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BABEL – OR TRANSLATION BY MAN AND MACHINE

Francois Kertesz

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BABEL — OR TRANSLATION BY MAN AND MACHINE*

by

Francois Kertesz

*This paper is based on a talk presented at the May 25, 1966, meeting of the Analytical Group of the East Tennessee Section of the American Chemical Society.

JANUARY 1967

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BABEL - OR TRANSLATION BY MAN AND MACHINE

I would like to start by expressing my thanks to you for the invitation to talk to you. I am a chemist who is not pouring any more colored liquids from one testtube into another and, although I think I have found a new and fascinating field of activity, I am somewhat jealous of you people who still have a chance to enjoy every day the stench and noise of chemistry. I am, therefore, deeply appreciative of this opportunity to be back among my colleagues. I propose in this talk to review briefly the problems that we encounter when we want to translate a thought, expressed in one language, into another one. I intend to focus my attention primarily on scientific and technical translations.

Before starting the subject, let me indicate the origin of languages. Although what I am about to tell you is far from preaching, I would like to read to you the Biblical explanation, the building of the Tower of Babel:

> Genesis XI:7 - "Let us go down and there confound their language that they may not understand one another's speech; 8 - So the Lord scattered them abroad from thence upon the face of all the earth and they left off to build a city."

If we want to discuss translation from one language into another, it might be of interest to start with the subject, "What are languages?" According to one author, they are simply *systems of arbitrarily selected but conventionalized signs which serve to convey arbitrarily selected, but conventionalized meanings.*(1) However, it is just about the most important tool of humanity; without language there would be no civilization. It might be possible to think without words, but there is no doubt that advanced cultures are based on some kind of a formalized method of transmitting ideas.

How language started cannot be found out by experimentation and our civilization is too far advanced to be able to learn from direct

observations as there aren't enough primitive societies left.

In addition to the above Biblical explanation, there are many theories concerning the origin of language. During the 19th century rival schools have been developed, giving scientific-sounding names for their own theories, and satirical ones for their rivals. I would like to mention a few of them citing from an excellent short review in The Sciences.(2)

The *bow-wow* theory suggests that human speech imitates naturally occurring sounds, such as the barking of dogs or the howling of wild animals. The *pooh-pooh* theory imagines that language is an outlet for pain or pleasure; in other words, primitive man cussed when wounded, or cooed when happy. These simple utterings served as the basis of the formalized language. Very similar is the *whistle and grunt* theory, expressing the mood; on the other hand, the *ding-dong* theory implies harmony between sound and sense.

It is of interest to note that some of the most primitive languages possesses more tonal variations than the advanced ones; by comparison the latter appear practically monotonic. A man might have hummed a simple melody until his companions identified him with it. That *sing-song* indicated his approach and could have helped to develop a name for him.

The *yo-he-ho* theory implies that languages are based on muscular effort. This illustrated in expressions such as *heave-and-haul*, emitted during hard work by two men working together as they synchronize their efforts with vocal expressions when moving a heavy log or a stone. A similar group endeavor is suggested by the *ta-ra-ra-boom-de-ay* theory. It is assumed that originally meaningless singing, chanting, or humming took place during activities such as hunting of the tribe. When the hunters brought down their prey, their spontaneous joy resulted in a triumphal song; later on, the song became identified with victory.

The *gestural* theory conceives of language as a substitute for bodily actions. Speech, according to this theory, was simply a substitute for indicating the movement of running or the actions of an enemy, and became an efficient warning system for joint warfare.

The professional linguists have more theories on the origin of speech and language; after all, we do not agree on the origin of oil, even though we have more "scientific" tools at our disposal. The theories are usually presented under more technical, - or perhaps more pompous, - names.

There is no need to spend more time with this uncertain history. Regardless of its origin, every language represents a complex structure. The languages of even the most primitive people living today, such as the Australian Bushmen or other aborigines, have very elaborate structures which in some cases already exhibit evidence of decay.

We have thus today a babble of languages, a multitude of conventionalized systems used to express a specific meaning. Translation requires the finding of an equivalent in a second system for a concept in the original tongue. A priori, this appears to be a simple problem but it can be realized completely only in a few special cases, for instance when translating a spoken or written language into Morse code, a computer program, or a similar, controlled mechanical system.

For some of the basic words or notions there is an exact equivalent between languages and the meaning is the same regardless of the system. When an Englishman cries *fire* and a German says *Feuer*, the two people mean exactly the same thing. Names of concrete objects, parts of the human body, animals, etc. usually can be translated correctly. In scientific work, there is a similar close agreement between names of elements, elementary particles, compounds and similar clearly defined items. Difficulties start to arise when we move away from pure science which has a controlled vocabulary in every language; technological and engineering terms are more deeply rooted in the culture of a country and its language and equivalents are not always easy to find. *Mu-meson*, *plutonium*, or *sodium chloride* are understood without ambiguity in any language but a *super highway* might refer to the New Jersey Turnpike in this country and to something much different in a new African country.

Cognates, - words which "look alike", - are very helpful to recognize the meaning of a text written in a completely unknown language. Such scientific words of Greek-Latin origin make it possible to guess

at the meaning of the text by recognizing these international words, spelled nearly the same way in many languages. Whether you see *téléphone* or *teléfono*, you know what the author is talking about, although *fernsprecher* might through you, unless you recognize that it refers to a *far speaker*.

There are many such cognates in French and English; sometimes you might not even recognize that you are dealing with another language. I remember that at the time of the first Atomic Conference I walked with an Oak Ridge friend in the streets of Geneva who suddenly cried out: "Look, they have English signs all over the city". The signs read: *Silence, Prudence* in French as an injunction to drivers; of course, it was "Silence" and "Prudence" in English also as the written word was easily and correctly understood by English-speaking people.

It should be kept in mind, however, that words which look alike and even sound alike may change their meaning and assume a different semantic content. These misleading *false friends* represent a major pitfall for the unwary translator. The meaning might be fairly close but there is a difference in shading which can cause difficulties. Thus, the French word *demander* and the English word *to demand* are basically the same. However, if in the United Nations, the French speaker talks about *demander une explication*, and the interpreter translates it as if he wanted to *demand an explanation*, there might be a diplomatic crisis as a result of this inadvertent mistake. The French word simply is a request, the English version actually implies slamming the table and issuing an ultimatum.

Such a situation actually developed during the Panama crisis a few years ago. After the breakdown of diplomatic relations, the governments of the United States and Panama agreed to *discuss* the situation of the Canal. The word *negotiate* was used in the text. Its actual meaning is to discuss*, but, the meaning in Spanish implied that the U. S. Government was ready to negotiate the overall question of the Canal and when the Panamanians found out that the United States did not intend to

*To communicate or confer with another, so as to arrive at the settlement of some matter; ... Come to terms, especially in state matters by meetings and discussions ...". Webster's Third New International Dictionary.

negociar but only to *discuss* the problem, the *negotiations* broke down once again and several months passed before the situation was finally clarified.

We may encounter such false friends in scientific texts also. I mentioned before that names of compounds are clearly defined; however, it should be kept in mind that there was a science of chemistry long before the Geneva nomenclature was universally adopted. The names of some of the more commonly available compounds are based on the old, pre-Geneva designations. I have seen the French term *eau oxygénée* translated into English, - horribile dictu, as *oxygenated water* instead of *hydrogen peroxide*. If the translator does not know exactly what subject he is dealing with, he is apt to make such mistakes.

In addition to these "false friends", the translator must also keep in mind the cultural connotation of the language which he is translating. Thus "three times thirty" is expressed in English as *ninety;* in Russian it is *devyanosto* which means ten less than one hundred, and in French, it is *quatrevingt dix* or "four times twenty and ten", coming from their counting system, originally based on twenty, as is the English equivalent *four score and ten*. In English, you can say *ninety* which is a scientifically correct statement, but *four score and ten* has a Biblical or literary ring, similar to the feelings evoked at the beginning of the Gettysburg address.

Each word in the language has also a special meaning derived from its culture. This "semantic storage" must be taken into account. *Left* and *right* do not designate simply sides. In most of the languages *right*, or the French *droit*, means also *the correct thing to do* (and also *the law)*. In English, *adroit* means *clever, dexterous*. The *left* in Latin is *sinister* and has a similarly unpleasant connotation in English as it is shown in expressions such as *left-handed compliment*. The *bar sinister* was a heraldic design but its meaning survived until our days as the *child of the left hand*. The French term *gauche* expresses the same unfavorable attribute, although more mildly.

Cognates may be overlooked and not recognized in both "easy" and "difficult" languages. You must be familiar with the laws governing the transformation of classical and vulgate Latin to recognize

immediately the Italian *ossido* as *oxide*. As far as Russian is concerned, you must keep in mind that the Greek-Latin expressions are changed according to specific rules; if you know them, you can easily recognize the original word in its transliterated form. Thus, *auto-* becomes *avto-; logarithm* is rendered as *logarifm; eutectic* will be *evtetika* and so on. It is much more difficult to recognize English or French names transliterated on the basis of pronounciation (by Russians). The best thing is to read the word aloud, then close your eyes and try to write it down, if you are lucky, you recognize *Rezerford* as *Rutherford; Debaevskaya model* as *Debye model; Dzhaul* as *Joule; Uoker* as *Walker*. Sometimes whole English expressions are written down phonetically and you must use your ingenuity or you will never find out what *baipassnaya linea* or *taimer* mean (*by-pass line* and *timer*).

Translators must also keep the "connotative meaning" in mind. I would like to again use an example from my own experience. As you know, it was President Eisenhower who proposed to hold the first International Conference on the Peaceful Uses of Atomic Energy. His letter was supposed to be exhibited near the swimming-pool reactor built in Oak Ridge and exhibited at the Conference. In the translated version of the Presidential letter the expression *peaceful uses of atomic energy* was translated into French by *utilisation de l'énergie atomique en temps de paix;* this means *use of atomic energy in time of peace*. By connotation, this term automatically brings to mind the *utilization of atomic energy in time of war*. I pointed this out to the powers that be but nothing could be done because only the State Department or the White House had the right to change a translation of a Presidential letter. Luckily, the error was discovered and before the opening of the Conference, a modified version (*utilisation de l'énergie atomique à des fins pacifiques*) was sent from Washington.

Words may have identical meaning in certain context but their coverage must also be taken into account. In English, the word *round* may be used for a ball (spherical) or a hoop (circular); *grey* may be used for the hair and for a wall color. This is not automatically true in other languages and these differences must be taken into account or one can

make serious errors. The English term *fluid* covers both liquids and gases; the German *Flüssigkeit* refers only to liquids*.

Sometimes we recognize one part of the meaning while ignoring the rest of the coverage of a word. The French *diffusion* is recognized as *diffusion;* however, it is also used to designate the phenomenon of *scattering*.

I mentioned *false friends,* cognates used in several languages, based on Latin and Greek roots. There are also many adopted foreign words used in English and English words used in other languages. We just assume that the words have the same meaning but very often the new surroundings change the meaning of the word. An American who knows that the word *bra* comes from *brassière* would assume that would be what a French woman would use when wanting to buy intimate apparel; unfortunately, that word is used for a kind of simple shirt worn by small children and the descriptive expression *soutien gorge* used in French is unknown to Americans.

The English word *water closet* has a completely different meaning in continental Europe and the initials actually represent a very important expression for tourists. However, they must learn the correct pronounciation of the letters *WC* in various languages; in France it is *doobl vay say,* Germany it is *vay tsay*. Knowing this, the tourist might be directed to the place he is looking for but if he uses the correct translation of the American euphemism *bathroom,* he might be led to a room provided with a bath tub and nothing else.

Strictly speaking, the English noun doesn't have gender; in some other languages the gender has a strictly grammatical meaning. In Russia the gender mostly follows the sex. This is true in French but we still have expressions, such as *le mannequin* which may refer to a beautiful girl model, and *la sentinelle*, a moustached solider. If you tell a story about the model who was accompanied by the guard to a dance, you must refer to him by the feminine *elle* and to her by the masculine *il*, causing a lot of confusion.

On the other hand, it is of interest to note that ships are regarded as feminine in English and masculine in French. This gives rise to apparently ungrammatical constructions involving ship's names, such as *le Normandie, le France*.

* The term *yankee* designates an American to an Englishman, a Northerner in the South and a native of New England in the North.

The important thing to remember is that the translator must understand correctly what he intends to translate. I would like to quote Bertrand Russell who said that "no one can understand the meaning of cheese unless he has a nonlinguistic acquaintance with it."

As you can see, there are many pitfalls awaiting the translator. It is not surprising that the Italians had a pithy expression for him: *Traduttore-traditore* (translator-betrayer). This is especially true in literary translations. The literary translator must *feel* his material; the scientific translator has a different problem: he must *understand* his subject.

I don't think I have to sell you on the need for scientific translations. After all, at least 50% of the scientific literature in the world is written in languages which more than half of the world's scientists cannot read.(3) It is correct to say that English is a very important, perhaps the most important, scientific language, and that more than half of the papers are written in English, - often, of course, by persons whose mother language is not English. However, this can be stated in another way: if you do not know other languages, you do not understand nearly half of the world's scientific literature, except if you have access to a translation.

It is no consolation that the situation was better during previous centuries. There has been considerable agreement on languages, at least as far as science was concerned. Unfortunately, in 1660 the Royal Society dropped the requirement that all scientific papers must be submitted in both English and Latin. Up to that time, Italian or German scientists could read and understand the papers presented at the Royal Society by their British colleagues.

Since that time, many attempts have been made to achieve again such a unity. Esperanto, an artificial language was developed to promote international understanding; more recently, Interlingua based on common Latin roots was introduced and efforts have been spent on the promotion of Basic English as a universal auxiliary language. Unfortunately, these attempts were not successful.(4) On the other hand, there is a tendency toward homogeneity; on the other hand, the rising nationalistic

feelings counteract this trend. Scientists in small countries learn fast that if they want their scientific literature read by others, they must use one of the world languages and start publishing in English, French, German or Russian, but in many places, nationalistic, or more precisely, chauvinistic feelings force the authors to use the national language. As a result, there are papers written in languages which do not even have a well-developed scientific vocabulary.

I would like to illustrate some of the pitfalls that await the poor scientific translator. He has to contend with the false friends and must know the current usage, both in scientific as in common parlance. As an example, in America the word *gasoline* refers to the stuff you put in your tank, called colloquially *gas* but designated as *petrol* in England; the French use another cognate, *essence* for it, and *pétrole* designates crude oil or a specific fraction. *High test* becomes *super-carburant* in French. The German word *technisch* does not always have the same shading as *technical;* it may mean *industrial* and for you, analytical chemists, it designates a commercial grade of a reagent. The Russian word *osnova* could indicate *basis* or *foundation,* or a *base,* or a *principle.* Technical usage follows unpredictable rules and if you do not follow closely the practice of the particular industry or branch of science with which you are concerned, your translation could sound ridiculous. I have seen the term *reactor control rod* translated as *control stick.* This probably was a perfectly good translation of the word used in the original. There is no rhyme or reason why we must refer to a *stick* in an airplane and a *rod* in a reactor but if you make such a simple and easily recognizable error, the reader may worry that you might have made mistakes in other areas and might lose his confidence in your ability. Some time ago I read a best seller on the history of the atomic bomb. The book, translated from the German, referred to the *Aberdeen Testing Station,* instead of the correct *Proving Grounds.* I realize that the name of the installation was translated from English into German and then back into English but in spite of the allowances, I started having doubts about the author's facts because I found an obvious error, and indeed, my confidence was shaken.

One must be careful with the meaning of prefixes. The French term *inhabitable* means *uninhabitable*, that is, "you cannot live there". A similar problem arose in this country in connection with the word *inflammable*. Many people thought that it meant *not flammable* and the National Safety Council took over the prerogatives of our nonexistent National Language Academy and changed the word to *flammable*, in order to eliminate a hazard.

It is most important that the translator be at home both in the target language and in the subject matter, otherwise he would not know that the concept expressed by the English word *buckling* is rendered as *laplacien* in French and many other languages. He must watch out for national differences in symbols and other practices. In this country, we use a decimal point; the British place the point about half-way up rather than at the base of the number; most other countries use a comma reserving the period to separate units of three digits. Thus *123,456* in a German or Russian text refers to *one hundred twenty three point four five six* and not *one hundred twenty three thousand four hundred fifty six**.

Misunderstandings may be caused by a really mean "false friend". Our word *billion* indicates a thousand million but even the British and people in many other countries use it for million million; the word *milliard* is used for our thousand million. The same is true for the subsequent orders of magnitude in the numbering system; *trillion*, *quadrillion*, etc. represent numbers derived by repeated multiplications by a factor of 10^3 in American English and by 10^6 in most European languages.

Thanks to international organizations such as IUPAC and IUPAP, there is a fair unanimity in chemical symbols, but as late as just before the war the French used *Az* and *Gl* for nitrogen and beryllium; the Russians and Germans still use *J* for iodine. In this country, there is a difference of opinion concerning the symbol of *niobium;* the chief users of the element, the metallurgists who are not officially represented in IUPAC, insist on using *Cb* and thus are more patriotic by referring to the element as *columbium* than the chemists who accepted the international symbol *Nb*.

* The date 7.8.'66 means July 8 in America and August 7 in the rest of the world (including the U. S. Army and Navy).

In many languages the chemical compounds are identified by reversing the order of cations and anions in comparison with the American usage; as a result, the chemical formulas may have an unaccustomed appearance.

The physicists also have their idiosyncracies. The translator must know that the term *hertz* should be rendered as *cycles per second*. And of course, anybody tackling a text on criticality, should know the true meaning of *dollars* and *cents* and recognize the French unit *p.c.m.* (pour cent mille).

Everybody knows that with the exception of the English-speaking countries, the whole world uses the centigrade scale (by the way, °*C* stands for *degree Celsius*, honoring the Swedish inventor). This is so natural that many authors eliminate the *C*. As long as the temperature is recognized, this does not present a problem; the American reader will know that the room-temperature experiment at 20° was carried out at 68°F. When you talk about very high or very low temperatures, the scale used is not so obvious any more. American scientists are quite familiar with metric units but the translator must be careful when he is working with engineers who are not accustomed to deal with the unfamiliar units. It is usually desirable to keep the metric unit in the text but give the American equivalents in a footnote or in parentheses. Difficulties arise with complex derived units in which there might be differences of several orders of magnitude between the units expressed in the two systems. Pressure may be given in kg/cm^2 or kg/mm^2 and the p.s.i. value must be carefully calculated with due regard to the location of the decimal point. When translating an American text into a European language, - and this situation arises quite often here in Oak Ridge, as the natural result of the many international meetings and scientific exhibits held abroad, - the poor translator must puzzle out how to translate *acre-foot* of water into French when speaking of the fresh water requirements of a desalination unit. Luckily, we are moving universal acceptance of the decimal system, although I do not think that my generation will profit from it. I am thankful that at least the time is divided into identical days, hours and seconds and that in every blue moon there is a temperature reference concerning -40°, for which you do not have to struggle with the centigrade or Fahrenheit scale.

Of course, every special field has its own terms; so, when you encounter the expression *sac de minerai* in a French geological article[5], you should translate it as an *ore pocket* and not *a bag of rocks*. I want to use this as an illustration to show that if the translator is not acquainted with the field, and especially if he did not have any technical training, very funny expressions may result.

From my own experience I would like to cite the catalog prepared by a commercial translating from the American exhibit held in conjunction with the 1958 Geneva Conference. I sympathized with the poor translators who probably were under great pressure to complete the work on schedule. One of the exhibits included references to the *mean free path* of particles. This term is understood by any technical man, be he chemist, physicist, or biologist but I could visualize the poor commercial translator who must have tried to find out what all this was about. The English text was translated into three other official languages of the Conference. The Spanish version referred to a *trajectory without average* (free of mean); it was translated into French as a *bad* (mean) *free-way*. In Russian it became *a meaningless road*.

A very confusing item that I encountered when reading that particular brochure was the French heading *Gyrations*. Checking the original, I realized that it referred to *spin*. It just happens that the English technical term *spin* is a "true friend", used in practically every language. The nontechnical translator, of course, did not know this and translated it literally, thereby completely misleading his readers.

