and spots on the sun. These rough "shocks" are reflected in them immediately. They register even and the much less rough effects, not connected with solar activity. Specifically, they reflect some incomprehensible cyclic annual fluctuations with sharp incidence/drop during March. ~~Whence they?~~ Where do they come from? ~~It can be,~~ Perhaps like tests ~~as~~ counter in motor vehicle "~~does~~ count off" the rate of our spacecraft in galaxy? Specifically, this thought was born in professor Piccardi. ~~It~~ He called/~~named~~ it "galactic hypothesis". It consists in the following.

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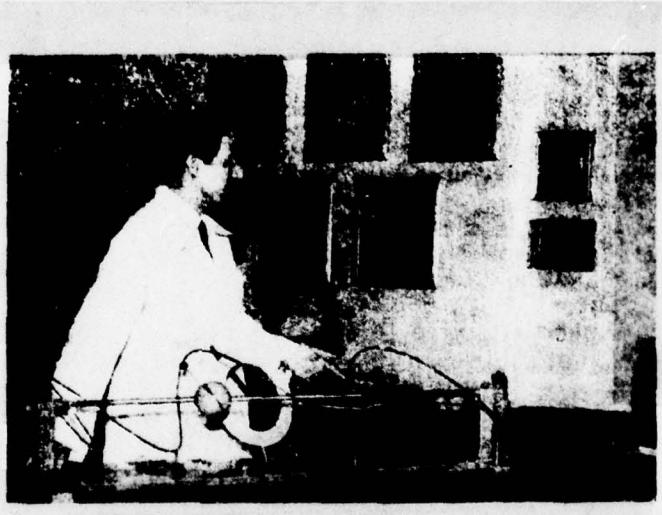

Professor G. Pikkardi with his model of the heliocoidal motion of the Earth in galaxy. Sphere in center - the sun, small sphere is the Earth.

The Earth moves around the sun at the average speed 30 km/s. Together with it ~~will be born~~ it moves toward to Hercules's constellation ~~with~~ at a velocity of 20 km/s. The combination of these motions determines the flight trajectory of our planet, which can be calculated. ~~The~~ The ~~partially~~ relative rate of the motion of the Earth ~~first stores/adds~~ is partially added to ~~up with~~ the speed of the motion of the sun, then it is deducted from it. Consequently, during one year the speed of the ~~displacement~~/movement of the Earth in the direction of Hercules's constellation first decreases, then it increases. From 24 km/s during September it ~~transfer/converts~~ changes to 45 km/s during March.

If in ~~M~~ilky way there are physical fields, characterized by lines of force, then the Earth, ~~being moved~~ moving, intersects them at ~~the~~ different rates and at different angles during September and during March. As a result the ~~coupling~~ effect of the interaction ~~with~~ these fields changes. To ~~control~~ observe that which occurs is possible at any point of terrestial globe. For testing "galactic hypothesis" was required by Piccardi ~~the~~ a laboratory ~~by~~ the size/dimension ~~with~~ of a whole planet.

This hypothesis at first glance is ~~so such fabulous~~ fantastic, that the author ~~even was not~~ decided not even to ~~be~~ subdivided ~~with~~ share it with the ~~associate~~ his associate chemists. He entrusted to ~~its~~ people with ~~the~~

hardened/tempered imagination, ~~it~~ and described it ~~on~~ in report in Pulkovo.

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The Soviet astrophysicists listened it with large interest because the contemporary theory of space and time does not deny (although directly and it does not assert) the expressed thought.

300 thous. experiments, set up on the initiative of Piccardi during fifteen ~~summer~~/years ~~on~~ our entire terrestial globe, confirmed the ~~assumption~~ hypothesis that the course of sensitive reactions strictly follows ~~the~~ a solar rhythm. Furthermore, it depends on the rate of the motion of the Earth in outer space. So, for the first time in the history of science on the basis of elementary chemical ~~experiment~~ experience it was ~~appeared~~ possibil~~ity~~e to judge ~~the~~ events, taking place in the universe !

Sun and life.