In the same booklet, the English term *assumption* was translated into French as *assomption* which, in that language has a primarily theological meaning of the Assumption of the Virgin Mary into Heaven; *théorie* or *hypothèse* should have been used.

All this is mentioned to illustrate some of the difficulties encountered by the technical translators who labor under great pressure to render the outpouring of thousands of scientists understandable by their American colleagues. Perhaps you will appreciate their specialized skill.

It is obvious that mere humans cannot cope with this enormous problem and the miracle machines of our day, the computers, were brought into play. For at least fifteen years there have been efforts all over the world to develop computer programs for translating one language into another. I hope that after my previous remarks, you realize the complexity of the problem: a simple, word-for-word match is not sufficient and a more sophisticated approach is needed.

Use of computers which possess an enormous capacity for routine work was a natural step to take care of the tremendously increased translation needs. In certain technical and linguistic areas the demand far exceeded the available supply of competent translators. It is a curious fact that although this country was founded by immigrants and in some of our cities a large portion of the population has relatively recent descendants of European background, the art of translation has never flourished here. This is possibly a result of the economic law of rewards: the potential technical translator could obtain better remuneration in other fields.(6) So, when proliferation of journals founded during the intensely nationalistic post-war period and expansion of American companies into the international market required a sudden increase of the demand for foreign-language experts, there were not enough people to translate the flood of articles into English, understandable to top management and bench scientists. This was especially true of the Russian-language literature since the advent of the first Sputnik.

The era of computerized or machine-assisted translations started about 15 years ago. I do not want to review the whole complex field of machine translations. In the United States alone, there are at least ten independent groups of linguistic computer experts who tackle the Augean problem of developing a program that will allow to translate automatically thoughts and concepts expressed in one language into a completely different one; in the whole world there must be over a hundred such groups. There are already technical meetings devoted to this subject.

In view of the tremendous amount of work involved the effort is concentrated in areas where the volume is largest, -- in this country,

this means translation from Russian into English; in Russia it is centered on the English-to-Russian and Chinese-to-Russian studies. In the smaller-language areas, the effort is concentrated on translations from one of the major languages into the national language. Because of the lack of need, probably no one is working on programs to translate Swedish into Danish or Italian into Portugese, but generalized programs involving whole families of languages (Romance, Slavic, etc.) are under development.

The problem facing the developers of such programs are indeed very complex. The simplest solution is to accumulate a tremendous vocabulary in the computer's memory, giving the original word and the translation into the target language. Such a system might be useful for two related languages but when one deals with two basically different language families, as is the case of English and Russian, the one-to-one agreement between words does not prevail often; in addition, the structure of the languages require complex transformations, e.g., the Russian double and triple negative must be changed into an acceptable English form.

Still, the first attempts to translate a language into another by means of a computer program were based on such word matching. We already discussed the difficulties facing even the knowledgeable human translator. The computer, of course, presented the advantage that it never forgets anything and follows the program blindly. It is possible to devise a program that helps to differentiate between the two different meanings of the word *plant* (whether a shrub or a factory) by programming botanical and engineering terms and instructing the computer to choose one or the other meaning, depending on the presence of words from one or the other classes in the immediate vicinity of the subject word.

However, in many cases there are a large number of possible meanings. For one Russian term *razryv*, one dictionary[7] gives the following English equivalents:"rupture, break, breach, fracture, fissure, crack, gap, void, space; severance, breaking, breaking off, disruption, discontinuity, interruption, disturbance; tearing, shredding; burst, bursting, explosion, blow-out (of tire); (astrophysics) burst; (min)

fracturing; (heart) failure; laceration (of perineum); shear (of wind); (glol.) fault; ..." You can see how difficult it is to choose a suitable term from the five shadings of the meaning. There are general terms in languages, such as the Russian *datchik* which can mean almost anything - *meter, device, detector, transducer*[8]...

We are in the fortunate position in Oak Ridge that we can benefit of the fruit of a fifteen-year long research in this area carried out at Georgetown University.[9] The Machine Translation Research Project established at that school at the initiative of Professor Leon Dostert was started twelve years ago under the sponsorship of several U.S. government agencies and Euratom to demonstrate the feasibility of translation by computers. At the beginning the project was assisted by the IBM Company which later pursued a somewhat different task.

The Georgetown group developed a machine system, into which a limited amount of lexicographic and syntactic rules have been incorporated. This type of work required a new breed of expert, the "engineer of the language". These new specialists discovered hitherto unknown rules governing the structure of both English and Russian languages and succeeded in codifying their findings.[10] The program selects the meaning to be assigned to a given construction on the basis of the position of the word and of other components of the text, thus solving, at least to a certain extent, the problem mentioned above.

They thus developed a dictionary which stores the material at three distinct levels: 1. The general language which is the most difficult to handle because it has many cultural connotations and secondary shadings and meanings; 2. General technical language which includes the words most commonly used in technical and scientific articles; and 3. A "super" technical dictionary covering the glossary of highly specialized fields. The about 40,000 different entries in the system amount to close to 400,000 because of the affixes, suffixes and paradigmatic forms of Russian. It is of interest to mention that these words were not copied from existing dictionaries but were built up from texts in various scientific subject areas which were examined by subject specialists. This latter action was very helpful for choosing the correct meaning.

It should be remembered, that in addition to the lexical, morphological and syntactical levels, there is also a semantic, "meaning-carrying" level which has been investigated only to a slight extent because it is strongly affected by cultural connotations. In this area the human translator can do wonders, while the machine is limited by its inability to do more than is contained in its program.

The human translator can take advantage of his education, his collateral reading, the computer program cannot consider more than the actual items on the tape. Thus, if a technical speaker or writer refers to the numerical results presented as "ball park figures", he is talking in the context of the American culture of which baseball is an important part. A literal translation for people not familar with this part would be meaningless. It is of interest to note that the informal American business and technical language is full of such expressions based on sports, e.g., tackle the problem, carry the ball, hit bases, etc. The human translator can colorfully change these references into a sport understood by his audience, such as soccer, for instance. A literary citation from Pushkin, unknown to an English-speaking audience could be replaced by a suitable Sheakespearean passage. Because such expressions are more apt to crop up in speech rather than in writing, the interpreter is more concerned with them than the translator.

As you know, Russian is a highly inflected language. For this reason, special codes have been developed to facilitate the identification of structural forms, determining whether a word is a noun, a verb or pronoun, etc. then determining the grammatical cases, such as nominative, dative, etc., and finally examining the position of the word in the logical sequence within a sentence.

It should be kept in mind that language has a very definite structure. The natural languages "grew" and were not artifically or logically created; therefore, the previously mentioned contextual cultural factors play a very important role in its structure. I am sure that the ingenuity of the linguist-programmers will overcome the vocabulary problems, eliminating some of the still prevailing confusion caused by words with multiple meanings. Current physics papers translated

by the Georgetown program still render the Russian word *yadro* by *kernel* as used in biological texts, rather than *nucleus* as it should be in atomic physics.

Such a multiplicity of meaning, depending on the context shown also, for example, in the Russian word *zemlya* which may be translated as *ground*, *soil*, or *Earth* (if the planet as a whole is considered). A wrong choice could be misleading.

After more than a decade of arduous development work, a fairly satisfactory, although not quite perfect, level has been reached. In order to evaluate the results, it was decided to do some field testing, giving the user an opportunity to express his opinion. The program has been made available to the Computing Sciences Center of Union Carbide Nuclear Division and for about one and half years it has been in actual routine use for translating material submitted by the staff to the Office of Language Services of the Laboratory.

The papers to be translated are submitted by the technical staff members of the Oak Ridge National Laboratory. We are attempting to decide whether a technical subject expert is able to understand the the translation as it comes from the computer, without any human editing. It is realized that some of the sentences might be somewhat awkward but is still important to find out whether it is worth while for a technical man to spend two hours instead of one on the material, keeping in mind that it is available in a few days rather than in several weeks, the time required by translating agencies. If urgently needed, the material could be keypunched immediately and the translation be made available overnight.

The keypunching is done by persons who do not know Russian but learned in a few days, to recognize the characters. The transliteration scheme used differs from that employed by Chemical Abstracts, Library of Congress, etc. because no double characters are used; each of the Cyrillic letters is represented by only one Latin character; in view of the fact that there are 32 letters in the Russian and only 26 in the Latin alphabet, a few numbers had to be used. Examples of this translation are shown in the appendix.

At the present time the actual research in this field is continued at Georgetown University under the supervision of Professors R. R. Macdonald, M. Pacak and their associates. The work is carried out at Union Carbide Nuclear Division's Computer Sciences Center under the supervision of E. M. Kidd and F. C. Hutton. It is planned to organize a group of technical men interested in language problems; this group will collaborate with the computer experts and other specialists by upgrading the vocabulary and developing *microthesauri* in specialized fields.

The big advantage of this method lies in the fact keypunch operators may be trained in a few days to handle Russian-language texts; it would take years to train competent Russian translators. It is already quite obvious that the system is very useful for a rapid checking of the material; even in its present, less than perfect, form it allows the user to decide whether the paper is of interest to him.

At present the keypunch operators are not assigned exclusively to this task; in view of their slower rate of speed the cost of the service is somewhat higher than that of human translators. It is hoped that continued research will result in a technological breakthrough; optical scanning methods might offer a promising approach.

It might be of interest to review briefly the sources of errors that arise in the machine translation program, as observed by the user. Knowledge of these sources of error is useful in the evaluation of the final product.

Whenever the computer is unable to find a translation for a word in its memory, it prints the original Russian word as given in the input. As the keypunchers do not know the language, they do not recognize typing and nonexisting words for which, of course, there is no translation, are introduced in the text, together with valid but wrong words. This is aggravated by the fact that the original text is often poorly printed and, especially when copied material is submitted, the keypunchers may have difficulty to recognize the characters. Occasionally, a word separated at the end of a line is entered as two separate words; if each of the two portions happen to have a meaning, a completely erroneous translation may result.

As Russian has no articles, introduction of the words *the* or *an* may change the emphasis of the text somewhat. Prepositions also present problems, certain Russian prepositions, such as *po*, have a large number of meanings from among which the human translator must choose the most suitable one. As in the case of the machine system has chosen one particular meaning which is acceptable in most cases, namely *according to;* however, the expression *po vidomomu* which means *probably* or *apparently,* is translated as *according to the visible.* This frequently used idiomatic expression confuses the reader of the machine translated text.

Fortunately many of the words missing from the memory of the computer are cognates which may be recognized by the experienced reader. Many of the missing words relate to combination of two cognates, or of a true Russian word and a cognate as in *mnogoelektronnyi,* relating to something containing many electrons, or *aerofotosnimok*, aerial photograph.

Often an adjective is used as a noun; thus, the term *"uchennyi"* (using a standard transliteration scheme) may be translated as *learned, educated,* hence *academic* as it is in the memory. However, very often it is used as a noun, with the meaning of *scientist, savant.*

The machine of course cannot differentiate whether an item should be translated or not and tackles author's name in the text or the bibliography. This could yield funny results. I remember one specific text, in which the term *The Old Man* figured prominently and somewhat mysteriously. Upon checking, we discovered that reference was made to a Russian author named *Starik,* -- and the computer translated the actual meaning of the man's name. Professor Macdonald told me that during the translation experiments at Georgetown University, he examined a Russian text in which Leonardo da Vinci was mentioned. The Italian names *Leonardo* and *Vinci* were, of course, missing from the memory and were printed in their original form but the system recognized *da* as the equivalent of *yes* and the English text dutifully contained the machine-printed version *Leonardo yes Vinci.*

Similar problems arise when English is translated into another language. A book on a Russian machine-translation project[11] of English

into Russian discusses the problem of Americanisms when faced with expressions such as *baloney, buck, grand,* explaining that the terms are rendered as *nonsense, dollar* (not deer), *a thousand dollars, etc.*

With all its shortcomings, this program has already rendered valuable services in actual use without requiring the services of a human editor. ORNL is one of the very few places in the country where a computerized Russian-into-English translation service is routinely available.

I have tried to give you a short summary of the problems facing the technical translator, the man who lends a helpful hand to the heirs of people of the Tower of Babel; I mentioned some of the attributes that he must possess.

The technical translator must be an interpreter of ideas in the broadest sense of the word. He must know the languages involved; he must be familiar with shades of meaning and grammatical niceties; must realize the changes in emphasis achieved by addition of prefixes, suffixes and changes of position within the sentence. He must understand the subject and be aware of current fads in the technical jargon. He must watch out for national preferences in the orthography of technical terms, writing of formulas, deviations from standard nomenclature; practices concerning units, abbreviations and keep a wary eye on many other potential pitfalls. If at all possible, he must be versed in the national culture of the language and the subculture of the subject.

If he attempts to use the computer as a powerful aid in his translating activities, he must realize that it is a tool rather than a panacea. Even if he is not an expert, he must have a nodding acquaintance with programming and certain aspects of "linguistic engineering".

His field of activity, his accomplishments are not always understood by his colleagues who often consider his product the result of a rather routine activity. But, of course, this is true in other fields also: the physician who asks for the analysis of a blood specimen does not always realize how much research, skill and know-how is behind that set of figures in his hands.

I wanted to finish with a plea to recognize the achievements of the technical translator. However, before I become too pompous, I must admit that, regardless whether man or machine does the translation, the result often comes out in a new language, *translatorese*, which, according to John Ciardi of the Saturday Review and translator of Dante's Inferno, *is a thought adrift in the vacuum between two dictionaries!*

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11. D. Yu Panov: Automatic Translation, (translated by R. Kisch), Pergamon Press, 1960.

The material presented in the following pages illustrate the present state of the machine-aided translation project, developed at Georgetown University's Machine Translation Research and Language Projects. The translations were made at the Union Carbide Nuclear Division Computer Science Center; the service is routinely available to the Laboratory's technical staff through the ORNL Office of Language Service. The examples were chosen to cover a relatively wide area: they include general science news in physics and biology, originally published in Scientific American and New Scientists and reprinted in the Russian journal Priroda, together with papers from Doklady Akad. Nauk SSSR in the field of chemistry and technical physics.

I would like to express my appreciation to Mr. Donald H. Miller, Jr., General Manager of Scientific American, 415 Madison Avenue, New York, N. Y. 10017 and to Mr. Donald Gould, Editor, New Scientist, Cromwelll House, Fulwood Place, High Holborn, London, U.K. for permission to reprint the original articles from the October 1965 issue of Scientific American, and the August 12, 1965 issue of New Scientist.

In order to facilitate the reading of the keypunched Russian text, the transliteration code is given on page 26. The requirement to use a single keypunching operation for each letter of the Cyrillic alphabet necessitated the inclusion of numbers in the transliteration scheme, giving an odd appearance to the text. However, a Russian-speaking person is able to follow text without undue difficulty. The translation sample presented by Dr. A. H. Snell at an international conference in Yugoslavia is also attached. The annotated versions are followed by the direct, somewhat reduced-size copy of the keypunched original text and the computer translated version, to illustrate the unedited material sent to the requesters.

Transliteration of the Cyrillic Alphabet

RUSSIAN	KEYPUNCH	RUSSIAN	KEYPUNCH
А а	A	Р р	R
Б б	B	С с	S
В в	V	Т т	T
Г г	G	У у	U
Д д	D	Ф ф	F
Е е	E	Х х	X
Ж ж	J	Ц ц	Q
З з	Z	Ч ч	C
И и	I	Ш ш	W
Й й	1	Щ щ	5
К к	K	Ъ ъ	7
Л л	L	Ы ы	Y
М м	M	Ь ь	6
Н н	N	Э э	3
О о	O	Ю ю	H
П п	P	Я я	4

* **Indicates the end of a sentence**

$ **Indicates the words that are not to be translated**

Two-Quantum Maser

A maser that operates only when the stimulating radiation arrives as a packet containing two quanta, instead of the usual single quantum, makes it possible to amplify simultaneously at two frequency levels instead of one. This new type of maser operation was observed for the first time by Norman S. Shiren of the International Business Machines Corporation.

The possibility of obtaining two-quantum emission in an optical maser, or laser, had been discussed a year ago by three other IBM workers: P. P. Sorokin, N. Braslau and R. L. Garwin. They pointed out that several advantages would accrue from such a mode of operation: amplification at two frequencies, the use of a wide combination of frequencies, rapid buildup of a giant pulse at one frequency if the other frequency were primed with energy in the form of a high density of photons. The Soviet physicist Aleksandr M. Prokhorov, who shared the 1964 Nobel prize in physics for his contributions to the maser, had independently discussed the possibility of a two-quantum laser. Two-quantum processes, although not applied to masers or lasers, had been investigated theoretically as early as 1931 by Maria Goeppert Mayer, now at the University of California at San Diego.

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In the ordinary one-quantum maser an atom that has been raised to a particular excited state is stimulated to return to a lower state when struck by a photon whose energy exactly matches the energy that would be emitted if the atom were to drop to the lower state spontaneously. In the two-quantum maser, stimulation is provided by two photons, represented by input signals of two different frequencies, that together carry the energy needed to match that of the transition between the atom's two states of excitation. It does not matter how the total energy is divided between the two photons; both input signals are amplified.

In the particular device used by Shiren one of the input signals was electromagnetic and the other mechanical, in the form of an ultrasonic vibration. The active material is a crystal of magnesium oxide containing ions of iron or nickel. With the maser immersed in liquid helium, these ions are pumped to a high energy state. When stimulated to return to a lower state, the ions emit one quantum of electromagnetic energy and one quantum of vibrational energy, whose frequencies match those of the original electromagnetic and ultrasonic signals. The IBM workers believe it should be possible to build a two-quantum laser that will operate on two input signals that are both electromagnetic.

ORIGINAL ENGLISH ARTICLE

ДВУХКВАНТОВЫЙ МАЗЕР

Если на возбужденный атом действуют одновременно два кванта, суммарная энергия которых равна резонансной, то атом испускает два таких же кванта по известному закону индуцированного испускания[1]. Таким образом, обычный принцип мазера или лазера допускает одновременное усиление двух частот. Возможность двухквантового лазера рассмотрел теоретически лауреат Ленинской и Нобелевской премии советский физик А. М. Прохоров. Эту идею осуществил на опыте американский физик Н. Ширен, пока, правда, не в виде лазера, а мазера (т. е. не на свете, а на радиоволнах). В эксперименте использован кристалл окиси магния с примесью железа или никеля, помещаемый в ванну из жидкого гелия. При одновременной подаче радиочастотного и ультразвукового сигналов оба они подвергаются усилению.

«Scientific American», v. 213, 1965, № 4, p. 40 (США)

RUSSIAN TEXT BASED ON ENGLISH ARTICLE

```
+* (PAGE,115) *
P* DVUXKVANTOVYI MAZER *
P* ESLI NA VOZBUJDENNYI ATOM DEISTVUHT ODNOVREMENNO DVA
KVANTA , SUMMARNA4 3NERGI4 KOTORYX RAVNA REZONANSNOI , TO
ATOM ISPUSKAET DVA TAKIX JE KVANTA PO IZVESTNOMU ZAKONU
INDUQIROVANNOGO ISPUSKANI4 (SFTN) *
TAKIM OBRAZOM , OBYCNYI PRINQIP MAZERA ILI LAZERA
DOPUSKAET ODNOVREMENNOE USILENIE DVUX CASTOT *
VOZMOJNOST6 DVUXKVANTOVOGO LAZERA RASSMOTREL TEORETICESKI
LAUREAT LENINSKOI I NOBELEVSKOI PREMII SOVETSKII FIZIK
A.M.PROXOROV *
3TU IDEH OSU5ESTVIL NA OPYTE AMERIKANSKII FIZIK N.WIREN,
POKA , PRAVDA , NE V VIDE LAZERA , A MAZERA ( T. E. NE NA
SVETE , A NA RADIOVOLNAX ) *
V 3KSPERIMENTE ISPOL6ZOVAN KRISTALL OKISI MAGNI4 S
PRIMES6H JELEZA ILI NIKEL4 , POME5AEMYI V VANNU IZ JIDKOGO
GELI4 *
PRI ODNOVREMENNOI PODACE RADIOCASTOTNOGO I UL6TRAZVUKOVOGO
SIGNALOV OBA ONI PODVERGAHTS4 USILENIH *
P* (SCIENTIFIC AMERICAN), L$V. 213$ , 1965$ , L$NO. 4$ ,
L$P. 40$ ( SWA ) *
```

TRANSCRIPTION OF RUSSIAN TEXT

"MASER" AND "LASER" ARE NOT IN THE MEMORY: THE COMPUTER PRINTED THEM IN THE GENETIVE FORM WITH THE RUSSIAN SPELLING

IN ENGLISH WHICH IS NOT INFLECTED, THE WHOLE EXPRESSION SHOULD BE RENDERED AS "EQUAL TO THE RESONANCE ENERGY"

```
+ (PAGE,115) .
      TWO-QUANTUM MAZER .
      IF ON EXCITED ATOM ACT SIMULTANEOUSLY TWO QUANTA , THE
OVERALL ENERGY OF WHICH IS [EQUAL RESONANT] , THEN ATOM EMITS
TWO THE SAME QUANTA ACCORDING TO KNOWN LAW OF INDUCED EMISSION
(SEE FOOTNOTE) .
THUS , THE USUAL PRINCIPLE OF [MAZERA] OR [LAZERA] PERMITS THE
SIMULTANEOUS INTENSIFICATION OF TWO FREQUENCIES .
THE POSSIBILITY OF TWO-QUANTUM [LAZERA] THERE CONSIDERED
THEORETICALLY THE LAUREATE OF THE [LENINIST] AND NOBEL PRIZE THE
SOVIET PHYSICIST OF A.M.PROXOROV .
THIS IDEA [EFFECTED] ON EXPERIMENT AMERICAN PHYSICIST N.WIREN,
[MEANWHILE] , TRUE , NOT IN THE FORM OF [LAZERA] , BUT [MAZERA] (
I.E. NOT [ON] LIGHT , BUT [ON] RADIO-WAVES ) .
IN EXPERIMENT WAS USED CRYSTAL OF OXIDE OF MAGNESIUM WITH
ADMIXTURE OF IRON OR NICKEL , BEING PLACED IN BATH [FROM] LIQUID
HELIUM .
[UPON] THE SIMULTANEOUS SUPPLY OF RADIO-FREQUENCY AND ULTRASONIC
SIGNALS BOTH THEY ARE SUBJECTED TO INTENSIFICATION .
      (SCIENTIFIC AMERICAN), V. 213 , 1965 , NO. 4 , P. 40 (
UNITED STATES ) .
```

"REALIZED"

"ALTHOUGH"

ADJECTIVAL FORM NOT NEEDED

ARTICLES (DEFINITE AND INDEFINITE) ARE MISSING

INCORRECT PREPOSITIONS

MACHINE TRANSLATION OF RUSSIAN TEXT INTO ENGLISH WITH EXPLANATORY NOTES

Two-Quantum Maser

If two quanta, the total energy of which is equal to the resonance energy, act simultaneously on an excited atom, that atom will emit the same two quanta according to the known law of induced emission. Thus, the usual maser or laser principle permits the simultaneous amplification of two frequencies. The Soviet physicist A. M. Probhorov, laureate of the Lenin and the Nobel Prizes, examined theoretically the possibility of the two-quantum laser. This idea was experimentally realized by the American physicist, N. Shiren, although not as a laser but as a maser (that is not with light but with radio waves). A magnesium oxide crystal with iron or nickel admixture, placed in a liquid helium bath, was used in the experiment. Simultaneous input of radiofrequency and ultrasonic signals resulted in the amplification of both.

HUMAN TRANSLATION OF RUSSIAN TEXT

Molecular Memory of Dawn

Individual nerve cells removed from a mollusk seem to "remember" the time of daybreak and the fortnightly time of particularly high tides. These two pieces of information are presumably important in the mollusk's feeding and reproductive habits. The evidence that the information is stored in individual nerve cells is reported by Felix Strumwasser of the California Institute of Technology.

The mollusk used in the experiments is the sea hare, a sluglike creature six to nine inches long that lives along rockbound coasts. Its extremely large nerve cells, up to half a millimeter in diameter, make it useful in studies of electrophysiology. The cells employed in the Cal Tech experiments are from the main ganglion in the sea hare's midsection; the ganglion is concerned with feeding, respiration, excretion, reproduction and the ejection of an inky fluid used for concealment.

Strumwasser "trained" sea hares by putting them in a tank that provided 12 hours of light followed by 12 hours of darkness. The sea hares were exposed to this cycle for several days. Then the ganglion associated with feeding was removed and placed in a constant-temperature bath of seawater. By inserting microelectrodes in individual cells Strumwasser could record when the cells produced a nerve impulse.

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The "resting" rate of the cells was a few impulses per minute. But periodically, at a time coinciding with the time when the tank lights had been switched on during the training period, the impulse rate shot up to about 40 counts per minute and remained elevated for about three hours. The rate then fell to the resting level until the following "dawn," when the rate increased again. After about 48 hours the isolated nerve cells stopped working, presumably for lack of nutrition. Some of the cells in the ganglion studied by Strumwasser increased their firing rates every 12 hours, as if they remembered evening as well as dawn.

A subtler and at first more puzzling impulse cycle was detected by analyzing the firing peaks of nerve cells of several sea hares covering a two-week period. These peaks did not coincide with either dawn or evening. Strumwasser finally observed that this cycle corresponded to the period of highest tides that occur fortnightly in the sea hare's original home. The memory of this lunar tidal cycle had not been destroyed by the laboratory training cycle.

Strumwasser has preliminary evidence that the firing patterns are related in some way to the production of ribonucleic acid (RNA), giant molecules formed within the cell on templates of deoxyribonucleic acid (DNA). A number of workers have proposed that RNA molecules can encode an organism's environmental experience in analogy with the way DNA encodes the sum total of its genetic history.

ORIGINAL ENGLISH ARTICLE

ПАМЯТЬ ОТДЕЛЬНЫХ КЛЕТОК

Моллюск, известный под названием морского зайца, имеет очень большие нервные клетки (до 1,5 *мм* в диаметре), удобные для экспериментов по электрофизиологии. Клетки из главного ганглия этого моллюска использовал физиолог Ф. Штурмвассер (США) в следующих интересных опытах. Животные подвергались «тренировке» в закрытом бассейне, где 12 час. освещения чередовались с 12 час. темноты. Затем ганглий удалялся и содержался в темноте в термостате с морской водой. Вводя микроэлектроды в отдельные клетки, исследователь мог регистрировать их импульсы. В покое клетка давала лишь несколько импульсов в минуту. Но через 24часа, после того как при тренировке включался свет, клетка приходила в состояние возбуждения и давала до 40 импульсов в минуту. Некоторые же клетки «помнили» не только включение, но и выключение света — у них возбуждение наступало каждые 12 часов. Можно предположить, что память клетки сохраняется в молекулах рибонуклеиновой кислоты (РНК).

«Scientific American», v. 213, 1965, № 4, p. 41 (США)

RUSSIAN TEXT BASED ON ENGLISH ARTICLE

```
P* PAM4T6 OTDEL6NYX KLETOK *
P* MOLLHSK , IZVESTNYI POD NAZVANIEM MORSKOGO ZAI QA ,
IMEET OCEN6 BOL6WIE NERVNYE KLETKI ( DO 1,5 MM V DIAMETRE
) , UDOBNYE DL4 3KSPERIMENTOV PO 3LEKTROFIZIOLOGII *
KLETKI IZ GLAVNOGO GANGLI4 3TOGO MOLLHSKA ISPOL6ZOVAL
FIZIOLOG F *
WTURMVASSER ( SWA ) V SLEDUH5IX INTERESNYX OPYTAX *

JIVOTNYE PODVERGALIS6 ( TRENIROVKE ) V ZAKRYTOM BASSEINE ,
GDE 12 CAS. OSVE5ENI4 CEREDOVALIS6 S 12 CAS. TEMNOTY *

ZATEM GANGLII UDAL4LS4 I SODERJALS4 V TEMNOTE V TERMOSTATE
S MORSKOI VODOI *
VVOD4 MIKRO3LEKTRODY V OTDEL6NYE KLETKI , ISSLEDOVATEL6
MOG REGISTRIROVAT6 IX IMPUL6SY *
V POKOE KLETKA DAVALA LIW6 NESKOL6KO IMPUL6SOV V MINUTU *

NO CEREZ 24 CASA , POSLE TOGO KAK PRI TRENIROVKE VKLHCALS4
SVET , KLETKA PRIXODILA V SOSTO4NIE VOZBUJDENI4 I DAVALA
DO 40 IMPUL6SOV V MINUTU *
NEKOTORYE JE KLETKI ( POMNILI ) NE TOL6KO VKLHCENIE , NO I
VYKLHCENIE SVETA - U NIX VOZBUJDENIE NASTUPALO KAJDYE 12
CASOV *
MOJNO PREDPOLOJIT6 , CTO PAM4T6 KLETKI SOXRAN4ETS4 V
MOLEKULAX RIBONUKLEINOVOI KISLOTY ( RNK ) *
P* END *
```

TRANSCRIPTION OF RUSSIAN TEXT

THE PREPOSITION "PO" IS DIFFICULT TO TRANSLATE. IN THIS CASE "IN" OR "ON" WOULD HAVE BEEN A BETTER CHOICE

THIS SHOULD HAVE BEEN TRANSLATED AS "INDIVIDUAL"

"SEA HARE" IS AN UNUSUAL WORD; NOT IN THE MEMORY

THE ADJECTIVAL ENDING IS NOT REQUIRED IN ENGLISH

THE MEMORY OF SEPARATE CELLS .
MOLLUSK , KNOWN UNDER THE NAME OF MARITIME ZAIQA , HAS
VERY GREATER NERVOUS CELLS (UP TO 1,5 MM. ~~IN DIAMETER)~~ ,
CONVENIENT FOR EXPERIMENTS ACCORDING TO ZLEKTROFIZIOLOGII .
CELLS FROM MAIN GANGLI4 OF THIS MOLLUSK USED PHYSIOLOGIST F .
WTURMVASSER (UNITED STATES) IN FOLLOWING INTERESTING
EXPERIMENTS .
ANIMALS WERE SUBJECTED (TO TRAINING) IN CLOSED BASIN , WHERE
12 THE HR. OF ILLUMINATION WERE ALTERNATED WITH 12 THE HR. OF
DARKNESS .
THEN GANGLII WAS REMOVED AND WAS CONTAINED IN DARKNESS IN
THERMOSTAT WITH MARITIME WATER .
INTRODUCING MICROELELTRODES IN SEPARATE CELLS , INVESTIGATOR
COULD RECORD THEIR IMPULSES .
IN REST CELL GAVE ONLY SEVERAL IMPULSES IN THE COURSE OF
MINUTE .
BUT THROUGH 24 HOUR , AFTER THIS AS UPON TRAINING THERE WAS
INCLUDED LIGHT , CELL ARRIVED IN THE STATE OF EXCITATION AND
GAVE UP TO 40 IMPULSES IN THE COURSE OF MINUTE .
CERTAIN HOWEVER CELLS (REMEMBERED) NOT ONLY INCLUSION , BUT
THE SWITCHING OFF OF LIGHT - AT THEM EXCITATION OCCURRED EACH
12 HOURS .
IT IS POSSIBLE TO SUPPOSE , THAT THE MEMORY OF CELL IS KEPT IN
MOLECULES OF RIBONUKLEINOVOI ACID (RNK) .
END .

THE ORIGINAL ENGLISH TEXT HAS 0.5 mm; THE RUSSIAN EDITOR (OR TYPIST) CHANGED IT

TYPOGRAPHICAL ERROR IN THE RUSSIAN TEXT. (SHOULD BE "STRUMWASSER")

THESE WORDS ARE MISSING FROM THE MACHINE'S MEMORY BUT AS THEY ARE COGNATES, THEY CAN BE EASILY UNDERSTOOD

THE ARTICLE "THE" IS MISSING

QUOTATION MARKS ARE INDICATED BY PARENTHESES

AGAIN, ADJECTIVAL FORM NOT NEEDED; "SEA WATER" WOULD HAVE BEEN BETTER

"KEPT" OR "MAINTAINED"

"AT"

THE ARTICLE "THE" MISSING

"THE" MISSING

"PER"

"SWITCHED ON"

"RETAINED"

"THE" MISSING

"A FEW"

REACHED

THIS SHOULD HAVE BEEN TRANSLATED AS "INDIVIDUAL"

RECOGNIZABLE COGNATE

RUSSIAN ABBREVIATION; SHOULD BE RNA

MACHINE TRANSLATION OF RUSSIAN TEXT INTO ENGLISH WITH EXPLANATORY NOTES

The Memory of Individual Cells

The mollusk known as the sea hare has very large nerve cells (up to 1.5 mm in diameter) which are very convenient for experiments in electrophysiology. The physiologist F. Strumwasser (USA) used cells from the main ganglion for the following interesting experiments. The animals were "trained" in a closed tank, alternating 12 hours of light with 12 hours of darkness. The ganglion was then removed and was kept in darkness in a constant-temperature bath of sea water. By inserting micro-electrodes in individual cells, the investigator could record their impulses. When resting, the cell gave a few impulses per minute. However, after 24 hours, whenever during the training the light was turned on, the cell became excited and emitted up to 40 impulses per minute. Some of these same cells "remembered" not only the startup of the lighting but also when it was stopped, -they became excited every 12 hours. It may be assumed that the memory of the cells is conserved in ribonucleic acid molecules.

HUMAN TRANSLATION OF RUSSIAN TEXT

HOW MUCH H_2O IN WATER?

Water is a thoroughly anomalous liquid. It expands on freezing, its latent heat of vaporization is higher than it should be and it boils about 160 degrees C higher than its nearest counterpart (H_2S). It is generally accepted that these peculiarities are because most of the molecules in water are bound together into loose polymeric $H_{2n}O_n$-type structures by hydrogen bonds (weak bonds which appear as the extensions of certain bonds between hydrogen and, for example, oxygen). However, authorities differ in their estimates of the extent of this association, and recent calculations have suggested as much as 30 per cent of free monomer (H_2O) in the liquid. Now D. P. Stevenson of the Shell Development Company, Emeryville, California, has re-examined the question using three distinct approaches (*Journal of Physical Chemistry*, Vol. 69, p. 2145).

Firstly, the features of the ultraviolet spectrum of the (totally monomeric) vapour should occur in that of the liquid, in so far as the liquid contains free molecules; and the effect of temperature on the liquid spectrum should enable the thermodynamics of the monomer-polymer equilibrium to be assessed. Incredibly, both the liquid and vapour spectra had to be specially run for this investigation, as sufficiently detailed ones were not already available. The results indicated only about 0.1 per cent of free H_2O in water at room temperature.

Secondly, the infrared spectra (which contain information on the vibrational and rotational freedom of the molecules) were taken of bulk water and of dilute solutions of water in chloroform and carbon tetrachloride, in which solvents the water molecules would be separate. The two sets of spectra were quite distinct, indicating that bulk water contained no monomer within the limit of detection—about 1 per cent. This result is consistent also with the third approach, that of comparing the thermodynamics of the vaporization of water with that of substances like methane and the rare gases which form unassociated liquids. This calculation suggested around 0.2 per cent of monomer. It therefore seems safe to conclude that the one piece of chemistry everyone knows is wrong—water really contains very little H_2O.

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ORIGINAL ENGLISH ARTICLE

ОПРЕДЕЛЕНИЕ ВЛАЖНОСТИ ВОДЫ

Жидкость, которую мы называем водой и описываем химической формулой H_2O, чрезвычайно странная. Она расширяется при замерзании, скрытая теплота испарения ее аномально велика и кипит она при температуре примерно на 160° С выше, чем ее ближайший химический аналог — сероводород H_2S. По-видимому, все эти особенности объясняются тем, что большинство молекул в воде связано между собой в неустойчивые полимерные структуры типа $(H_2O)_n$ слабыми водородными связями. Недавно была проведена экспериментальная проверка того, сколько же свободного мономера H_2O, т. е. «химической» воды содержится в жидкости, именуемой водой. Проверка проводилась тремя способами.

В первом способе использовался тот факт, что характер ультрафиолетового спектра пара, состоящего, как известно, целиком из мономерных молекул, должен сохраняться и у жидкости, поскольку она также содержит свободные молекулы.

RUSSIAN TEXT BASED ON ENGLISH ARTICLE

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P* OPREDELENIE VLAJNOSTI VODY *
P* JIDKOST6 , KOTORUH MY NAZYVAEM VODOI I OPISYVAEM
XIMICESKOI FORMULOI H2O , CREZVYCAINO STRANNA4 *
ONA RASWIR4ETS4 PRI ZAMERZANII , SKRYTA4 TEPLOTA ISPARENI4
EE ANOMAL6NO VELIKA I KIPIT ONA PRI TEMPERATURE PRIMERNO
NA 160 DEGREES L$C VYWE , CEM EE BLIJAIWII XIMICESKII
ANALOG - SEROVODOROD H2S *
PO-VIDIMOMU , VSE 3TI OSOBENNOSTI OB74SN4HTS4 TEM , CTO
BOL6WINSTVO MOLEKUL V VODE SV4ZANO MEJDU SOBOI V
NEUSTOICIVYE POLIMERNYE STRUKTURY TIPA (H2O)N SLABYMI
VODORODNYMI SV4Z4MI *
NEDAVNO BYLA PROVEDENA 3KSPERIMENTAL6NA4 PROVERKA TOGO ,
SKOL6KO JE SVOBODNOGO MONOMERA H2O , T. E. ( XIMICESKOI )
VODY SODERJITS4 V JIDKOSTI , IMENUEMOI VODOI *
PROVERKA PROVODILAS6 TREM4 SPOSOBAMI *
P* V PERVOM SPOSOBE ISPOL6ZOVALS4 TOT FAKT , CTO XARAKTER
UL6TRAFIOLETOVOGO SPEKTRA PARA , SOST045EGO , KAK IZVESTNO
, QELIKOM IZ MONOMERNYX MOLEKUL , DOLJEN SOXRAN4T6S4 I U
JIDKOSTI , POSKOL6KU ONA TAKJE SODERJIT SVOBODNYE
MOLEKULY *
```

TRANSCRIPTION OF RUSSIAN TEXT

THE ABSENCE OF "IS" DOES NOT CONFUSE THE READER

INTRODUCTION OR OMISSION OF "THE" OR "A" PRESENTS PROLEMS AS RUSSIAN HAS NO ARTICLES

PREPOSITIONS CAUSE MANY DIFFICULTIES

ANOTHER SYNONYM WOULD HAVE BEEN PREFERABLE

THE SYSTEM CORRECTLY TRANSLATES THE RUSSIAN FEMININE "ONA" BY "IT" INSTEAD OF "SHE"

THE ORDER OF THE PRONOUN AND VERB WAS REVERSED IN THE RUSSIAN FOR LITERARY REASONS; THIS RESULTS IN AN AWKWARD ENGLISH CONSTRUCTION

THE FREQUENTLY USED IDIOMATIC EXPRESSION "PO VIDIMONU" WILL BE INCORPORATED IN THE VOCABULARY OF THE SYSTEM

"HIGHER" SHOULD HAVE BEEN USED

THE RUSSIAN INTENSIFYING TERM "ZHE" SHOULD HAVE BEEN LEFT UNTRANSLATED

THIS PREPOSITION INDICATES (UNNECESSARILY) THE RUSSIAN INSTRUMENTAL CASE ENDING

"CONSERVED" WOULD HAVE GIVEN MORE EMPHASIS TO THE INTENDED MEANING

THE RUSSIAN TERM "i" MAY MEAN "AND" OR "ALSO". THE WRONG MEANING WAS CHOSEN

"IN AS MUCH AS" WOULD HAVE BEEN BETTER IN THIS CONTEXT

UNNEEDED ARTICLE AGAIN