Thus, to heliobiology is known many facts, which convincingly testify to the existence of connections between ~~the~~ fluctuations ~~of~~ in solar activity and the numerous manifestations of the vital activity of terrestrial organisms. Are ~~such~~ what are the mechanisms of these ~~communication~~/connections? ~~As,~~ Thus, with the aid of ~~which~~ what physical agents does ~~affect the sun~~ the sun affect the living world of the Earth?

It would seem, it is clear that life moves ~~the~~ with solar energy: fluctuates energy flow, which goes from the sun, fluctuates life, also ~~So,~~ inflow to the Earth of solar energy is changed in connection with changes in the position of planet relative to the sun. As a result thus occur ~~by~~ there well the all known seasonal metamorphoses in living nature. It is natural that the biosphere (totality of the living transformers of solar energy) sensitively reacts to changes in the "input power".

However, in the questions of communication/connection of the manifestations of life with changes in the solar activity of this straight line and clear energy approach is impossible. Whole the fact is that the total intensity of solar radiations is virtually constant ! The intensity of emission/radiation in the short-wave and long-wave parts of the spectrum, and also the intensity of corpuscular fluxes in the years of activity, as we already spoke, it can grow/rise into thousand and even millions once in comparison with of for years quiet sun. But the general fraction of these emission/radiations in the energy balance of our star is negligibly small - on the average one hundredth of a percent.

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Yes moreover their large part, apparently, is not passed by the atmosphere. Specifically, this fact serves as the basic source of skepticism.

In fact, at first glance it seems improbable in order that such negligible from energy point of view external disturbance/perturbations could cause any noticeable deviations during biological processes. In connection with this one should recall statement of one of the outstanding biochemists of our time, Nobel prize winner Albert Saint-Georgy. "Biology, speaks he, this the

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science of the improbable, and I think that in principle for an organism are essential only statistically improbable reaction.... Reactions are monitored by the facts that they are statistically unlikely improbable and can occur only because of the specific mechanisms, capable of ensuring their ~~control~~ regulation. Thus, in living organism become possible ~~the~~ reactions, which ~~seem~~ to physicist seem impossible, or in any case, improbable" [1].

FOOTNOTE [1] A. Saint-Georgy. An introduction to submolecular biology. Moscow, "Nauka," 1964. END FOOTNOTE

The very phenomenon of life from the positions of thermodynamics ~~is an event~~ event "improbable", that contradicts the universal tendency of the universe toward its most probable state, to which would correspond ~~the~~ maximum entropy.

Biology deals with systems ~~where~~ for more complex than those, which use the physicists for checking their theories. The organisms, which achieved in their evolution ~~of~~ highest organization and finest internal regulation, are immeasurably more complex than the most complex of ~~the~~ those created by man automatic systems. But it is strange: while in technology became already completely customary to see, ~~as~~ how

a control signal of negligible strength activates
negligible due to its power/thickness control signal gives into
action giant energy flows, in biology this possibility is still considered
many continues
by many to be
to consider improbable !

But meanwhile it is possible that precisely the secrets of regulation ensured living peace of the Earth with sensitivity to finest variations in the hues of the respiration of the sun. "The mechanism of the conversions of solar energy," wrote the creator of the study of biosphere V. I. Vernadskiy," was hidden for us in the infinite diversity of colors/paints, forms, motions of the nature: we
ourselves
themselves compose part of it with by our life.

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Centuries passed before human thought could note the feature of the single connected mechanism in the apparent chaotic picture of nature" [1].

FOOTNOTE [1] V. I. Vernadskiy. Collected works, Vol. V. Moscow, Izdatel'stvo AN SSSR, 1960. END FOOTNOTE

Heliobiology - one of the youngest branches of the science,

which is occupied by research on life, ~~(~~is still not in state to reliably answer ~~the~~ question concerning the nature of the mechanism of sun-earth ~~communication~~/connections. Nevertheless ~~is made already~~ much has already been accomplished. ~~little~~.

By the works of the astronomers Herschel, Flammarion, the botanists A. E. Douglas and F. R Shvedova, chemist Arrhenius, biophysicist A. L. Chizhevskiy, entomologists N. M. Kulagin and N. S. Shcherbinovskiy, hematologist Maki Takata, physicians P. M. Nagorskiy, M. Faure, G. Sardu and G. Vallo, S. T. Vel'khover, chemist Georgio Piccardi, heliophysicists M. S. Eygenson, A. I. Ol', M. B. Rubashev and many, many other researchers ~~is~~ if has been proved the existence of ~~the caused by the sun~~ caused by the Sun periodic perturbation in the living nature of planet. These basic investigations in recent years obtained confirmation in the works of the psychiatrist V. P. Desyatov (Tomsk), professor of veterinary science K. A. Dorofeyev (Kazan'), zoologist P. A. Panteleyev (Moscow), physiologist Michel Goclen (Paris), entomologist V. B. Chernishev (Moscow), chemist K. Kappel-Butte (Brussels), hematologist A. T. Platonova (Irkutsk), professor A. A. Maximov (Novosibirsk), microbiologist A. T. Sytin (Novosibirsk), physician-hematologist N. A. Shul'ts (Sochi) and other researchers.

We were restricted to ~~the~~ an incomplete enumeration of the works only ~~of~~ some heliobiologists. At present numerous works on radiation

biology and medicine, magnetobiology experimentally prove the ability of living organisms one way or another to ~~answer to~~ respond to emission/radiations and the effects of stationary and ~~of~~ alternating magnetic fields in the different combinations. These interesting investigations directly adjoin heliobiology, because, as has already been spoken, solar storms constant/invariably are accompanied by electrical and magnetic disturbances in all spheres of the Earth.

Erroneous it would be to think that in biosphere to the bursts of solar activity reacts some ~~separate~~ one certain organism, determined ~~the form~~ a certain types of animals, bacteria or plants.

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On them answers entire living world of planet, the totality of all organisms, which V. I. Vernadskiy so laconically and accurately ~~call~~/named the "living substance of the Earth". "Chemical energy of biosphere in its ~~efficient~~ effective form is ~~reveal~~/detected represents of ~~from~~ radiant solar heat ~~by the~~ totality of the living organisms of the Earth - ~~by~~ its living substance. Creating by photosynthesis - solar ray/~~beam~~ - in biosphere ~~the~~ the infinite number of new chemical compounds, many millions of the different combinations of atoms, they ~~it is~~ continuously ~~with to mind by~~ and at a speed incomprehensible speed they cover/~~coat~~ the Earth with great ~~thickness~~ mantle of the molecular systems, which

extremely easily give the new compounds, rich in free energy in the thermodynamic field of biosphere, unstable and which steadily convert in it to the new forms of stable equilibrium.

...No matter what the phenomena of life consisted of, the energy, isolated by organisms, is of their main part, and there can be, and wholly radiant solar heat" [1].

FOOTNOTE [1] V. I. Vernadskiy. The biosphere as a region for the transformation of cosmic energy. Collected works, Vol. V. Moscow, Izdatel'stvo AN SSSR, 1960. END FOOTNOTE

The fact that as a result of weak disturbance/perturbations occur the completely perceptible in their energy characteristics changes in some biological processes, does not give grounds to suspect heliobiologists in attempt to the law of conservation of energy. As any transformer, living organism cannot give up "at outdrop" more energy how it obtains "at entrance". With the aid of the control system it is possible to affect the efficiency of the transformer, the qualitative and quantitative characteristics transformed by it energy flux and even to increase instantaneous power, if, of course, is a corresponding "storage

battery/accumulator". It is possible fimally to entirely "turn off" (i.e. to kill) organism in the same way as disconnects powerful power station tiny relay on the panel for its control.

Unfortunately, we almost nothing know neither about the device of regulator nor about the nature of control signal nor about his code. The numerous attempts to explain the observed synchronism of some biological processes with solar activity are extremely contradictory and not always will agree with with all known facts. The majority of the voiced assumptions can be reduced to three ~~in principle~~ basically different hypotheses. The first of them, ~~shielded in essence~~ defended primarily by the botanists and the zoologists, ~~consists in~~ lies the fact that the effects of the activity of the sun on life ... does not exist.