```
THE DETERMINATION OF [DAMPNESS] OF WATER .
LIQUID , WHICH WE CALL WATER AND WE DESCRIBE BY CHEMICAL
FORMULA H2O , EXTREMELY STRANGE .
[IT] IS EXTENDED UPON FREEZING , THE LATENT HEAT OF ITS
EVAPORATION ANOMALOUSLY GREAT AND [BOILS IT] AT TEMPERATURE
APPROXIMATELY [ON] 160 DEGREES C [ABOVE] , THAN ITS NEXT CHEMICAL
ANALOG - HYDROGEN SULFIDE H2S .
[ACCORDING TO-VISIBLE] , ALL THESE PECULIARITIES ARE EXPLAINED
BY THE FACT THAT THE MAJORITY OF MOLECULES IN WATER WAS
CONNECTED IN THE UNSTABLE POLYMER STRUCTURES OF TYPE (H2O)N BY
WEAK HYDROGEN BONDS .
RECENTLY WAS CONDUCTED EXPERIMENTAL CHECK THIS , HOW MUCH
[HOWEVER] THE FREE MONOMER H2O , I.E. ( CHEMICAL ) WATER IS
CONTAINED IN LIQUID , [BY] CALLED WATER .
THE CHECK WAS CONDUCTED BY THREE METHODS .
        IN THE FIRST METHOD THERE WAS USED THIS FACT , THAT THE
CHARACTER OF ULTRAVIOLET SPECTRUM OF STEAM , WHICH CONSISTS ,
AS IS KNOWN , WHOLLY FROM MONOMERIC MOLECULES , MUST BE [KEPT]
[AND] AT LIQUID , [AS FAR AS] IT ALSO CONTAINS [THE] FREE MOLECULES
```

MACHINE TRANSLATION OF RUSSIAN TEXT INTO ENGLISH WITH EXPLANATORY NOTES

Determination of the wetness of water

The liquid that we call water and identify by the chemical formula H_2O, is a very strange one. It expands upon freezing, its latent heat of evaporation is abnormally high and it boils at a temperature that is about 160° C higher than that of its nearest chemical analog, hydrogen sulfide, H_2S. These peculiar properties are probably explained by the fact that most of the molecules are bound to each other by weak hydrogen bonds, forming unstable $(H_2O)_n$-type polymeric structures. Recently, experimental tests were carried out to determine how much of the free monomer H_2O, i.e., "chemical" water is contained in the liquid called water.

In the first method, use is made of the fact that the nature of the ultraviolet spectrum of steam which, as it is known, consists entirely of monomeric molecules, must be conserved in the liquid because the latter also contains free molecules.

HUMAN TRANSLATION OF RUSSIAN TEXT

УДК 541.1.11 **ХИМИЯ**

Г. Л. ГАЛЬЧЕНКО, Н. С. ЗАУГОЛЬНИКОВА, С. М. СКУРАТОВ,
Л. С. ВАСИЛЬЕВ, А. Я. БЕЗМЕНОВ, Б. М. МИХАЙЛОВ

ТЕПЛОТЫ ОБРАЗОВАНИЯ МЕТОКСИБОРАЦИКЛОПЕНТАНА И МЕТИЛОВОГО ЭФИРА ДИ-*н*-БУТИЛБОРНОЙ КИСЛОТЫ

(Представлено академиком О. А. Реутовым 13/IV 1965 г.)

По теплотам образования бороргаических соединений в литературе имеются лишь немногие данные. Это в значительной мере обусловлено трудностями, встретившимися при попытках применения к бороргаическим веществам метода теплот сгорания. Главная из трудностей — неполнота сгорания этих веществ: как правило, в калориметрической бомбе остаются некоторые количества твердых продуктов неполного сгорания. Однако, если достигается высокая степень сгорания, состав этих продуктов может быть довольно простым (в основном B_4C, B, C). Тогда поправка на неполноту сгорания в калориметрических определениях вычисляется обоснованно и является достаточно точной [1–3].

RUSSIAN TEXT

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P* DOKLADY AKADEMII NAUK SSSR *
P* 1966$ TOM 166, L$NO. 1$ *
P* G.L.GAL6CENKO , N.S.ZAUGOL6NIKOVA , S.M.SKURATOV ,
L.S.VASIL6EV , A.4.BEZMENOV , B.M.MIXAILOV *
P* TEPLOTY OBRAZOVANI4 METOKSIBORAQIKLOPENTANA I
METILOVOGO 3FIRA DI-I-BUTILBORNOI KISLOTY *
P* ( PREDSTAVLENO AKADEMIKOM O.A.REUTOVYM 13/IV 1965$ ) *

P* PO TEPLOTAM OBRAZOVANI4 BORORGANICESKIX SOEDINENII V
LITERATURE IMEHTS4 LIW6 NEMNOGIE DANNYE *
3TO V ZNACITEL6NOI MERE OBUSLOVLENO TRUDNOST4MI ,
VSTRETIVWIMIS4 PRI POPYTKAX PRIMENENI4 K BORORGANICESKIM
VE5ESTVAM METODA TEPLOT SGORANI4 *
GLAVNA4 IZ TRUDNOSTEI - NEPOLNOTA SGORANI4 3TIX VE5ESTV .
. KAK PRAVILO , V KALORIMETRICESKOI BOMBE OSTAHTS4
NEKOTORYE KOLICESTVA TVERDYX PRODUKTOV NEPOLNOGO SGORANI4
*
ODNAKO , ESLI DOSTIGAETS4 VYSOKA4 STEPEN6 SGORANI4 ,
SOSTAV 3TIX PRODUKTOV MOJET BYT6 DOVOL6NO PROSTYM ( V
OSNOVNOM B4C, B, C) *
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TRANSCRIPTION OF RUSSIAN TEXT

THE NAME OF THE JOURNAL "DOKLADY AKADEMII NAUK SSSR" SHOULD HAVE BEEN LEFT UNTRANSLATED

KEYPUNCHING ERROR: SHOULD HAVE BEEN "di-n-..." (NORMAL) THE ITALIC "n" LOOKS SOMEWHAT LIKE THE RUSSIAN "i" WHICH MEANS "AND"

"TOM" MEANS "VOLUME". UNFORTUNATELY, IT IS ALSO AN INFLECTED FORM OF THE RUSSIAN WORD FOR "THIS"

A CHEMIST RECOGNIZES "METHOXYBOROCYCLOPENTHANE". IF HE DOESN'T, HE DOES NOT NEED THIS PAPER

THE SAME WORD MAY MEAN "PRESENTED" AND "REPRESENTED"

THE PROGRAM REMOVED THE INFLECTED ENDING OF THE PROPER NAME IN THE INSTRUMENTAL CASE

THE PREPOSITION "PO" SHOULD HAVE BEEN TRANSLATED IN THIS CASE AS "ON"

MORE SIMPLY AND LESS LITERALLY "THIS IS DUE MOSTLY TO.....

"ENCOUNTERED"

ANOTHER COGNATE WITH INFLECTED RUSSIAN ENDING

ADJECTIVE USED AS NOUN IN THE ORIGINAL "THE MAIN ONE OF THE DIFFICULTIES"

THE ALERT KEYPUNCH OPERATOR RECOGNIZED THAT THE CHEMICAL SYMBOLS OF THE ORIGINAL SHOULD NOT BE TRANSLITERATED; OTHERWISE, THE "B_4C, B AND C" WOULD HAVE BEEN PRINTED AS "V_4S, V AND S", REPLACING BORON AND CARBON WITH VANADIUM AND SULFUR.

THE VERB "IS" IS MISSING

THE REPORTS OF ACADEMY OF SCIENCES USSR .
1966 THIS 166, NO. 1 .
G.L.GAL6CENKO , N.S.ZAUGOL6NIKOV , S.M.SKURATOV ,
L.S.VASIL6EV , A.4.BEZMENOV , B.M.MIXAILOV .
THE HEATS OF FORMATION OF METOKSIBORAQIKLOPENTANA AND
THE METHYL ESTER OF THE D-AND-BUTYLBORIC ACID .
(REPRESENTED BY ACADEMICIAN BY O.A.REUTOV 13/IV 1965)
.
ACCORDING TO THE HEATS OF FORMATION OF BORORGANICESKIX
COMPOUNDS IN THE LITERATURE THERE ARE ONLY A FEW DATA .
THIS IN SIGNIFICANT MEASURE STIPULATEDLY BY DIFFICULTIES , MET
UPON THE ATTEMPTS OF APPLICATION TO BORORGANICESKI TO THE
SUBSTANCES OF METHOD OF HEATS OF COMBUSTION .
MAIN FROM DIFFICULTIES - THE INCOMPLETENESS OF COMBUSTION OF
THESE SUBSTANCES . . AS RULE , IN CALORIMETRIC BOMB REMAIN
CERTAIN QUANTITIES OF SOLID PRODUCTS OF INCOMPLETE COMBUSTION
.
HOWEVER , IF THERE IS REACHED THE HIGH DEGREE OF COMBUSTION ,
THE COMPOSITION OF THESE PRODUCTS CAN BE RATHER SIMPLE (
BASICALLY B4C, B, C) .

MACHINE TRANSLATION OF RUSSIAN TEXT INTO ENGLISH WITH EXPLANATORY NOTES

Doklady Akademii Nauk SSSR
1966 Volume 166, No. 1

The heats of formation of methoxyborocyclopenthane and of the methylester of di-n-butyl boric acid

Presented by Academician O. A. Reutov, April 13, 1965

There are only a few data in the literature on the heats of formation of boron-organic compounds. This is mostly due to the difficulties encountered when attempting to apply the heat-of-combustion method to boron-organic compounds. The chief difficulty lies in the incomplete combustion of these compounds: as a rule, some solid products of incomplete combustion remain in the calorimetric bomb. However, if a sufficiently high burnup level is reached, the composition of these products becomes quite simple (essentially B_4C, B, C).

HUMAN TRANSLATION OF RUSSIAN TEXT

А. С. ФИАЛКОВ, Я. Г. ДАВИДОВИЧ, И. М. ЮРКОВСКИЙ

О ПРЕДПОЧТИТЕЛЬНОЙ КРИСТАЛЛИЗАЦИИ В УГЛЕГРАФИТОВЫХ МАТЕРИАЛАХ

(Представлено академиком П. А. Ребиндером 5 V 1965)

Как известно ([1, 2]), при нагревании углеграфитовых материалов происходят изменения их структуры, которые заключаются в последовательном росте гексагональных углеродных сеток, их ориентировке в параллельные пачки (двухмерное упорядочение) и перемещении слоев внутри пачек до состояния, приближающегося к трехмерному упорядочению. Последнее выражается в появлении на рентгенограммах взамен двухмерных линий (10), (11) трехмерных максимумов (100), (110) и отражений от косых плоскостей, например (101), (112) и др.

Описанные выше структурные преобразования сопровождаются объемной и линейной усадками материалов, начинающимися от максимальной температуры, достигавшейся при предшествующей термообработке (рис. 2).

RUSSIAN TEXT

P* DOKLADY AKADEMII NAUK SSSR *
P* 1966. L$TOM 166, L$NO. 1$ *
P* TEXNICESKA4 FIZIKA *
P* A.S.FIALKOV, 4.G.DAVIDOVIC, I.M.HRKOVSKII *
P* O PREDPOCTITEL6NOI KRISTALLIZAQII V UGLEGRAFITOVYX MATERIALAX *
P* (PREDSTAVLENO AKADEMIKOM P.A.REBINDEROM 5$ L$V 1965$) *
P* KAK IZVESTNO (1,2) , PRI NAGREVANII UGLEGRAFITOVYX MATERIALOV PROISXOD4T IZMENENI4 IX STRUKTURY , KOTORYE ZAKLHCAHTS4 V POSLEDOVATEL6NOM ROSTE GEKSAGONAL6NYX UGLERODNYX SETOK , IX ORIENTIROVKE V PARALLEL6NYE PACKI (DVUXMERNOE UPOR4DOCENIE) I PEREME5ENII SLOEV VNUTRI PACEK DO SOSTO4NI4 , PRIBLIJAH5EGOS4 K TREXMERNOMU UPOR4DOCENIH *
POSLEDNEE VYRAJAETS4 V PO4VLENII NA RENTGENOGRAMMAX VZAMEN DVUXMERNYX LINII (10) , (11) TREXMERNYX MAKSIMUMOV (100) , (110) I OTRAJENII OT KOSYX PLOSKOSTEI , NAPRIMER (101) , (112) I DR *
P* OPISANNYE VYWE STRUKTURNYE PREOBRAZOVANI4 SOPROVOJDAHTS4 OB7EMNOI I LINEINOI USADKAMI MATERIALOV , NACINAH5IMIS4 OT MAKSIMAL6NOI TEMPERATURY , DOSTIGAVWEIS4 PRI PREDWESTVUH5EI TERMOOBRABOTKE (RIS . 2$) *

TRANSCRIPTION OF RUSSIAN TEXT

THE PREPOSITION "PRI" IS DIFFICULT TO TRANSLATE CORRECTLY SHOULD HAVE BEEN "WHEN"

THE TITLE OF THE JOURNAL "DOKLADY AKADEMII NAUK SSSR" SHOULD NOT HAVE BEEN TRANSLATED

THE INSTRUMENTAL-CASE ENDING "OM" OF THE PROPER NAME AND THE SECOND "BY" SHOULD HAVE BEEN OMITTED

VOLUME

"PREFERRED" IS PREFERRED

PRESENTED

THE SECOND HALF OF THE WORD IS BASED ON THE COGNATE "GRAPHITE"

"GRADUAL"

"LATTICE"

"SHIFTING"

"ORDERING"

THE GENETIVE SHOULD BE INDICATED BY "OF THE"

THIS COGNATE IS NOT USED IN ENGLISH BUT IT IS UNDERSTOOD BY TECHNICAL READERS

"INCLINED"

"DURING THE PREVIOUS"

"ETC"

TRANSFORMATIONS

IN THIS CASE, THE SIMPLER "VOLUME" SHOULD HAVE BEEN USED

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THE REPORTS OF ACADEMY OF SCIENCES USSR .
1966. THIS 166, NO. 1 .
TECHNICAL PHYSICS .
A.S.FIALKOV, 4.G.DAVIDOVIC, I.M.HRKOVSKI .
CONCERNING PREFERABLE CRYSTALLIZATION IN UGLEGRAFITOVYX
MATERIALS .
( REPRESENTED BY ACADEMICIAN BY P.A.REBINDEROM 5 V 1965
) .
        AS IS KNOWN (1,2) , UPON THE HEATING OF UGLEGRAFITOVYX
MATERIALS OCCUR CHANGES OF THEIR STRUCTURE , WHICH CONSIST IN
THE SUCCESSIVE INCREASE OF HEXAGONAL CARBON NETS , TO THEIR
ORIENTATION IN PARALLEL BUNCHES ( TWO-DIMENSIONAL REGULATING )
AND THE TRANSFER OF LAYERS INSIDE OF BUNCHES UP TO STATE ,
WHICH APPROACHES THREE-DIMENSIONAL REGULATING .

THE LATTER IS EXPRESSED IN APPEARANCE ON ROENTGENOGRAMS
INSTEAD OF THE TWO-DIMENSIONAL LINES (10) , (11)
THREE-DIMENSIONAL MAXIMA (100) , (110) AND REFLECTIONS FROM
SLANTING PLANES , FOR EXAMPLE (101) , (112) AND OTHER .
        THE ABOVE-DESCRIBED STRUCTURAL TRANSPOSITIONS ARE
ACCOMPANIED BY THE VOLUMETRIC AND LINEAR SHRINKAGES OF
MATERIALS , WHICH ARE BEGUN FROM MAXIMUM TEMPERATURE , REACHED
UPON THE PRECEDING HEAT TREATMENT ( FIG . 2 ) .
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MACHINE TRANSLATION OF RUSSIAN TEXT INTO ENGLISH WITH EXPLANATORY NOTES

Preferred Crystallization in Graphitic Carbon Materials

It is known that when graphitic carbon materials are heated, their structure is changed, resulting in the gradual growth of the hexagonal carbon lattice, orientation in parallel blocks (two-dimensional ordering) and shifting of the layers within the blocks until a nearly three-dimensionally ordered state is approached. This is expressed in the x-ray diffraction patterns in the appearance of the three-dimensional maxima (100), (110) and of reflections from inclined planes, such as (101), (112), etc. instead of the two-dimensional lines (10), (11).

These structural transformations are accompanied by volume and linear contractions of the materials, starting at the highest temperatures reached during the previous heat treatment (Figure 2).

HUMAN TRANSLATION OF RUSSIAN TEXT

This sheet was used as an illustration of a talk presented by Dr. A. H. Snell of ORNL at the Second International Conference on Science and Society, July 1966 in Herceg-Novi, Yugoslavia.

TRANSLATION SAMPLE

ПЕРВЫЙ ИСКУССТВЕННЫЙ СПУТНИК ЛУНЫ — ТВОРЕНИЕ СОВЕТСКОГО НАРОДА

СООБЩЕНИЕ ТАСС

3 апреля 1966 года в 21 час 44 минуты по московскому времени автоматическая станция «Луна-10» была выведена на селеноцентрическую [окололунную] орбиту и стала первым в мире искусственным спутником Луны.

Вывод станции на селеноцентрическую орбиту был обеспечен успешно проведенной 1 апреля сего года коррекцией траектории полета станции и точно осуществленным маневром при ее подлете к Луне по командам с Земли.

Параметры орбиты первого искусственного спутника Луны:

— минимальное удаление от поверхности Луны (в перисселении) — около 350 километров;

— максимальное удаление от поверхности Луны (в апосселении) — около 1000 километров;

— период обращения станции вокруг Луны — около 3 часов.

На борту первого искусственного спутника Луны установлены научные приборы для исследования окололунного космического пространства.

Данные научных измерений с помощью телеметрической системы передаются на Землю.

Наблюдение за полетом искусственного спутника Луны и измерение параметров его орбиты производятся центром дальней космической радиосвязи.

Вывод первого искусственного спутника на орбиту вокруг Луны — новая выдающаяся победа советских ученых, инженеров и рабочих. Наша страна, создавшая в 1957 году первый искусственный спутник Земли, ныне вывела первый искусственный спутник на орбиту вокруг Луны, что является важным этапом в ее исследовании.

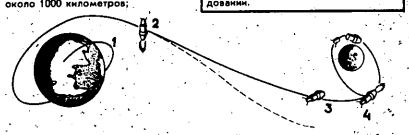

Схема полета автоматической станции «Луна-10». 1. Промежуточная околоземная орбита. 2. Коррекция траектории полета к Луне. 3. Ориентация автоматической станции «Луна-10» перед торможением. 4. Торможение и выход на орбиту искусственного спутника Луны.

Наблюдение за полетом искусственного спутника Луны и измерение параметров его орбиты производятся центром дальней космической радиосвязи.

Вывод первого искусственного спутника на орбиту вокруг Луны — новая выдающаяся победа советских ученых, инженеров и рабочих. Наша страна, создавшая в 1957 году первый искусственный спутник Земли, ныне вывела первый искусственный спутник на орбиту вокруг Луны, что является важным этапом в ее исследовании.

Words not in the dictionary are reprinted in Russian within the English text. In this case "SPUTNIK" is understood by the English-language reader.

The absence of "IS" is indicated by a dash.

As Russian has no articles, introduction of "THE" or "AN" causes problems.

MACHINE TRANSLATION

OBSERVATION FOR THE FLIGHT OF THE ARTIFICIAL SPUTNIK OF MOON AND THE MEASUREMENT OF PARAMETERS ITS ORBITS ARE PRODUCED BY THE CENTER OF FAR COSMIC RADIO COMMUNICATION .
THE CONCLUSION OF THE FIRST ARTIFICIAL SPUTNIK ON ORBIT AROUND MOON - THE NEW OUTSTANDING VICTORY OF SOVIET ACADEMIC , ENGINEERS AND WORKERS .
OUR COUNTRY , WHICH CREATED IN 1957 TO YEAR THE FIRST ARTIFICIAL SPUTNIK OF GROUND , NOW CONCLUDED THE FIRST ARTIFICIAL SPUTNIK ON ORBIT AROUND MOON , THAT IS IMPORTANT STAGE IN ITS INVESTIGATION .

This term should be replaced with "EARTH" when referring to the Earth as a planet.

The word indicating year after a date should have been completely eliminated in the translation.

The Russian word "UCENNYI" translates as "learned, educated", - hence academic. Here it is used in the sense of "SCIENTIST", as a noun.

HUMAN TRANSLATION

The flight of the artificial Moon satellite was observed and its orbital parameters were measured by the cosmic radio observatory center. The placement of the first artificial Moon satellite on a lunar orbit is a new outstanding success of Soviet scientists, engineers and workers. Our country which created the first artificial Earth satellite in 1957, now placed the first artificial satellite on a lunar orbit; this is an important stage in its study.

P* PERVYI ISKUSSTVENNYI SPUTNIK LUNY - TVORENIE SOVETSKOGO NARODA *
P* SOOB5ENIE TASS *
P* 3$ APREL4 1966 GODA V 21$ CAS 44$ MINUTY PO MOSKOVSKOMU VREMENI AVTOMATICESKA4 STANQI4 (LUNA-10) BYLA VYVEDENA NA SELENOQENTRICESKUH (OKOLOLUNNUH) ORBITU I STALA PERVYM V MIRE ISKUSSTVENNYM SPUTNIKOM LUNY *
P* VYVOD STANQII NA SELENOQENTRICESKUH ORBITU BYL OBESPECEN USPEWNO PROVEDENNOI I$ APREL4 SEGO GODA KORREKQIEI TRAEKTORII POLETA STANQII I TOCNO OSU5ESTVLENNY4 MANEVROM PRI EE PODLETE K LUNE PO KOMANDAM S ZEMLI *
P* PARAMETRY ORBITY PERVOGO ISKUSSTVENNOGO SPUTNIKA LUNY .. - MINIMAL6NOE UDALENIE OT POVERXNOSTI LUNY (V PERISELENII) - OKOLO 350 KILOMETROV ., - MAKSIMAL6NOE UDALENIE OT POVERXNOSTI LUNY (V APOSELENII) - OKOLO 1000 KILOMETROV ., - PERIOD OBRA5ENI4 STANQII VOKRUG LUNY - OKOLO 3$ CASOV *
P* (FIGURE,1) *
P* SXEMA POLETA AVTOMATICESKOI STANQII (LUNA - 10) *
1$. PROMEJUTOCNA4 ORBITA *
2$. KORREKQI4 TRAEKTORII POLETA K LUNE *
3$. ORIENTAQI4 AVTOMATICESKOI STANQII (LUNA - 10) PERED TORMOJENIEM *
4$. TOMOJENIE I VYXOD NA ORBITU ISKUSSTVENNOGO SPUTNIKA LUNY *
P* NA BORTU PERVOGO ISKUSSTVENNOGO SPUTNIKA LUNY USTANOVLENY NAUCNYE PRIBORY DL4 ISSLEDOVANI4 OKOLOLUNNOGO KOSMICESKOGO PROSTRANSTVA *
P* DANNYE NAUCNYX IZMERENII S POMO564 TELEMETRICESKOI SISTEMY PEREDAHTS4 NA ZEMLH *
P* NABLHDENIE ZA POLETOM ISKUSSTVENNOGO SPUTNIKA LUNY I IZMERENIE PARAMETROV EGO ORBITY PROIZVOD4TS4 QENTROM DAL6NEI KOSMICESKOI RADIOSV4ZI *
P* VYVOD PERVOGO ISKUSSTVENNOGO SPUTNIKA NA ORBITU VOKRUG LUNY - NOVA4 VYDAH5A4S4 POBEDA SOVETSKIX UCENYX , INJENEROV I RABOCIX *
NAWA STRANA , SOZDAVWA4 V 1957 GODU PERVYI ISKUSSTVENNYI SPUTNIK ZEMLI , NYNE VYVELA PERVYI ISKUSSTVENNYI SPUTNIK NA ORBITU VOKRUG LUNY , CTO 4VL4ETS4 VAJNYM 3TAPOM V EE ISSLEDOVANII *

P* (PAGE,77) *
P* DOKLADY AKADEMII NAUK SSSR *
P* 1966. L$TOM 166, L$NO. 1$ *
P* TEXNICESKA4 FIZIKA *
P* A.S.FIALKOV, 4.G.DAVIDOVIC, I.M.HRKOVSKII *
P* O PREDPOCTITEL6NOI KRISTALLIZAQII V UGLEGRAFITOVYX MATERIALAX *
P* (PREDSTAVLENO AKADEMIKOM P.A.REBINDEROM 5$ L$V 1965$) *
P* KAK IZVESTNO (1,2) , PRI NAGREVANII UGLEGRAFITOVYX MATERIALOV PROISXODAT IZMENENI4 IX STRUKTURY , KOTORYE ZAKLHCAHTS4 V POSLEDOVATEL6NOM ROSTE GEKSAGONAL6NYX UGLERODNYX SETOK , IX ORIENTIROVKE V PARALLEL6NYE PACKI (DVUXMERNOE UPORA4DOCENIE) I PEREME5ENII SLOEV VNUTRI PACEK DO SOSTO4NI4 , PRIBLIJAH5EGOS4 K TREXMERNOMU UPOR4DOCENIH *
POSLEDNEE VYRAJAETS4 V PO4VLENII NA RENTGENOGRAMMAX VZAMEN DVUXMERNYX LINII (10) , (11) TREXMERNYX MAKSIMUMOV (100) , (110) I OTRAJENII OT KOSYX PLOSKOSTEI , NAPRIMER (101) , (112) I DR *
P* OPISANNYE VYWE STRUKTURNYE PREOBRAZOVANI4 SOPROVOJDAHTS4 OB7EMNOI I LINEINOI USADKAMI MATERIALOV , NACINAH5IMIS4 OT MAKSIMAL6NOI TEMPERATURY , DOSTIGAVWEIS4 PRI PREDWESTVUH5EI TERMOOBRABOTKE (RIS . 2$) *
P* UGLEGRAFITOVYM MATERIALAM , IZGOTOVL4EMYM IZ CASTIQ KOKSOV I NATURAL6NYX GRAFITOV , SVOISTVENNA XOROWO VYRAJENNA4 ANIZOTROPI4 STRUKTURY I SVOISTV *
ONA OBUSLOVLENA PREDPOCTITEL6NOI ORIENTAQIEI UGLERODNYX SLOEV V POROWKOVYX CASTIQAX , RASPOLOJENIE KOTORYX V MATERIALE OPREDEL4ETS4 USLOVI4MI FORMOVANI4 (3) *
P* V KACESTVE OB7EKTA DANNOGO ISSLEDOVANI4 BYLI VZ4TY OTPRESSOVANNYE OBRAZQY KREKINGOVOGO KOKSA V SMESI S 20$ L$PERCENT SREDNETEMPERATURNOGO PEKA , ISPOL5ZOVAVWEGOS4 V KACESTVE SV4ZUH5EGO *
KREKINGOVYI KOKS BYL PREDVARITEL6NO PROKALEN PRI TEMPERATURE 1100$ L$DEGREES , IMEL UDEL6NUH POVERXNOST5 PO B3T 12$ M2 / G , UDEL6NYI VES 2,08$ G / SM3, CASTIQ RAZMEROM DO 20$ . . . 22$ L$PERCENT , (20/45) 78$ L$PERCENT ., SREDNETEMPERATURNYI PEK IMEL TEMPERATURU RAZM4GCENI4 82,5$ L$DEGREES , VYXOD KOKSA 40,4$ L$PERCENT *
UKAZANNA4 SMES6 PRESSOVALAS6 I SPEKALAS6 DO TEMPERATURY 1100$ L$DEGREES *
IZ SPECENNYX BLOKOV PARALLEL6NO I PERPENDIKUL4RNO NAPRAVLENIH USILI4 PRESSOVANI4 VYREZALIS6 OBRAZQY (0,7X0,7X6) SM *
PINEINOE RASWIRENIE OBRAZQOV ISSLEDOVALOS6 NA USTANOVKE , IZOBRAJENNOI NA RIS . 1$, V INTERVALE TEMPERATUR 100-3000$ L$DEGREES *
P* L$(FIGURE,1) *
P* RIS . 1$. SXEMA USTANOVKI DL4 OPREDELENI4 KOEFFIQIENTA LINEINOGO RASWIRENI4 *
1. - METALLICESKII KORPUS , 2. - GRAFITOVYI NAGREVATEL5 I DERJATEL6 OBRAZQOV , 3. - TEPLOVOI IZOL4TOR , 4$. - KRYWKA S KONTAKTNYM+* (PAGE,115) *

P* DVUXKVANTOVYI MAZER *
P* ESLI NA VOZBUJDENNYI ATOM DEISTVUET ODNOVREMENNO DVA KVANTA , SUMMARNA4 3NERGI4 KOTORYX RAVNA REZONANSNOI , TO

THE FIRST ARTIFICIAL SATELLITE OF MOON - THE CREATION OF SOVIET NATION .
REPORT TASS .
3 //APRIL 1966 YEAR IN 21 HOUR 44 MINUTES FOR MOSCOW TIME AUTOMATIC STATION (MOON-10) WAS CONCLUDED ON SELENOQENTRICESKUH (OKOLOLUNNUH) ORBIT AND ALSO BECAME FIRST IN THE WORLD BY THE ARTIFICIAL SATELLITE OF MOON .
THE CONCLUSION OF STATION ON SELENOQENTRICESKUH ORBIT WAS SECURED SUCCESSFULLY CONDUCTED I //APRIL OF THIS YEAR BY THE CORRECTION OF TRAJECTORY OF FLIGHT OF STATION AND BY THE ACCURATELY ACCOMPLISHED MANEUVER UPON ITS FLIGHT TO MOON ACCORDING TO THE TEAMS FROM GROUND .
THE PARAMETERS OF ORBIT OF THE FIRST ARTIFICIAL SATELLITE OF MOON .. - THE MINIMUM REMOVAL FROM THE SURFACE OF MOON (IN PERISELENII) - ABOUT 350 KILOMETERS ., - MAXIMUM REMOVAL FROM THE SURFACE OF MOON (IN APOSELENII) - ABOUT 1000 KILOMETERS ., - THE PERIOD OF THE CONVERSION OF STATION AROUND MOON - ABOUT 3 HOURS .
(FIGURE,1) .
PLAN OF FLIGHT OF AUTOMATIC STATION (MOON - 10) .
1 . INTERMEDIATE ORBIT .
2 . THE CORRECTION OF TRAJECTORY OF FLIGHT TO MOON .
3 . ORIENTATION OF AUTOMATIC STATION (MOON - 10) BEFORE RETARDATION .
4 . TOMOJENIE AND YIELD ON THE ORBIT OF ARTIFICIAL SATELLITE OF MOON .
ON THE SIDE OF THE FIRST ARTIFICIAL SATELLITE OF MOON WERE ESTABLISHED SCIENTIFIC APPARATUSES FOR INVESTIGATION OKOLOLUNNOGO COSMIC SPACE .
THE DATA OF SCIENTIFIC MEASUREMENTS WITH TELEMETRICESKOI SYSTEM ARE TRANSFERRED ON GROUND .
OBSERVATION FOR THE FLIGHT OF ARTIFICIAL SATELLITE OF MOON AND THE MEASUREMENT OF PARAMETERS ITS ORBITS ARE PRODUCED BY THE CENTER OF FAR COSMIC RADIO COMMUNICATION .
THE CONCLUSION OF THE FIRST ARTIFICIAL SATELLITE ON ORBIT AROUND MOON - THE NEW OUTSTANDING VICTORY OF SOVIET ACADEMIC , ENGINEERS AND WORKERS .
OUR COUNTRY , WHICH CREATED IN 1957 TO YEAR THE FIRST ARTIFICIAL SATELLITE OF GROUND , NOW CONCLUDED THE FIRST ARTIFICIAL SATELLITE ON ORBIT AROUND MOON , THAT IS IMPORTANT STAGE IN ITS INVESTIGATION .

(PAGE,77) .
THE REPORTS OF ACADEMY OF SCIENCES USSR .
1966. THIS 166, NO. 1 .
TECHNICAL PHYSICS .
A.S.FIALKOV, 4.G.DAVIDOVIC, I.M.HRKOVSKI .
CONCERNING PREFERABLE CRYSTALLIZATION IN UGLEGRAFITOVYX MATERIALS .
(REPRESENTED BY ACADEMICIAN BY P.A.REBINDEROM 5 V 1965) .
AS IS KNOWN (1,2) , UPON THE HEATING OF UGLEGRAFITOVYX MATERIALS OCCUR CHANGES OF THEIR STRUCTURE , WHICH CONSIST IN THE SUCCESSIVE INCREASE OF HEXAGONAL CARBON NETS , TO THEIR ORIENTATION IN PARALLEL BUNCHES (TWO-DIMENSIONAL REGULATING) AND THE TRANSFER OF LAYERS INSIDE OF BUNCHES UP TO STATE , WHICH APPROACHES THREE-DIMENSIONAL REGULATING .

THE LATTER IS EXPRESSED IN APPEARANCE ON ROENTGENOGRAMS INSTEAD OF THE TWO-DIMENSIONAL LINES (10) , (11) THREE-DIMENSIONAL MAXIMA (100) , (110) AND REFLECTIONS FROM SLANTING PLANES , FOR EXAMPLE (101) , (112) AND OTHER .
THE ABOVE-DESCRIBED STRUCTURAL TRANSPOSITIONS ARE ACCOMPANIED BY THE VOLUMETRIC AND LINEAR SHRINKAGES OF MATERIALS , WHICH ARE BEGUN FROM MAXIMUM TEMPERATURE , REACHED UPON THE PRECEDING HEAT TREATMENT (FIG . 2) .
BY UGLEGRAFITOV TO MATERIALS , PREPARED FROM THE PARTICLES OF COKES AND NATURAL GRAPHITES , IS WELL PROPER THE EXPRESSED ANISOTROPY OF THE STRUCTURE AND PROPERTIES .
IT IS STIPULATED BY PREFERABLE ORIENTATION OF CARBON LAYERS IN POWDER PARTICLES , THE LOCATION OF WHICH IN MATERIAL IS DETERMINED BY THE CONDITIONS OF FORMING (3) .
AS OBJECT OF THE GIVEN INVESTIGATION WERE TAKEN THE OTPRESSOVANNYE FORMS OF CRACKING COKE IN MIXTURE FROM 20 PERCENT SREDNETEMPERATURNOGO PITCH , USED AS BINDING .

CRACKING COKE WAS PREVIOUSLY WAS TEMPERED AT TEMPERATURE 1100 DEGREES , THERE HAD SPECIFIC SURFACE ACCORDING TO BET 12 M2 / G , SPECIFIC WEIGHT 2,08 G / SM3, PARTICLES BY DIMENSION UP TO 20 . . . 22 PERCENT , (20/45) 78 PERCENT ., SREDNETEMPERATURNYI PITCH HAD THE TEMPERATURE OF THE SOFTENING 82,5 DEGREES , THE YIELD OF COKE 40,4 PERCENT .

INDICATED MIXTURE WAS PRESSED AND SINTERED UP TO TEMPERATURE 1100 DEGREES .
FROM SINTERED BLOCKS PARALLEL AND PERPENDICULARLY TO THE DIRECTION OF EFFORT OF PRESSING THERE WERE CUT OUT FORMS (0,7X0,7X6) CM. .
PINEINOE THE EXPANSION OF FORMS WAS STUDIED ON APPARATUS , WHICH WAS SHOWED ON FIG . 1 , IN TEMPERATURE RANGE 100-3000 DEGREES .
(FIGURE,1) .
FIG . 1 . PLAN OF APPARATUS FOR THE DETERMINATION OF COEFFICIENT OF LINEAR EXPANSION .
1. - METALLIC CASING , 2. - GRAPHITE HEATER AND THE HOLDER OF FORMS , 3. - THE THERMAL INSULATOR , 4 . - COVER WITH CONTACT + (PAGE,115) .

TWO-QUANTUM MAZER .
IF ON EXCITED ATOM ACT SIMULTANEOUSLY TWO QUANTA , THE OVERALL ENERGY OF WHICH IS EQUAL RESONANT , THEN ATOM EMITS