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(At least, direct effect). I.e. facts are not disputed. On the contrary, precisely the representatives of these specialties ~~supply~~ offer in essence the empirical confirmation of synchronism, but interpret these facts as result only of the mediated effect of the sun. By direct/~~straight~~ effect solar activity can ~~have~~ only influence ~~to~~ some meteorological and geophysical conditions, but ~~already~~ those in turn, [can influence] ~~to~~ different biological processes and phenomena.

The second hypothesis, which has won ~~conquered to itself~~ numerous supporters, mainly among ~~the number of~~ biophysicists and biochemists, assumes that ~~critical~~ responsible for sun-earth biological phenomena ~~appear as~~ are ~~time~~ those forms of electromagnetic and corpuscular radiation, which so sharply are amplified at the ~~torque~~/moments of an increase in the activity of the sun. Is implied direct effect of radiation on vital organ~~controls~~s and the systems of organisms.

Finally, the third hypothesis, which was advanced by A. L. Chizhevskiy and which actively ~~it shields~~ defended at present by Maki Takata, proceeds from assumption about the fact that along with known electromagnetic and corpuscular radiation the sun in the period of its intensive activity emits even some unregistered by the physical instruments ~~the~~ emission/radiation, which possesses the specific property of biological activity ("emission/radiation z" per Chizhevsiy, or the "fourth solar radiation" per Takata).

It is interesting to note the peculiar interrelations of these points of view. The supporters of the first completely deny ~~everything~~ all others, the supporters of the second recognize the first and reject the right to the existence of the third, the supporters of the latter consider that not one of the hypotheses can be neither

unconditional is rejected nor considered that which rule.

We did not have the capability in short pamphlet to subject to comprehensive analysis entire mass of the known facts of sun-earth biological communication/connections, yes this and impossibly. However, it thinks that i those a few examples, which were mentioned in the preceding/previous chapters, are made it possible the reader very to arrive at the conclusion about the fact that each of the named points of view deserves attention. In any case: "Are valid hypotheses or not, noted Canadian physiologist Selye, they always determined the direction of scientific searches".

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But final sentence in natural science will carry usually "its majesty experiment". By estimating the contemporary state of heliobiology as a whole, it is possible to briefly describe it thus: the pore of the accumulation of empirical facts and formation of working hypotheses concludes. Heliobiology it enters into the stage of the expanded/scanned experimental and theoretical studies with the application/use of contemporary methods. This means that heliobiology as science finally conquered to itself place "under the sun" and confidently entered into contemporary natural science.

Pierced by the sun*.

FOOTNOTE * This chapter was written by Yu. G. Shishina. END FOOTNOTE

The book "In the rhythm of the sun" was ~~initiated~~ began even ~~with~~ during the life of its basic author Aleksandr Leonidovich Chizhevskiy. To finish it ~~it~~ he did not have time. ~~Work~~ His ~~it~~ was interrupted by death.

A. L. Chizhevskiy began to study the effect of cycles of solar activity on biosphere in 1915, i.e., more half century back/ago, when man only learned to fly on the first clumsy airplanes, and flight into ~~K~~kosmos seemed ~~by~~ an unrealizable fantasy. "In astronomy I began to be ardently interested as early as in 1906, thus wrote A. L. Chizhevskiy in its recollections, i. e., nine years old. The stars and the sun always were represented to me ~~by~~ as supernatural bodies, burning interest in which ~~it did~~ has not weaken of in me ~~and~~ even now. With which sincere trembling I admired ~~by~~ the stars through ~~its~~ my telescope and took pleasure in the marvellous ability of mind to ~~get to~~ know. Nightly observations with telescope of stars opened to me whole unspeakable splendour of above-ground world. ~~As frequently to me~~ How often I

dreamed of the same stars with their living game, small and large diamonds of gold, ruby, the blue color of the purest ~~clearest~~ water.... ~~But~~ Yet however shallow were my ~~sleeps~~ dreams, ~~star~~ the reality of stars was still excellent. ~~And not~~ Never ~~time for~~ once in my entire ~~its~~ life (I later was the assistant of astronomical observatory), could I, after thousand of times applying ~~its~~ my eye to telescope, ~~I could not quietly~~ calmly look at celestial bodies. Even professional/occupational habit did not free me from awe before beauty and sublimity of sky. ~~As~~ How passionately ~~will draw~~ it attracts and simultaneously frightens the ~~celestial sphere~~ human soul the celestial sphere!