ATOM ISPUSKAET DVA TAKIX JE KVANTA PO IZVESTNOMU ZAKONU INDUQIROVANNOGO ISPUSKANI4 (SFTN) *
TAKIM OBRAZOM , OBYCNYI PRINQIP MAZERA ILI LAZERA DOPUSKAET ODNOVREMENNOE USILENIE DVUX CASTOT *
VOZMOJNOST6 DVUXKVANTOVOGO LAZERA RASSMOTREL TEORETICESKI LAUREAT LENINSKOI I NOBELEVSKOI PREMII SOVETSKII FIZIK A.M.PROXOROV *
3TU IDEH OSU5ESTVIL NA OPYTE AMERIKANSKII FIZIK N.WIREN, POKA , PRAVDA , NE V VIDE LAZERA , A MAZERA (T. E. NE NA SVETE , A NA RADIOVOLNAX) *
V 3KSPERIMENTE ISPOL6ZOVAN KRISTALL OKISI MAGNI4 S PRIMES6H JELEZA ILI NIKEL4 , POMESAEMYI V VANNU IZ JIDKOGO GELI4 *
PRI ODNOVREMENNOI PODACE RADIOCASTOTNOGO I UL6TRAZVUKOVOGO SIGNALOV OBA ONI PODVERGAHTS4 USILENIH *
P* (SCIENTIFIC AMERICAN), L$V. 213$, 1965$, L$NO. 4$, L$P. 40$ (SWA) *

P* OPREDELENIE VLAJNOSTI VODY *
P* JIDKOST6 , KOTORUH MY NAZYVAEM VODOI I OPISYVAEM XIMICESKOI FORMULOI H2O , CREZVYCAINO STRANN4 *
ONA RASWIR4ETS4 PRI ZAMERZANII , SKRYTA4 TEPLOTA ISPARENI4 EE ANOMAL6NO VELIKA I KIPIT ONA PRI TEMPERATURE PRIMERNO NA 160 DEGREES L$C VYWE , CEM EE BLIJAIWII XIMICESKII ANALOG - SEROVODOROD H2S *
PO-VIDIMOMU , VSE 3TI OSOBENNOSTI OB74SN4HTS4 TEM , CTO BOL6WINSTVO MOLEKUL V VODE SV4ZANO MEJDU SOBOI V NEJSTOICIVYE POLIMERNYE STRUKTURY TIPA (H2O)N SLABYMI VODORODNYMI SV4Z4MI *
NEDAVNO BYLA PROVEDENA 3KSPERIMENTAL6NA4 PROVERKA TOGO , SKOL6KO JE SVOBODNOGO MONOMERA H2O , T. E. (XIMICESKOI) VODY SODERJITS4 V JIDKOSTI , IMENUEMOI VODOI *
PROVERKA PROVODILAS6 TREM4 SPOSOBAMI *
P* V PERVOM SPOSOBE ISPOL6ZOVALS4 TOT FAKT , CTO XARAKTER UL6TRAFIOLETOVOGO SPEKTRA PARA , SOSTO45EGO , KAK IZVESTNO , QELIKOM IZ MONOMERNYX MOLEKUL , DOLJEN SOXRAN4T6S4 I U JIDKOSTI , POSKOL6KU ONA TAKJE SODERJIT SVOBODNYE MOLEKULY *
PRI 3TOM , MEN44 TEMPERATURY I FIKSIRU4 EE VOZDEISTVIE NA SPEKTR JIDKOSTI , MOJNO OQENIT6 TERMODINAMIKU RAVNOVESI4 MEJDU MONOMEROM I POLIMEROM I OPREDELIT6 IX KOLICESTVENNYE SOOTNOWENI4 DRUG S DRUGOM *

P* VO VTOROM SPOSOBE SNACALA IZUCALIS6 INFRAKRASNYE SPEKTRY CISTOI VODY , A ZATEM DL4 SRAVNENI4 - RAZBAVLENNYX RASTVOROV VODY V XLOROFORME I CETYREXXLORISTOM UGLERODE *

V 3TIX RASTVORAX MOLEKULA RASTVORITEL4 I VODA NAXOD4TS4 OTDEL6NO I SPECTRY DVUX VIDOV MOLEKUL XOROWO VIDNY *

P* NAKONEQ , V TRETOEM SPOSOBE SRAVNIVALIS6 TERMODINAMICESKIE XARAKTERISTIKI ISPARENI4 VODY S XARAKTERISTIKAMI ISPARENI4 TAKIX VESESTV , KAK METAN I REDKIE GAZY , KOTORYE , KAK IZVESTNO , OBRAZUHT NEASSOQIIROVANNYE JIDKOSTI *
P* REZUL6TATY OKAZALIS6 POISTINE UDIVITEL6NYMI .. VSE TRI SPOSOBA POKAZYVAHT , CTO MONOMERA , T. E. H2O , V VODE SODERJITS4 VO VS4KOM SLUCAE MEN6WE , CEM 1$ PERCENT *

P* PAM4T6 OTDEL6NYX KLETOK *
P* MOLLHSK , IZVESTNYI POD NAZVANIEM MORSKOGO ZAIQA , IMEET OCEN6 BOL6WIE NERVNYE KLETKI (DO 1,5 MM V DIAMETRE) , UDOBNYE DL4 3KSPERIMENTOV PO 3LEKTROFIZIOLOGII *
KLETKI IZ GLAVNOGO GANGLI4 3TOGO MOLLHSKA ISPOL6ZOVAL FIZIOLOG F *
WTURMVASSER (SWA) V SLEDUH5IX INTERESNYX OPYTAX *

JIVOTNYE PODVERGALIS6 (TRENIROVKE) V ZAKRYTOM BASSEINE , GDE 12 CAS. OSVESENI4 CEREDOVALIS6 S 12 CAS. TEMNOTY *

ZATEM GANGLII UDAL4LS4 I SODERJALS4 V TEMNOTE V TERMOSTATE S MORSKOI VODOI *
VVOD4 MIKROELECTRODY V OTDEL6NYE KLETKI , ISSLEDOVATEL6 MOG REGISTRIROVAT6 IX IMPUL6SY *
V POKOE KLETKA DAVALA LIW6 NESKOL6KO IMPUL6SOV V MINUTU *

NO CEREZ 24 CASA , POSLE TOGO KAK PRI TRENIROVKE VKLHCALS4 SVET , KLETKA PRIXODILA V SOSTO4NIE VOZBUJDENI4 I DAVALA DO 40 IMPUL6SOV V MINUTU *
NEKOTORYE JE KLETKI (POMNILI) NE TOL6KO VKLHCENIE , NO I VYKLHCENIE SVETA - U NIX VOZBUJDENIE NASTUPALO KAJDYE 12 CASOV *
MOJNO PREDPOLOJIT6 , CTO PAM4T6 KLETKI SOXRAN4ETS4 V MOLEKULAX RIBONUKLEINOVOI KISLOTY (RNK) *
P* END *

P* DOKLADY AKADEMII NAUK SSSR *
P* 1966$ TOM 166, L$NO. 1$ *
P* G.L.GAL6CENKO , N.S.ZAUGOL6NIKOVA , S.M.SKURATOV , L.S.VASIL6EV , A.4.BEZMENOV , B.M.MIXAILOV *
P* TEPLOTY OBRAZOVANI4 METOKSIBORAQIKLOPENTANA I METILOVOGO 3FIRA DI-I-BUTILBORNOI KISLOTY *
P* (PREDSTAVLENO AKADEMIKOM O.A.REUTOVYM 13/IV 1965$) *

P* PO TEPLOTAM OBRAZOVANI4 BORORGANICESKIX SOEDINENII V LITERATURE IMEHTS4 LIW6 NEMNOGIE DANNYE *
3TO V ZNACITEL6NOI MERE OBUSLOVLENO TRUDNOST4MI , VSTRETIVWIMIS4 PRI POPYTKAX PRIMENENI4 K BORORGANICESKIM VESESTVAM METODA TEPLOT SGORANI4 *
GLAVNA4 IZ TRUDNOSTEI - NEPOLNOTA SGORANI4 3TIX VESESTV . . KAK PRAVILO , V KALORIMETRICESKOI BOMBE OSTAHTS4

TWO THE SAME QUANTA ACCORDING TO KNOWN LAW OF INDUCED EMISSION (SEE FOOTNOTE) .
THUS , THE USUAL PRINCIPLE OF MAZERA OR LAZERA PERMITS THE SIMULTANEOUS INTENSIFICATION OF TWO FREQUENCIES .
THE POSSIBILITY OF TWO-QUANTUM LAZERA THERE CONSIDERED THEORETICALLY THE LAUREATE OF THE LENINIST AND NOBEL PRIZE THE SOVIET PHYSICIST OF A.M.PROXOROV .
THIS IDEA EFFECTED ON EXPERIMENT AMERICAN PHYSICIST N.WIREN, MEANWHILE , TRUE , NOT IN THE FORM OF LAZERA , BUT MAZERA (I.E. NOT ON LIGHT , BUT ON RADIO-WAVES) .
IN EXPERIMENT WAS USED CRYSTAL OF OXIDE OF MAGNESIUM WITH ADMIXTURE OF IRON OR NICKEL , BEING PLACED IN BATH FROM LIQUID HELIUM .
UPON THE SIMULTANEOUS SUPPLY OF RADIO-FREQUENCY AND ULTRASONIC SIGNALS BOTH THEY ARE SUBJECTED TO INTENSIFICATION .
(SCIENTIFIC AMERICAN), V. 213 , 1965 , NO. 4 , P. 40 (UNITED STATES) .

THE DETERMINATION OF DAMPNESS OF WATER .
LIQUID , WHICH WE CALL WATER AND WE DESCRIBE BY CHEMICAL FORMULA H2O , EXTREMELY STRANGE .
IT IS EXTENDED UPON FREEZING , THE LATENT HEAT OF ITS EVAPORATION ANOMALOUSLY GREAT AND BOILS IT AT TEMPERATURE APPROXIMATELY ON 160 DEGREES C ABOVE , THAN ITS NEXT CHEMICAL ANALOG - HYDROGEN SULFIDE H2S .
ACCORDING TO-VISIBLE , ALL THESE PECULIARITIES ARE EXPLAINED BY THE FACT THAT THE MAJORITY OF MOLECULES IN WATER WAS CONNECTED IN THE UNSTABLE POLYMER STRUCTURES OF TYPE (H2O)N BY WEAK HYDROGEN BONDS .
RECENTLY WAS CONDUCTED EXPERIMENTAL CHECK THIS , HOW MUCH HOWEVER THE FREE MONOMER H2O , I.E. (CHEMICAL) WATER IS CONTAINED IN LIQUID , BY CALLED WATER .
THE CHECK WAS CONDUCTED BY THREE METHODS .
IN THE FIRST METHOD THERE WAS USED THIS FACT , THAT THE CHARACTER OF ULTRAVIOLET SPECTRUM OF STEAM , WHICH CONSISTS , AS IS KNOWN , WHOLLY FROM MONOMERIC MOLECULES , MUST BE KEPT AND AT LIQUID , AS FAR AS IT ALSO CONTAINS THE FREE MOLECULES .
IN ADDITION TO THAT , CHANGING TEMPERATURES AND FIXING ITS ACTION ON THE SPECTRUM OF LIQUID , IT IS POSSIBLE TO EVALUATE THE THERMODYNAMICS OF EQUILIBRIUM BETWEEN MONOMER AND BY POLYMER AND TO DETERMINE THEIR QUANTITATIVE RATIOS WITH EACH OTHER .
IN THE SECOND METHOD THERE AT FIRST WERE STUDIED THE INFRA-RED SPECTRA OF PURE WATER , AND THEN FOR COMPARISON - DILUTE SOLUTIONS OF WATER IN CHLOROFORM AND CARBON TETRACHLORIDE .
IN THESE SOLUTIONS MOLECULE OF SOLVENT AND WATER ARE SEPARATELY AND THE SPECTRA OF TWO FORMS OF MOLECULES WELL APPARENT .
FINALLY , IN THE THIRD METHOD THERE WERE COMPARED THE THERMODYNAMIC CHARACTERISTICS OF EVAPORATION OF WATER WITH THE CHARACTERISTICS OF EVAPORATION OF SUCH SUBSTANCES , AS METHANE AND RARE GASES , WHICH , AS IS KNOWN , FORM NON-ASSOCIATED LIQUIDS .
RESULTS TURNED OUT TO BE TRULY SURPRISING .. ALL OF THE THREE METHODS SHOW , THAT MONOMER , I.E. H2O , IN WATER IS CONTAINED IN ANY CASE LESS , THAN 1 PERCENT .

THE MEMORY OF SEPARATE CELLS .
MOLLUSK , KNOWN UNDER THE NAME OF MARITIME ZAIQA , HAS VERY GREATER NERVOUS CELLS (UP TO 1,5 MM. IN DIAMETER) , CONVENIENT FOR EXPERIMENTS ACCORDING TO 3LEKTROFIZIOLOGII .
CELLS FROM MAIN GANGLI4 OF THIS MOLLUSK USED PHYSIOLOGIST F .

WTURMVASSER (UNITED STATES) IN FOLLOWING INTERESTING EXPERIMENTS .
ANIMALS WERE SUBJECTED (TO TRAINING) IN CLOSED BASIN , WHERE 12 THE HR. OF ILLUMINATION WERE ALTERNATED WITH 12 THE HR. OF DARKNESS .
THEN GANGLII WAS REMOVED AND WAS CONTAINED IN DARKNESS IN THERMOSTAT WITH MARITIME WATER .
INTRODUCING MICROELELTRODES IN SEPARATE CELLS , INVESTIGATOR COULD RECORD THEIR IMPULSES .
IN REST CELL GAVE ONLY SEVERAL IMPULSES IN THE COURSE OF MINUTE .
BUT THROUGH 24 HOUR , AFTER THIS AS UPON TRAINING THERE WAS INCLUDED LIGHT , CELL ARRIVED IN THE STATE OF EXCITATION AND GAVE UP TO 40 IMPULSES IN THE COURSE OF MINUTE .
CERTAIN HOWEVER CELLS (REMEMBERED) NOT ONLY INCLUSION , BUT THE SWITCHING OFF OF LIGHT - AT THEM EXCITATION OCCURRED EACH 12 HOURS .
IT IS POSSIBLE TO SUPPOSE , THAT THE MEMORY OF CELL IS KEPT IN MOLECULES OF RIBONUKLEINOVOI ACID (RNK) .
END .

THE REPORTS OF ACADEMY OF SCIENCES USSR .
1966 THIS 166, NO. 1 .
G.L.GAL6CENKO , N.S.ZAUGOL6NIKOV , S.M.SKURATOV , L.S.VASIL6EV , A.4.BEZMENOV , B.M.MIXAILOV .
THE HEATS OF FORMATION OF METOKSIBORAQIKLOPENTANA AND THE METHYL ESTER OF THE D-AND-BUTYLBORIC ACID .
(REPRESENTED BY ACADEMICIAN BY O.A.REUTOV 13/IV 1965) .

ACCORDING TO THE HEATS OF FORMATION OF BORORGANICESKIX COMPOUNDS IN THE LITERATURE THERE ARE ONLY A FEW DATA .
THIS IN SIGNIFICANT MEASURE STIPULATEDLY BY DIFFICULTIES , MET UPON THE ATTEMPTS OF APPLICATION TO BORORGANICESKI TO THE SUBSTANCES OF METHOD OF HEATS OF COMBUSTION .
MAIN FROM DIFFICULTIES - THE INCOMPLETENESS OF COMBUSTION OF THESE SUBSTANCES . . AS RULE , IN CALORIMETRIC BOMB REMAIN

NEKOTORYE KOLICESTVA TVERDYX PRODUKTOV NEPOLNOGO SGORANI4
*
ODNAKO , ESLI DOSTIGAETS4 VYSOKA4 STEPEN6 SGORANI4 ,
SOSTAV 3TIX PRODUKTOV MOJET BYT6 DOVOL6NO PROSTYM (V
OSNOVNOM B4C, B, C) *
TOGDA POPRAVKA NA NEPOLNOTU SGORANI4 V KALORIMETRICESKIX
OPREDELENI4X VYCISL4ETS4 OBOSNOVANNO I 4VL4ETS4 DOSTATOCNO
TOCNOI (1-3) *
P* V NASTO45EI RABOTE 3KSPERIMENTAL6NO OPREDELENY TEPLOTY
SGORANI4 METOKSIBORAQIKLOPENTANA (FBHF) I METILOVOGO
3FIRA DI-I-BUTILBORNOI KISLOTY *
PRI 3TIX OPREDELENI4X OSOBOE VNIMANIE BYLO UDELENO
ISSLEDOVANIH SOSTAVA PRODUKTOV SGORANI4 *

P* OBRAZQY VE5ESTV *
DL4 SINTEZA ISPOL6ZOVALIS6 T5ATEL6NO OCI5ENNYE ISXODNYE
VE5ESTVA *
METOKSIBORAQIKLOPENTAN BYL POLUCEN IZ DI-1,4-(1-
BORAQIKLOPENTIL) - BUTANA I METILBORATA V PRISUTSTVII
TETRA-I-BUTILDIBORANA KAK KATALIZATORA (4) *
METILOVYI 3FIR DI-I-BUTILBORNOI KISLOTY BYL SINTEZIROVAN
IZ TRI-I-BUTILBORA I METILBORATA V PRISUTSTVII TOGO JE
SAMOGO KATALIZATORA (5) *
P* SINTEZIROVANNYE VE5ESTVA OCI5ALIS6 NEODNOKRATNOI
PEREGONKOI V VAKUUME NA KOLONKE GEMPEL4 *
OCI5ENNYE OBRAZQY VE5ESTV IMELI SLEDUH5IE
FIZIKO-XIMICESKIE KONSTANTY .. (FBHF) PRI 82 MM RT. ST. ,
(FBHF) PRI 12 MM RT. ST. , (FBHF) *
METOKSIBORAQIKLOPENTAN XRANILI V JIDKOM AZOTE , POSKOL5KU
PRI KOMNATNOI TEMPERATURE PROISXODIT EGO POLIMERIZAQI4 (4)
*
P* APPARATURA I METODIKA *
OPREDELENI4 TEPLOT SGORANI4 PROIZVODILI V PREQIZIONNOM
VOD4NOM KALORIMETRE S IZOTERMICESKOI OBOLOCKOI *
EMKOST6 KALORIMETRICESKOI BOMBY 281 ML *
SOJJENI4 PROVODILI PRI DAVLENII 25 ATM. KISLORODA *
PODTEM TEMPERATURY V OPYTE 1,7-1,9 DEGREES IZMER4LI
RTUTNYM KALORIMETRICESKIM TERMOMETROM PALOCNOGO TIPA S
TOCNOST6H DO 0,0003 DEGREES (SFTN) *
NAVESKI VE5ESTVA 0,32-0,37 G DL4 SOJJENI4 NAXODILIS6 V
ZAPA4NNYX TONKOSTENNYX WAROVIDNYX AMPULAX IZ STEKLA PIREKS
*
PRI NAPOLNENII AMPUL OBRAZQY VE5ESTV PREDOXRAN4LI OT
OKISLENI4 I GIDROLIZA SUXIM ARGONOM *
DL4 ZAJIGANI4 VE5ESTVA V BOMBE ISPOL6ZOVALI JELEZNUH
PROVOLOKU ((FBHF) *
PERED SOJJENIEM V BOMBU VVODILI 1$ ML VODY *
NACAL6NA4 TEMPERATURA GLAVNOGO PERIODA VO VSEX OPYTAX
SOSTAVL4LA 25,1 DEGREES L$C *
TEPLOVOE ZNACENIE KALORIMETRICESKOI SISTEMY L$W,
OPREDEL4LI SOJJENIEM ZTALONNOI BENZOINOI KISLOTY DL4 TEX
JE INTERVALOV TEMPERATUR , CTO I V OPYTAX S
ISSLEDOVAVWIMIS4 VE5ESTVAMI *
P* (FOOTNOTE) *
P* 1$ GRADUS TERMOMETRA RAVEN 0,67 DEGREES L$C *

P* PAGE 45 *
P* REDKIE 3LEMENTY V METEORITAX *
P* KAK RASPREDEL4HTS4 REDKIE 3LEMENTY RAZLICNOI
GEOXIMICESKOI PRIRODY MEJDU OTDEL6NYMI FAZAMI METEORITNOGO
VE5ESTVA *
OTVETIT6 NA 3TOT VOPROS - ZNACIT POZNAT6 PROQESSY
OBRAZOVANI4 I 3VOLHQII METEORITOV *
BLAGODAR4 RAZVITIH VYSOKOCUVSTVITEL6NOGO METODA NEITRONNOI
AKTIVAQII , ZA POSLEDNIE GODY UDALOS6 PROIZVESTI BOL5WOE
CISLO OPREDELENII SODERJANI4 REDKIX 3LEMENTOV V METEORITAX
RAZNYX TIPOV *
P* ANALIZ POLUCENNYX DANNYX POZVOLIL 3. ANDERSU (SWA)
PRIITI K ZAKLHCENIH , CTO NABLHDAETS4 OPREDELENNOE
SOOTNOWENIE V SODERJANII 20 REDKIX 3LEMENTOV V UGLISTYX
METEORITAX *
METEORITY TIPOV II (MEREI) I III (FELIKS)
SOOTVETSTVENNO V DVA I CETYRE RAZA OBEDNENY 3TIMI
3LEMENTAMI PO SRAVNENIH S METEORITAMI TIPA I$ (ORGEI) *

PODOBNYE ZAKONOMERNOSTI NAIDENY TAKJE DL4 OBYCNYX I
3NSTATITOVYX XONDRITOV *
VPERVYE OB 3TOM INTERESNOM NABLHDENII ANDERS SOOB5IL V MAE
1964 V MOSKVE NA XI METEORITNOI KONFERENQII *