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Experimentalfältet 19/1 1924.

Sehr geehrter Herr Doktor

Ich habe Ihren Brief vom 25 Juni 1924 gestern durch Vermittelung des schwedischen Exportvereins erhalten.

Es gibt eine sehr grosse Literatur auf dem von Ihnen behandelten Gebiet. So viel ich weiss, war Wm Herschel der erste welcher einen Zusammenhang zwischen Polarlichter (d.h. Sonnenflecken) und Ernteertung bzw. Missernten aufgefunden zu haben glaubte (Ende des 18 Jahrh.) Da aber diese Vermutung sich nicht bestätigte in der folgenden Zeit, wurde diese Ansicht meistens verlassen. In Fritz' Buch über Polarlichter finden Sie eine Zusammenstellung, die bis zur Mitte des 19. Jahrh. gilt. In neuerer Zeit hat Kommerzienrat Axel F. Enström (Ingeniörsvetenskapsakademien, Stockholm) die Idee Herschels aufgenommen in seiner Abhandlung "Om periodiciteten i de ekonomiska lagarna och därmed sammanhängande spörsmål" (Stockholm 1914. Tekniskt bibliotek 1914). Er parallelisiert die Sonnenflecken mit den Missernten, den oekonomischen Krisen und danach folgenden politischen Unruhen und Kriegen. Die Periode der Napoleon-Kriege 1800–1814 und das Kriegsjahr 1914 waren durch geringe Sonnen-Aktivität gekennzeichnet. Ergebenst

Svante Arrhenius.

Letter from Svante Arrhenius to A. L. Chizhevskiy of 19 January, 1924.

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I was attracted to
~~E~~especially ~~drew me~~ the sun ! All books about the sun, which I found in the library of father and in Kaluga urban library, were by me conscientious~~ly were~~ studied. Everything, which is possible, was extracted from the largest stores of Moscow and Petrograd. ~~Demands~~ Requests ~~about the~~ for books, the ~~extractions~~ abstract, references flew to the libraries of different cities. The books of Young, Abbot, Arrhenius ~~made by~~ became my ~~table~~ desk handbooks. I penetrated into the observatory of Moscow University in Presnya" [1].

FOOTNOTE [1] From the memoirs of A. L. Chizhevskiy, stored in the archives of the widow of N. V. Chizhevskiy. END FOOTNOTE

In 1914 took place the acquaintance with K. E. Tsiolkovskiy, ~~pass over subsequently to~~ which later turned to friendship, and which finally determined A. L. Chizhevskiy's scientific interests, and actually entire his further fate. ~~Seized~~ Captured by hypothesis about the existence of the interconnection between the activity of the sun and the terrestrial life, for the first time distinctly formulated by noted astronomer U. Herschel, A.

L. Chizhevskiy since 1915 actively searches for theoretical and experimental confirmation of it, he rises the mountains of literature, and corresponded it is copied with Svante Arrhenius. Arrhenius was one of the first to showed the existence of correlation between a series of neuropsychic disturbances and physiological sending and fluctuations of the field of the atmospheric electricity, depending on the sun.

"All around quivers the pulse of the universe" - writes A. L. Chizhevskiy in one of the youthful poems, that belongs to the year 1918, attempting to transmit his being inherent in it from early pores "space attitude" view.

"Came time has come in a most careful manner to study action effect on the organism of some powerful factors of environment ..., also, first of all of the specifically active emission/radiations of the inner central body of our planetary system - sun", emphasizes A. L. Chizhevskiy the main thought, which was became the sense thought of its his life, in one of the latter articles [2].

FOOTNOTE [2] A. L. Chizhevskiy. One form of the specifically bioactive, or Z-radiation, of the sun. In the collection: The world in the universe. Moscow, "Mysl'", 1964. END FOOTNOTE

Into ~~20-20th~~ 1920's years in his works A. L. Chizhevskiy persistently carries out thought ~~about~~ on the existence of periodic sun-earth dependence. According to ~~its~~ his views the current of all vital processes, which ~~go~~ occur in biosphere, is ~~located~~ found in connection with the periodic activity of the sun, ~~it~~ and depends on a quantity and a quality flowing to the Earth space, of radiations in particular solar, radiation.