NA XX KONGRESSE HPAK IM I O. MHLLEROM SOOB5ENY NOVYE
DANNYE O SODERJANII GALLI4 , INDI4 , SELENA I TELLURA ,
KOTORYE PODTVERDILI NAIDENNYE RANEE ZAKONOMERNOSTI *

P* VSE 3TO POZVOLILO ANDERSU VYSKAZAT6 PREDPOLOJENIE , CTO
METEORITY PREDSTAVL4HT SOBOI SMES6 PERVICNOGO MATERIALA
DVUX TIPOV .. FRAKQII PYLI , NE ISPYTAVWEI NAGREVA I
OBOGA5ENNOI LETUCIMI KOMPONENTAMI , I FRAKQII PYLI ,
PREVRA5ENNOI V PAR I PEREKONDENSIROVANNOI VO VREM4
PROXOJDENI4 UDARNOI VOLNY CEREZ PROTOPLANETNUH TUMANNOST6
I POZTOMU POTER4VWEI LETUCIE KOMPONENTY *
P* V SVETE 3TOI GIPOTEZY PREDSTAVL4HT INTERES DANNYE ,
SOOB5ENNYE NA TOM JE KONGRESSE AK.LAVRUXINOI I
G.M.KOLESOVYM (SSSR) *
METODOM NEITRONNOI AKTIVAQII OPREDEL4LOS6 SODERJANIE
SELENA , QERI4 , EVROPI4 , BARI4 I URANA V RAZNYX FAZAX ,
SVETLYX I TEMNYX RAZNOVIDNOST4X , GIPERSTENOVYX XONDRITOV
KUNAWAK I PERVOMAISKII POSELOK *
V SVETLYX KRUPNOZERNISTYX RAZNOVIDNOST4X 3TIX XONDRITOV
OBNARUJENO DVUX-CETYREXKRATNOE OBOGA5ENIE QERIEM ,
3LEMENTOM , PROJAVL4H5IM SPOSOBNOST6 K OKISLENIH DO
CETYREXVALENTNOGO SOSTO4NI4 *
POVYWENNOE SODERJANIE QERI4 V SVETLYX RAZNOVIDNOST4X

CERTAIN QUANTITIES OF SOLID PRODUCTS OF INCOMPLETE COMBUSTION
.
HOWEVER , IF THERE IS REACHED THE HIGH DEGREE OF COMBUSTION ,
THE COMPOSITION OF THESE PRODUCTS CAN BE RATHER SIMPLE (
BASICALLY B4C, B, C) .
THEN CORRECTION ON THE INCOMPLETENESS OF COMBUSTION IN
CALORIMETRIC DETERMINATIONS IS CALCULATED PROVED AND IS
SUFFICIENTLY ACCURATE (1-3) .
IN THE PRESENT WORK WERE DETERMINED THE HEATS OF
COMBUSTION OF METOKSIBORAQIKLOPENTANA (FBHF) AND THE METHYL
ESTER OF THE D-AND-BUTYLBORIC ACID .
IN ADDITION TO THESE DETERMINATIONS SPECIAL ATTENTION WAS
DEVOTED TO THE INVESTIGATION OF COMPOSITION OF PRODUCTS OF
COMBUSTION .
THE FORMS OF SUBSTANCES .
FOR SYNTHESIS THERE WERE USED CAREFULLY THE PURIFIED INITIAL
SUBSTANCES .
METOKSIBORAQIKLOPENTAN WAS OBTAINED FROM
D-1,4-(1-BORAQIKLOPENTIL) - BUTANE AND METHYLBORATE IN THE
PRESENCE OF TETR-AND-BUTYLDIBORANE AS CATALYST (4) .
THE METHYL ESTER OF THE D-AND-BUTYLBORIC ACID WAS SYNTHESIZED
FROM THREE-AND-BUTYLBORON AND METHYLBORATE IN THE PRESENCE OF
THE SAME CATALYST (5) .
SYNTHESIZED SUBSTANCES WERE PURIFIED BY FREQUENT
REDISTILLATION IN VACUUM ON COLUMN GEMPEL4 .
THE PURIFIED FORMS OF SUBSTANCES HAD FOLLOWING
PHYSICAL-CHEMICAL CONSTANTS .. (LONG FORMULA) 82 MM. MERCURY
COL. , (LONG FORMULA) 12 MM. MERCURY COL. , (LONG FORMULA) .
METOKSIBORAQIKLOPENTAN KEPT IN LIQUID NITROGEN , AS FAR AS AT
ROOM TEMPERATURE OCCURS ITS POLYMERIZATION (4) .

EQUIPMENT AND METHOD .
THE DETERMINATIONS OF HEATS OF COMBUSTION EFFECTED IN
PRECISION WATER CALORIMETER WITH ISOTHERMAL COVER .
THE CAPACITY OF THE CALORIMETRIC BOMB 281 ML. .
BURNINGS CONDUCTED UPON PRESSURE 25 ATM. OXYGEN .
RAISING OF TEMPERATURE IN EXPERIMENT 1,7-1,9 DEGREES MEASURED
BY MERCURY CALORIMETRIC THERMOMETER OF PALOCNOGO TYPE WITH
ACCURACY UP TO 0,0003 DEGREES (SEE FOOTNOTE) .
THE WEIGHED PORTIONS OF THE SUBSTANCE 0,32-0,37 G FOR BURNING
WERE IN SEALED THIN-WALLED WAROVIDNYX AMPOULES OF PYREX GLASS
.
UPON THE FILLING OF AMPOULES THE FORMS OF SUBSTANCES PROTECTED
FROM OXIDATION AND HYDROLYSIS WITH ANHYDROUS ARGON .
FOR THE IGNITION OF SUBSTANCE IN BOMB USED IRON RIBBON ((LONG
FORMULA) .
BEFORE BURNING IN BOMB INTRODUCED 1 ML. OF WATER .
THE INITIAL TEMPERATURE OF THE MAIN PERIOD IN ALL EXPERIMENTS
CONSTITUTED 25,1 DEGREES C .
THE THERMAL VALUE OF CALORIMETRIC SYSTEM W, DETERMINED BY THE
BURNING OF ZTALONNOI BENZOIC ACID FOR THE SAME TEMPERATURE
RANGES', THAT ALSO IN EXPERIMENTS WITH THE STUDIED SUBSTANCES
.
(FOOTNOTE) .
1 THE DEGREE OF THERMOMETER IS EQUAL 0,67 DEGREES C .

PAGE 45 .
RARE ELEMENTS IN METEORITES .
AS THERE ARE DISTRIBUTED THE RARE ELEMENTS OF THE
DIFFERENT GEOCHEMICAL NATURE BETWEEN THE SEPARATE PHASES OF
METEORITIC SUBSTANCE .
TO ANSWER THIS QUESTION - MEANS TO UNDERSTAND THE PROCESSES OF
FORMATION AND THE EVOLUTIONS OF METEORITES .
DUE TO THE DEVELOPMENT OF HIGHLY SENSITIVE METHOD OF NEUTRON
ACTIVATION , IN RECENT YEARS WAS POSSIBLE TO PRODUCE THE GREAT
NUMBER OF THE DETERMINATIONS OF CONTENT OF RARE ELEMENTS IN
METEORITES OF DIFFERENT TYPES .
THE ANALYSIS OF THE OBTAINED DATA PERMITTED 3. ANDERSU (
UNITED STATES) TO COME TO CONCLUSION , THAT THERE IS OBSERVED
DEFINITE RATIO IN CONTENT 20 RARE ELEMENTS IN CARBONACEOUS
METEORITES .
METEORITES OF TYPES OF II (MEREI) AND III (FELIKS) IN TWO
AND ALSO FOUR TIMES WERE IMPOVERISHED BY THESE ELEMENTS IN
COMPARISON WITH METEORITES OF TYPE I (ORGEI CORRESPONDINGLY)
.
SIMILAR RULES WERE FOUND ALSO FOR USUAL AND 3NSTATITOVYX
XONDRITOV .
FIRST CONCERNING THIS INTERESTING OBSERVATION ANDERS REPORTED
IN //MAY 1964 IN MOSCOW ON XI OF METEORITIC CONFERENCE .
ON XX CONGRESS HPAK BY IT AND BY O. BY MUELLER INFORMED THE
NEW DATA CONCERNING THE CONTENT OF GALLIUM , INDIA , THE
SELENIUM AND TELLURIUM , WHICH CONFIRMED PREVIOUSLY THE FOUND
RULES .
ALL THIS PERMITTED ANDERSU TO EXPRESS PREMISE , THAT
METEORITES ARE MIXTURE OF INITIAL MATERIAL OF TWO TYPES .. THE
FRACTIONS OF DUST , WHICH DID NOT EXPERIENCE HEATING AND
ENRICHED BY VOLATILE COMPONENTS , AND THE FRACTIONS OF DUST ,
TRANSFORMED IN STEAM AND PEREKONDENSIROVANNOI DURING THE
PASSAGE OF STRIKING WAVE THROUGH PROTOPLANETNUH NEBULA AND
THEREFORE WHICH LOST VOLATILE COMPONENTS .
IN THE LIGHT OF THIS HYPOTHESIS THERE REPRESENT INTEREST
THE DATA , INFORMED ON THE SAME CONGRESS AK.LAVRUXINOI AND BY
G.M.KOLESOV (USSR) .
BY THE METHOD OF NEUTRON ACTIVATION WAS DETERMINED THE CONTENT
OF THE SELENIUM , CERIUM , EUROPIUM , BARIUM AND URANIUM IN
DIFFERENT PHASES , THE LIGHT AND ALSO DARK VARIETIES ,
GIPERSTENOVYX XONDRITOV KUNAWAK AND PERVOMAISK SETTLEMENT .
IN THE LIGHT COARSE VARIETIES THESE XONDRITOV WAS DISCOVERED
TWO-FOUR-FOLD ENRICHMENT BY CERIUM , BY ELEMENT , WHICH
MANIFEST CAPABILITY TO OXIDATION UP TO TETRAVALENT STATE .

THE INCREASED CONTENT OF CERIUM IN THE LIGHT VARIETIES WILL

SOGLASUETS4 S OBNARUJENNYM RANEE M.I.D64KONOVOI I V.4.XARITONOVOI (SSSR , 1964) FAKTOM PONIJENNOGO SODERJANI4 V NIX METALLICESKOGO JELEZA I BOLEE VYSOKOGO SODERJANI4 ZAKISI JELEZA *
P* 3TO ZNACIT , CTO VE5ESTVO SVETLYX RAZNOVIDNOSTEI METEORITOV PROWLO , PO-VIDIMOMU , CEREZ STADIH BOLEE INTENSIVNOGO OKISLENI4 , NEJELI VE5ESTVO TEMNYX RAZNOVIDNOSTEI *
P* L$END *

P* PAGE 117 *
P* INFRAKRASNYE ZVEZDY *
P* NA OBSERVATORII MAUNT-VIL6SON USTANOVLEN TELESKOP S 62-DHIMOVYM ALHMINIROVANNYM PLASTMASSOVYM ZERKALOM I SVETOSILOI 1,0 *
TELESKOP SNABJEN DETEKTORAMI INFRAKRASNOGO IZLUCENI4 DL4 DLIN VOLN 0,62-0,92 I 2,01-2,41 G$M *

3TIM TELESKOPOM UJE UDALOS6 OBNARUJIT6 DVE ZVEZDY , ISPUSKAH5IX V INFRAKRASNOM SVETE V TYS4CU RAZ BOL6WE 3NERGII , CEM V VIDIMOM *
ODNA IZ NIX NAXODITS4 V SOZVEZDII TEL6QA I IMEET TEMPERATURU POVERXNOSTI 650 L$DEGREES L$C , VTORA4 - V SOZVEZDII LEBED4 , TEMPERATURA POVERXNOSTI 430 DEGREES L$C *
NESMOTR4 NA STOL6 NIZKIE POVERXNOSTNYE TEMPERATURY , ASTRONOMY SCITAHT IX NASTO45IMI ZVEZDAMI , V NEDRAX KOTORYX TEMPERATURY DOSTATOCNO VYSOKI DL4 PROTEKANI4 4DERNYX REAKQII *
POKA NEIZVESTNO RASSTO4NIE DO 3TIX ZVEZD - NEL6Z4 SKAZAT6 , OTNOS4TS4 LI ONI K KARLIKAM ILI K GIGANTAM , NO MOJNO OJIDAT6 , CTO S RAZVITIEM INFRAKRASNOI ASTRONOMII BUDET OTKRYTO E5E MNOGO PODOBNYX ZVEZD *

P* L$END *

P* PAGE 118 *
P* PRIRODNYE NEITRINO *
P* DEV4T6 LET TOMU NAZAD F.REINSU I K.KOU3NU VPERVYE UDALOS6 OSU5ESTVIT6 PR4MOE NABLHDENIE MEL6CAIWIX CASTIQ - NEITRINO , ISPUSKAEMYX 4DERNYM REAKTOROM *
TEPER6 GRUPPA ISSLEDOVATELEI POD RUKOVODSTVOM TOGO JE REINSA OSU5ESTVILA 3KSPERIMENT PO OBNARUJENI4 NEITRINO PRIRODNOGO PROISXOJDENI4 *
P* V ZOLOTOM RUDNIKE BLIZ IOGANNESBURGA NA GLUBINE SVYWE 3000 L$M BYLO RAZME5ENO 36 JIDKOSTNYX SQINTILL4QIONNYX SCETCIKOV *
REGISTRIROVALIS6 TOL6KO VYSWIX UCEBNYX ZAVEDENII , ZAPOVEDNIKOV I DRUGIX UCREJDENII , IMEH5IX OTNOWENIE K ORNITOLOGII (SEL6SKOE I LESNOE XOZ4ISTVO , OXOTA , VETERINARI4) *
P* ORNITOLOGICESKIE ISSLEDOVANI4 VES6MA MNOGOOBRAZNY I RAZNOSTORONNI *
KONFERENQI4 , ESTESTVENNO , NE MOGLA OTRAZIT6 IX POLNOST6H *
OSNOVNA4 EE RABOTA BYLA POSTROENA V VIDE CETYREX SIMPOZIUMOV PO NAIBOLEE AKTUAL6NYM I VAJNYM VOPROSAM ORNITOLOGII I IZUCENIH DIKOI FAUNY VOOBSE *
P* ODIN IZ SIMPOZIUMOV BYL POSVS45EN SOVREMENNOMU SOSTO4NIH SISTEMATIKI I IZUCENIH VIDOOBRAZOVANI4 I FORMOOBRAZOVANI4 U PTIQ *
ZA POSLEDNIE GODY INTERES K 3TIM VOPROSAM KRAINE VOZROS *
NOVYE BIOLOGICESKIE NAPRAVLENI4 , IZ NIX V PERVUH OCEREDI SLEDUET UPOM4NUT6 O PROGRESSE V IZUCENII NUKLEINOVYX KISLOT , VYDVIGAHT PERED SISTEMATIKAMI NOVYE ZADACI I OTKRYVAHT NOVYE PUTI DL4 OB7EKTIVNYX ISSLEDOVANII *
P* PTIQY IZDAVNA SCITAHTS4 KLASSICESKOI MODEL6H DL4 OB5EBIOLOGICESKIX ISSLEDOVANII *
NO TEPER6 , NA4DU S KLASSICESKOI METODIKOI IZUCENI4 MORFOLOGII , FIZIOLOGII VSE BOL6WE UDEL4ETS4 VNIMANI4 TAKIM NOVYM NAUKAM , KAK BIOFIZIKA , BIOXIMI4 , BIONIKA , 3TOLOGI4 *
P* PERVOOCEREDNOGO VNIMANI4 TREBUET IZUCENIE NACAL6NYX 3TAPOV FORMOOBRAZOVANI4 I VIDOOBRAZOVANI4 , VOZNIKNOVENIE I DEISTVIE IZOLIRUH5IX MEXANIZMOV , A TAKJE RAZVITIE ISSLEDOVANI4 PO GENETIKE PTIQ , OBLASTI , V KOTOROI U NAS ZA POSLEDNIE GODY RABOTALI 4VNO NEDOSTATOCNO *

NA 3TI TEMY BYLO PREDSTAVLENO CETYRE DOKLADA ..
G.P.DEMENT6EVA (MOSKVA) - SOVREMENNOE SOSTO4NIE SISTEMATIKI PTIQ .., S.S.WVARQ (SVERDLOVSK) - UCENIE O MIKRO3VOLHQII I TEORETICESKIE VOPROSY SISTEMATIKI PTIQ .., V.D.IL6ICEVA (MOSKVA) - FUNKQIONAL6NA4 MORFOLOGI4 I NEMORFOLOGICESKIE KRITERII V SOVREMENNOI SISTEMATIKE .., F.I.STRAUTMAN (ODESSA) - BIOXIMICESKIE POKAZATELI RODSTVENNYX SV4ZEI PLASTINCATOKLHVYX PTIQ (IZUCENIE BELKOV SYVOROTKI KROVI PUTEM 3LEKTROFOREZA) *
P* VTOROI SIMPOZIUM RASSMATRIVAL ROL6 PTIQ V TAK NAZYVAEMOM KUL6TURNOM LANDWAFTE *
OGROMNYE , INOGDA E5E TRUDNO UCITYVAEMYE PEREMENY , VNOSIMYE V PRIRODU DE4TEL6NOST6H CELOVEKA , V ZNACITEL6NOI MERE 4VL4HTS4 OSNOVNYM FAKTOROM JIZNI , IZMENENI4 I RAZVITI4 BIOGEOQENOZOV *
VNIMANIE ISSLEDOVATELEI SLEDUET PRIVLEC6 KO VSESTORONNEMU IZUCENIH XARAKTERA I ROLI 3TIX IZMENENII , CTOBY RAZRABOTAT6 REKOMENDAQII DL4 RAQIONAL6NOGO , RAZUMNOGO NAPRAVLENI4 3TIX IZMENENII *
K 3TOMU V WIROKOM PLANE I SVODITS4 VAJNEIWA4 ZADACA OXRANY PRIRODY *
PRIXODITS4 PRIZNAT6 , CTO ZOOGEOGRAFY DO SIX POR INTERESOVALIS6 GLAVNYM OBRAZOM (DIKIMI) FAUNAMI , IX RASPREDELENIEM I ISTORIEI *

CONFORM WITH SHOWED PREVIOUSLY M.I.D64KONOVOI AND V.4.XARITONOVOI (USSR , 1964) BY THE FACT OF LOWERED CONTENT IN THEM METALLIC IRON AND THE HIGHER CONTENT OF LOWER OXIDE OF IRON .
THIS MEANS , THAT THE SUBSTANCE OF THE LIGHT VARIETIES OF METEORITES PASSED THROUGH , ACCORDING TO-VISIBLE , THROUGH THE STAGE OF MORE INTENSE OXIDATION , THAN THE SUBSTANCE OF THE DARK VARIETIES .
END .

PAGE 117 .
THE INFRA-RED STARS .
ON OBSERVATORY MAUNT-VIL6SON ESTABLISHED TELESCOPE WITH 62-INCH ALHMINIROVANNYM PLASTIC MIRROR AND BY LUMINOSITY 1,0 .

TELESCOPE WAS EQUIPPED WITH THE DETECTORS OF THE INFRA-RED RADIATION FOR THE LENGTHS OF THE WAVES 0,62-0,92 AND 2,01-2,41 MU .
BY THIS TELESCOPE ALREADY WAS POSSIBLE TO DISCOVER TWO STARS , WHICH EMIT IN THE INFRA-RED LIGHT IN THOUSAND OF TIMES GREATER OF ENERGY , BY WHICH IN VISIBLE .
ONE OF THEM IS IN THE CONSTELLATION OF TAURUS AND THERE HAS THE TEMPERATURE OF THE SURFACE 650 DEGREES C , THE SECOND - IN THE CONSTELLATION OF SWAN , THE TEMPERATURE OF SURFACE 430 DEGREES C .
TO SO LOW SUPERFICIAL TEMPERATURES , ASTRONOMERS COUNT THEIR PRESENT STARS , IN THE BOWELS OF WHICH OF TEMPERATURE SUFFICIENTLY HIGH FOR THE COURSE OF NUCLEAR REACTIONS .

IS MEANWHILE UNKNOWN DISTANCE UP TO THESE STARS - IT IS NOT POSSIBLE TO SAY , WHETHER THERE ARE RELATED THEY TO THE DWARFS OR TO THE GIANTS , BUT IT IS POSSIBLE TO EXPECT , THAT WITH THE DEVELOPMENT OF THE INFRA-RED ASTRONOMY WILL BE OPENED STILL MANY SIMILAR STARS .
END .

PAGE 118 .
NATURAL NEUTRINOS .
NINE YEARS TO THIS BACK F.REINSU AND K.KOU3NU FIRST WAS POSSIBLE TO EFFECT THE STRAIGHT OBSERVATION OF THE FINEST PARTICLES - NEUTRINOS , EMITTED BY NUCLEAR REACTOR .
NOW GROUP OF INVESTIGATORS UNDER MANUAL THE SAME REINSA EFFECTED EXPERIMENT ACCORDING TO THE DETECTING OF THE NEUTRINOS OF NATURAL ORIGIN .
IN THE GOLD MINE NEAR IOGANNESBURGA ON DEPTH BEYOND 3000 M WAS PLACED 36 LIQUID SCINTILLATION COUNTERS .