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In our time, when flight into Cosmos ~~does not manage~~ cannot be managed without preliminary research on solar "weather", ~~but~~ or radiobiological and radio-medical experiments - without the lead thick-walled shielding chambers, this not is amazing. But during the years 1915-1920 ~~in the consciousness of~~ when people ~~still~~ had an idea hardly ~~entered the representations~~ of X-rays, were obtained the first grams of radioactive material - the proof of the division of material into atoms, for the majority of people, brought up in the traditions of geocentric ideology, the thought ~~about~~ of sun-earth communication/connections sounded at least unusually. A. L. Chizhevskiy's ~~compositions~~ reports caused perplexity and even frank mockery. ~~On~~ Of their author spoke as about the dreamer, searching ~~for~~ on ~~the~~ sun "some kind of spots". This very distressed A. L. Chizhevskogo in and found reflection in the verses, which he wrote at that time: "O, you

perceived sunspots with the your splendid your impudence ~~of your~~ - ~~did~~ I have not know you, as ~~will be~~ no matter how to me clear and close, your sorrows, Galileo" !

But nothing it could force scientist to ~~step back~~ retreat. ~~It~~ He did not doubt the fact that ~~its~~ his ideas immediately will not be considered: "About the exceptional killing sluggishness of the penetration of new ideas into the brain of man and the routine of science I judge ~~by its~~ from my own bitter experiment. Will be required several decades, before ~~how~~ in us is found common language with biologists.... The basic objections, which to me make, consist in the following: there is no need "to climb ~~into~~ sky ~~after the~~ for an explanation of the phenomena, which can easily be understood with the aid of terrestrial ~~reasons.~~ factors. Social conditions - here is the initial cause of all illness/sickness/diseases. Change them - and epidemics will ~~stop~~ cease to exist, although the microorganisms can be preserved on terrestial globe".

In this treatment of epidemic phenomena ~~consists large~~ there is great truth. Clearly, social conditions cause epidemics of all types... But to narrow question to such an extent, to ~~uncover~~ remove man and microorganisms from the natural medium - the surrounding world with all his electrical radiation, flows and fields - this ~~it~~ means to ~~inflow~~ enter into the ~~roughest~~ greatest, unpardonable error and to preach thoughts, having nothing in common with the tendency of contemporary science ~~having~~. ~~There~~ No, both is no, ~~and~~ or evil man and microbe - ~~essence~~ are social beings not only social, ~~but~~ and also

space, connected by their entire biology, all their molecules, all particles of bodies with Kosmos, with its ray/beams, flows and fields....

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Fortunately, increasingly more frequent and more frequently begin to be encountered the minds, which ~~count world by~~ consider the to be something single. My compatriots: professor V. M. Bekhterev, professor D. K. Zabolotny, professor G. A. Ivashentsev, doctor S. T. Bel'khover et al. completely ~~they~~ share this point of view ~~into~~ of the participation in ~~the~~ epidemic phenomena of the factors of space and epidemic phenomena" [1].

FOOTNOTE [1] Translated from the book: A. L. Tzhijevsky. Les epidemies et les perturbations electromagnetiques du milieu exterieur. Paris, 1938. END FOOTNOTE

Later, ~~again returning mentally by~~ thinking back on this time, he confirms: "Not only N. A. Semashko, G. A. Ivashentsev and S. T. Vel'khover, but also many other prominent scientists supported or were interested in my investigations, ~~in any way~~ without at all considering them fantastic

hypotheses. These scientists already at that time knew that the statistical laws are completely equivalent to laboratory experiment. ~~In the number of such~~ Among these scientists were academician V. I. Vernadskiy, academician D. K. Zabolotny, academician P. P. Lazarev, K. E. Tsiolkovskiy, academician A. V. Leontovich, professor A. A. Sadov et al., as orally or printed expressed positive opinion about these investigations ..." [2].