THERE WERE RECORDED ONLY THE HIGHER SCHOOL INSTITUTIONS , NATIONAL FOREST AND THE OTHER ESTABLISHMENTS , WHICH HAVE RELATION TO ORNITOLOGII (RURAL AND ALSO FOREST ECONOMY , WILLINGNESS , VETERINARI4) .
ORNITOLOGICESKIE INVESTIGATIONS VERY DIVERSE AND DIVERSE .
CONFERENCE , NATURALLY , COULD NOT REFLECT THEM COMPLETELY .

MAIN ITS WORK WAS CONSTRUCTED IN THE FORM OF FOUR SYMPOSIA ACCORDING TO THE MOST ACTUAL AND IMPORTANT QUESTIONS OF ORNITOLOGII AND TO THE STUDY OF WILD FAUNA IN GENERAL .
ONE OF SYMPOSIA WAS DEDICATED TO THE CONTEMPORARY STATE OF SYSTEMATICS AND TO THE STUDY OF VIDOOBRAZOVANI4 AND FORMOOBRAZOVANI4 AT BIRDS .
IN RECENT YEARS INTEREST TO THESE QUESTIONS VERY GREW .
THE NEW BIOLOGICAL DIRECTIONS , FROM THEM MAINLY IS NECESSARY TO MENTION CONCERNING PROGRESS IN THE STUDY OF THE NUCLEINIC ACIDS , ADVANCE BEFORE SYSTEMATICS THE NEW PROBLEMS AND OPEN THE NEW WAYS FOR OBJECTIVE INVESTIGATIONS .
THE BIRDS OF IZDAVNA ARE COUNTED CLASSICAL MODEL FOR OB5EBIOLOGICESKIX INVESTIGATIONS .
NOW BUT , ALONG WITH THE CLASSICAL METHOD OF STUDY OF MORFOLOGII , PHYSIOLOGIES EVER GREATER THERE IS DEVOTED ATTENTIONS TO SUCH NEW SCIENCES , AS BIOPHYSICS , BIOCHEMISTRY , BIONIKA , 3TOLOGI4 .
PRIME ATTENTION THERE REQUIRES THE STUDY OF THE INITIAL STAGES OF FORMOOBRAZOVANI4 AND VIDOOBRAZOVANI4 , EMERGENCE AND THE ACTION OF THE ISOLATING MECHANISMS , AND ALSO THE DEVELOPMENT OF INVESTIGATION ACCORDING TO GENETIKE BIRDS , RANGES , IN WHICH AT US IN RECENT YEARS WORKED EVIDENTLY INSUFFICIENTLY .
ON THESE TOPICS WAS REPRESENTED FOUR REPORTS .. G.P.DEMENT6EV (MOSCOW) - THE CONTEMPORARY STATE OF SYSTEMATICS OF BIRDS .., S.S.WVARQ (SVERDLOVSK) - DOCTRINE CONCERNING MIKRO3VOLHQII AND THE THEORETICAL QUESTIONS OF SYSTEMATICS OF BIRDS .., V.D.IL6ICEV (MOSCOW) - FUNCTIONAL MORFOLOGI4 AND THE NEMORFOLOGICESKIE CRITERIA IN CONTEMPORARY SYSTEMATICS .., F.I.STRAUTMAN (ODESSA) - THE BIOCHEMICAL INDEXES OF RELATED BONDS OF PLASTINCATOKLHVYX BIRDS (THE STUDY OF THE PROTEINS OF SYVOROTKI OF BLOOD BY MEANS OF ELECTROPHORESIS) .
THE SECOND SYMPOSIUM CONSIDERED THE ROLE OF BIRDS IN SO-CALLED CULTURAL LANDSCAPE .
ENORMOUS , SOMETIMES STILL DIFFICULT CONSIDERED CHANGES , BEING INTRODUCED IN NATURE BY THE ACTIVITY OF MAN , IN SIGNIFICANT MEASURE THERE ARE THE MAIN FACTOR OF LIFE , CHANGES AND THE DEVELOPMENTS OF BIOGEOQENOZOV .
THE ATTENTION OF INVESTIGATORS IS NECESSARY TO ATTRACT TO THE THOROUGH STUDY OF THE CHARACTER AND THE ROLES OF THESE CHANGES , TO WORK OUT RECOMMENDATIONS FOR THE RATIONAL , REASONABLE DIRECTION OF THESE CHANGES .
TO THIS IN WIDE PLAN AND THERE COMES THE MOST IMPORTANT PROBLEM OF PROTECTION OF NATURE .
IS NECESSARY TO ACKNOWLEDGE , THAT ZOOGEOGRAFY UP TO THESE TIMES BECOME MAINLY (WILD) BY FAUNA , BY THEIR DISTRIBUTION AND BY HISTORY .

TAK NAZYVAEMYI KUL6TURNYI LANDWAFT NE V SFERE IX VNIMANI4 *
NA SIMPOZIUME BYLO SDELANO DVA VYZVAVWIX OJIVLENNYE PRENI4 DOKLADA .. N.A.GLADKOVA (MOSKVA) I A.K.RUSTAMOVA (AWXABAD) OB OSNOVNYX PROBLEMAX IZUCENI4 PTIQ V KUL6TURNYX LANDWAFTAX ., V.V.STROKOVA (TAMBOV) O KUL6TURNYX LANDWAFTAX I ZADACAX ORNITOLOGICESKIX ISSLEDOVANII *

P* TRETII SIMPOZIUM KASALS4 NEKOTORYX PRAKTICESKIX STORON IZUCENI4 PTIQ *
PRIVLEKAH5IE TEPER6 BOL6WOE I ZASLUJENNOE VNIMANIE VOPROSY BIONIKI , ZADACI BIOLOGICESKOGO MODELIROVANI4 , STAV4T NA OCERED6 IZUCENIE SLOJNYX I POKA NE VPOLNE 4SNYX SEZONNYX PEREME5ENII PTIQ V PRIRODE *
S 3TOI JE PROBLEMOI SEZONNYX PEREME5ENII SOCETAHTS4 I VOPROSY POPUL4QIONNOI 3KOLOGII , KOLICESTVENNYX UCETOV , A TAKJE R4D PRACTICESKIX ZADAC V OBLASTI MEDIQINY I VETERINARII , V DELE OXOTNIC6EGO PROMYSLA I SPORTIVNOI OXOTY *

P* PAGE 119 *
NA 3TOM SIMPOZIUME BYLI ZASLUWANY I OBSUJDENY DOKLADY .. CL.-KORR. AN 3STONSKOI SSR 3.V9KUMARI (TARTU) - O TEORETICESKIX ASPEKTAX NAVIGAQII PERELETNYX PTIQ ., G.I.NEQKOGO (NOVOSIBIRSK) - O PERELETAX PTIQ I PROBLEME ARBOVIRUSOV ., V.F.GAVRINA (KIROV) - O ZNACENII PERNATOI DICI V OXOTNIC6EM XOZ4ISTVE I VOZMOJNOSTI LUCWEGO EE ISPOL6ZOVANI4 *

P* STRANA NAWA TAK VELIKA I PRIRODNYE USLOVI4 EE STOL5 RAZNOOBRAZNY , CTO U NAS , V OTLICIE OT MNOGIX DRUGIX , V CASTNOSTI EVROPEISKIX STRAN , FAUNISTICESKIE ISSLEDOVANI4 E5E NE MOGUT SCITAT6S4 ZAVERWENNYM 3TAPOM *
A MEJDU TEM FAUNISTIKA - OSNOVA DL4 LHBYX ZOOLOGICESKIX , V CASTNOSTI I ORNITOLOGICESKIX ISSLEDOVANII , A TAKJE I DL4 3KOLOGICESKIX , IMEH5IX V NASTO45EE VREM4 OSNOVNOE ZANACENIE *
NO OCEN6 VAJNO USOVERWENSTVOVAT6 SOOTVETSTVUH5IE METODIKI , SREDI KOTORYX OSOBOE ZNACENIE IMEET VY4SNENIE KOLICESTVENNOI STORONY 4VLENII , UCET DINAMIKI POPUL4QII , IZUCENIE IX BIOMASSY *
3TIM ZADACAM IZUCENI4 AVIFAUNY SSSR I BYL POSV45EN CETVERTYI SIMPOZIUM KONFERENQII *
NA NEM BYLI OBSUJDENY DOKLADY L.A.PORTENKO (LENINGRAD) - O SOVREMENNOM SOSTO4NII , UROVNE I ZADACAX AVIFAUNISTICESKIX ISSLEDOVANII V SSSR ., I.A.DOLGUWINA (ALMA-ATA) - OB IZUCENNOSTI 3KOLOGII NAWIX PTIQ ., A.P.KUZ4KINA I P.P.VTOROVA (MOSKVA) - O KOLICESTVENNYX METODIKAX V AVIFAUNISTIKE I ORNITOLOGII *

P* V RABOTE KONFERENQII PRIN4LI UCASTIE I ORNITOLOGI IZ ZARUBEJNYX STRAN *
PROF. G.WIL6DM4AXER (GDR) PROCEL DOKLAD O FIZIOLOGICESKIX IZMENENI4X V ORGANIZME PTIQ , SV4ZANNYX S SEZONNYMI 4VLENI4MI ., D-R V.WTEFAN - OB AVIFAUNISTICESKIX ISSLEDOVANI4X V GERMANSKOI DEMOKRATICESKOI RESPUBLIKE , IX ORGANIZAQII I ZADACAX *
H.WTHBE (GDR) - O RABOTE PO IZDANIH ATLASA RASPROSTRANENI4 PALEARKTICESKIX PTIQ ., D-R V.PWIGODDA (FRG) - O VLI4NII NA AVIFAUNU PRIMENENI4 V SEL5SKOM I LESNOM XOZ4ISTVE 4DOXIMIKATOV *
P* NA KONFERENQII BYLO PRODEMONSTRIROVANO NESKOL6KO KINOFIL6MOV (A.S.MAL6CEVSKII - O GNEZDOVOI JIZNI PTIQ ., S.S.TUROV - O PRIVLECENII PTIQ V PODMOSKOV6E ., D-R C.VORI POKAZAL DVA FIL6MA - O POLETE KOLIBRI I O HJNOAMERIKANSKOI AVIFAUNE ., D-R- R.MELMER - OB ZKOLOGII LUGOVOGO TETEREVA *
P* PROVEDENIE SLEDUH5EI KONFERENQII NAMECENO NA 1969 *

P* L$END *

P* SKOL6KO STOIT VODA *
P* K NASTO45EMU VREMENI OQENENY VSE VIDY ISKOPAEMYX , KROME VODY *
A OPREDELIT6 , VO SKOL6KO ONA OBXODITS4 , NE TAK-TO PROSTO , KA KAJETS4 NA PERVYI VZGL4D *
EE STOIMOST6 SKLADYVAETS4 IZ STOIMOSTI SOORUJENII , KOTORYE EE ZABIRAHT U PRIRODY , OCISAHT I PODVODT K POTREBITELH , EJEGODNYX ZATRAT NA IX REMONT I OCISTKU , STOIMOSTI 3NERGII DL4 VODOPODTEMA I OPLATY OBSLUJIVAH5EGO PERSONALA *
3TO KAK BY MESTNYE SOVPADENI4 , SVIDETEL6STVUH5IE , CTO NABLHDAEMA4 CASTIQA PROLETALA VDOL6 WTREKA , T. E. V GORIZONTAL6NOM NAPRAVLENII *
DO SIX POR ZAREGISTRIROVANO SEM6 SLUCAEV PODOBNYX SOVPADENII *
P* NA TAKUH GLUBINU MOGUT PRONIKAT6 TOL6KO NEITRINO I G$M - MEZONY , OBRAZOVANNYE KOSMICESKIMI LUCAMI V ATMOSFERE *

NO CASTIQY , PRIXOD45IE SVERXU , V USLOVI4X 3KSPERIMENTA NE REGISTRIROVALIS6 *
TAKIM OBRAZOM , NABLHDAVWIES4 CASTIQY (VIDIMO , G$M - MEZONY) DOLJNY BYLI OBRAZOVAT6S4 V MOMENT STOLKNOVENI4 NEITRINO , PRIWEDWIX IZ ATMOSFERY , S ATOMNYMI 4DRAMI GLUBINNYX GORNYX POROD *
K SOJALENIH , NET OSNOVANII PREDPOLAGAT6 , CTO 3TI NEITRINO PRIWLI IZ KOSMOSA *
ONI SKOREE VSEGO OBRAZOVALIS6 POD DEISTVIEM KOSMICESKIX LUCEI V ATMOSFERE *
NO 3TOT 3KSPERIMENT - PERVYI WAG NA PUTI K REGISTRAQII ISTINNO KOSMICESKIX NEITRINO *
ANALOGICN4A RABOTA VEDETS4 OB7EDINENNOI GRUPPOI INDIISKIX , 4PONSKIX I BIRMANSKIX ISSLEDOVATELEI V ZOLOTOM RUDNIKE KOLAR (HJNA4 INDI4) *
IMI POKA ZAREGISTRIROVAN ODIN SLUCAI SOVPADENI4 *

SO-CALLED CULTURAL LANDSCAPE NOT IN THE SPHERE OF THEIR ATTENTION .
ON SYMPOSIUM WAS MADE TWO WHICH CAUSED LIVELY DISCUSSIONS OF REPORT .. N.A.GLADKOV (MOSCOW) AND A.K.RUSTAMOV (AWXABAD) CONCERNING THE MAIN PROBLEMS OF STUDY OF BIRDS IN CULTURAL LANDSCAPES ., V.V.STROKOV (TAMBOV) CONCERNING CULTURAL LANDSCAPES AND THE PROBLEMS OF ORNITOLOGICESKIX INVESTIGATIONS .

THE THIRD SYMPOSIUM CONCERNED CERTAIN PRACTICAL SIDES OF STUDY OF BIRDS .
NOW ATTRACTING GREAT AND MERITED ATTENTION THE QUESTIONS OF BIONIKI , THE PROBLEMS OF BIOLOGICAL MODELING , PUT ON PLACE THE STUDY OF COMPLEX AND MEANWHILE NOT COMPLETELY CLEAR SEASONAL TRANSFERS OF BIRDS IN NATURE .
WITH THE SAME PROBLEM OF SEASONAL TRANSFERS THERE ARE COMBINED AND THE QUESTIONS OF POPUL4QIONNOI ECOLOGY , QUANTITATIVE CALCULATIONS , AND ALSO THE ORDER OF PRACTICAL PROBLEMS IN THE RANGE OF MEDICINE AND VETERINARII , IN THE FACT OF THE OXOTNIC6EGO FIELD AND SPORTS WILLINGNESS .

PAGE 119 .
ON THIS SYMPOSIUM WERE HEARD AND DISCUSSED REPORTS .. MEMBER-CORRESPONDENT ACAD.SCI. ESTONIAN SSR 3.V9KUMARI (TARTU) - CONCERNING THE THEORETICAL ASPECTS OF NAVIGAQII OF PERELETNYX BIRDS ., G.I.NEQKOGO (NOVOSIBIRSK) - CONCERNING PERELETAX OF BIRDS AND TO THE PROBLEM OF ARBOVIRUSOV ., V.F.GAVRINA (KIROV) - CONCERNING THE VALUE OF PERNATOI DICI IN OXOTNIC6EM ECONOMY AND POSSIBILITIES BETTER ITS UTILIZATION .

COUNTRY OUR SO GREAT AND ITS NATURAL CONDITIONS SO VARIOUS , THAT AT US , IN CONTRAST TO MANY OTHERS , IN PARTICULAR OF EUROPEAN COUNTRIES , FAUNISTICESKIE INVESTIGATIONS STILL CANNOT BE COUNTED CONCLUDED STAGE .
AND MEANWHILE FAUNISTIKA - BASIS FOR ANY ZOOLOGICESKIX , IN PARTICULAR AND ORNITOLOGICESKIX INVESTIGATIONS , AND AND ALSO FOR ECOLOGICAL , HAVING AT PRESENT MAIN ZANACENIE .

BUT VERY SIGNIFICANTLY TO IMPROVE THE CORRESPONDING METHODS , AMONG WHICH SPECIAL VALUE HAS THE EXPLANATION OF QUANTITATIVE SIDE OF PHENOMENA , THE CALCULATION OF DYNAMICS POPUL4QII , THE STUDY OF THEIR BIOMASS .
TO THESE PROBLEMS OF STUDY OF AVIFAUNY USSR AND WAS DEDICATED THE FOURTH SYMPOSIUM OF CONFERENCE .
ON IT WERE DISCUSSED REPORTS L.A.PORTENKO (LENINGRAD) - CONCERNING CONTEMPORARY STATE , LEVEL AND THE PROBLEMS OF AVIFAUNISTICESKIX INVESTIGATIONS IN USSR ., I.A.DOLGUWINA (ALMA-ATE) - CONCERNING THE BODY OF KNOWLEDGE OF THE ECOLOGY OF OUR BIRDS ., A.P.KUZ4KINA AND P.P.VTOROV (MOSCOW) - CONCERNING QUANTITATIVE METHODS IN AVIFAUNISTIKE AND ORNITOLOGII .
IN WORK CONFERENCES TOOK PARTICIPATION AND ORNITOLOGI FROM FOREIGN COUNTRIES .
PROFESSOR G.WIL6DM4AXER (GDR) PROCEL REPORT CONCERNING PHYSIOLOGICAL CHANGES IN THE ORGANISM OF BIRDS , WHICH WERE CONNECTED TO SEASONAL PHENOMENA ., D-R V.WTEFAN - CONCERNING AVIFAUNISTICESKIX INVESTIGATIONS IN GERMAN DEMOCRATIC REPUBLIC , THEIR ORGANIZATIONS AND PROBLEMS .
H.WTHBE (GDR) - CONCERNING WORK ACCORDING TO THE EDITION OF ATLAS OF EXTENSION OF PALEARKTICESKIX BIRDS ., D-R V.PWIGODDA (FRG) - CONCERNING INFLUENCE ON AVIFAUNU APPLICATIONS IN THE RURAL AND FOREST ECONOMY OF CHEMICAL POISONS .
ON CONFERENCE WAS DEMONSTRATED SEVERAL MOTION PICTURES (A.S.MAL6CEVSKI - CONCERNING THE CLUSTER-SOWING LIFE OF BIRDS ., S.S.TUROV - CONCERNING ATTRACTING OF BIRDS IN PODMOSKOV5E ., D-R C.VORI SHOWED TWO FIL6MA - CONCERNING THE FLIGHT OF KOLIBRI AND CONCERNING HJNOAMERIKANSKOI AVIFAUNE ., D-R-R.MELMER - CONCERNING ZKOLOGII OF LUGOVOGO TETEREV .
THE CONDUCTING OF FOLLOWING CONFERENCE WAS MARKED ON 1969 .
END .

HOW MANY IS WATER .
TO THE PRESENT TENSE WERE EVALUATED ALL OF THE FORMS MINERAL , BESIDES WATER .
AND TO DETERMINE , IN HOW MANY IT COSTS , NOT THEN SIMPLY , KILOAMPERE APPEARS AT FIRST SIGHT .
ITS VALUE IS ADDED FROM THE VALUE OF EQUIPMENT , WHICH IT TAKE AT NATURE , PURIFY AND THERE BRING TO CONSUMER , YEARLY OUTLAYS FOR THEIR REPAIR AND PURIFICATION , THE VALUES OF ENERGY FOR WATER LIFTING AND THE PAYMENTS OF SERVING PERSONNEL .
THIS AS IT WERE LOCAL COINCIDENCES , WHICH GIVE EVIDENCE , THAT OBSERVED PARTICLE PASSED ALONG DRIFT , I.E. IN HORIZONTAL DIRECTION .
UP TO THESE TIMES RECORDED SEVEN CASES OF SIMILAR COINCIDENCES .

ON SUCH A DEPTH CAN PENETRATE ONLY BY NEUTRINOS AND ALSO BY MU - MESONS , WHICH WERE FORMED BY COSMIC RAYS IN ATMOSPHERE .
BUT NO PARTICLES , WHICH ARRIVE FROM ABOVE , IN THE CONDITIONS OF EXPERIMENT WERE RECORDED .
THUS , OBSERVED PARTICLES (VISIBLY , MU - MESONS) HAD TO BE FORMED IN THE COURSE OF THE MOMENT OF THE COLLISION OF NEUTRINOS , WHICH CAME FROM ATMOSPHERE , WITH ATOMIC THE NUCLEI OF DEPTH MOUNTAINOUS BREEDS .
TO REGRET , THERE ARE NO BASES TO SUPPOSE , THAT THESE NEUTRINOS CAME FROM KOSMOSA .
THEY SOONER IN ALL WERE FORMED UNDER THE ACTION OF THE COSMIC RAYS IN ATMOSPHERE .
BUT THIS EXPERIMENT - THE FIRST STEP ON WAYS TO THE RECORDING OF REALLY COSMIC NEUTRINOS .
ANALOGOUS WORK IS CARRIED OUT BY JOINED GROUP OF INDIAN , //JAPANESE AND BIRMANSKIX INVESTIGATORS IN THE GOLD MINE KOLAR (SOUTH INDIA) .
BY THEM WAS MEANWHILE RECORDED ONE CASE OF COINCIDENCE .

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