FOOTNOTE [2] Op cit. END FOOTNOTE

Among the adherents of A. L. Chizhevskiy especially one should note V. I. Vernadskiy, who created ~~in~~ at the beginning the XX centuries ~~the~~ study ~~of~~ biosphere. Approximately in the same years Vernadskiy wrote: "~~C~~osmic radiation~~s~~ always and continuously ~~flows~~ pour to the face of the Earth ~~the~~ a powerful flow of forces, which imparts a special, new character to parts of the planet, that border to outer space. Because of cosmic radiation the biosphere obtains in all its structure new, unusual and unknowns for a terrestrial substance substances.... The living substance of the biosphere because of them is penetrated by energy; ~~it~~ becomes active, ~~it~~ accumulates and distributes in biosphere the energy obtained in the form of emission/radiations ~~energy~~, it converts it finally into energy in the terrestrial medium, free,

capable of producing work. The formed by it terrestrial surface shell cannot, thus, be considered as region ~~only~~ of substance alone, this is ~~the~~ a region of energy, the source of a change in the planet by external space forces. The face of the Earth by them is changed, by them to a considerable degree it is modelled. This is ~~It is~~ not ~~there is~~ the only reflection of our planet, the manifestation of its substance and its energy - it is simultaneously ~~is producing~~ the product of the external forces of Cosmos.

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A. L. Chizhevskiy (1949).

Therefore the history of biosphere is sharply different from the history of other parts of the planet, and its value in planetary mechanism completely exceptional. ~~It~~ It to the same degree, if not to a larger degree, ~~there is~~ a creation of the sun as the development/~~detection~~ of the processes of the Earth. The ancient intuitions of the great religious creations of humanity ~~about~~ on the creatures of the Earth, in particular about people as children of the sun, are much nearer to truth than ~~think~~ the Ideas of those, who see in the creatures of the Earth ~~the~~ only ephemeral producings of blind and random changes of the terrestrial substance, terrestrial forces. The creatures of the Earth are the creation of complex space process, a ~~the~~ necessary and regular part of the ordered space mechanism, in which, as we know, there ~~are~~ is no chances" [1].

FOOTNOTE [1] V. I. Vernadskiy. The biosphere in space. Collected works, Vol. V. Moscow, Izdatel'stvo AN SSSR, 1960. END FOOTNOTE

In the secrets of this space mechanism of terrestrial life tried to penetrate A. L. Chizhevskiy. His book "Les epidemies et perturbations electromagnetiques du milieu exterieur", published in

1938 in the French language, dedicated to the effect of the periodic activity of the sun on epidemic process, brought to the author world ~~glory.~~ fame

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In 1939 A. L. Chizhevskiy was chosen together with d'Arsonval, Langevin and Branley honorary President of the I International congress on biological physics and space biology.

Through all the tests Aleksandr Lenidovich it carried ~~past~~ confidence in the truth of ~~its~~ his scientific persuasions. They say that ~~the~~ ones profession superimposes leaves an impression on a man. Those, who were ~~sign~~ ~~or it was~~ acquainted with or friends with ~~[illegible]~~ professor Aleksandr Leonidovich Chizhevskiy, always ~~drew in it~~ attributed to him a clear mind, kindness, generosity, kindness, large spiritual culture, ~~It had been seemingly right~~ It was as if he through pierced by invigorating sun rays.

~~In~~ The book "In the rhythm of the sun" ~~not entered~~ does not contain many facts, found by science and confirmatory in this intimate sun-earth ~~communication,~~ connections. After several ~~summer~~ years, passed from the day of A. L. Chizhevskiy's death (1964), heliobiology it accumulated many facts and it continues to impetuously be developed. The reader will find them in the works of contemporary

heliobiologists. ~~Us~~ We only ~~it~~ want again to emphasize that time "works" on the idea, expressed half a century back/ago by A. L. Chizhevskiy, and free ~~releases~~ in the history of science for ~~its~~ his name ~~that~~ by place, which it deserves rightfully.

In conclusion I consider ~~my long~~ it my duty to express deep gratitude for the granting of archive and aid in preparation of the manuscript for the press to Nina Vadimovna Chizhevskaya, the widow of professor Aleksandr Leonidovich Chizhevskiy.

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