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# USSR Report

BIOMEDICAL AND BEHAVIORAL SCIENCES

(FOUO 4/79)

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27 July 1979

USSR REPORT  
BIOMEDICAL AND BEHAVIORAL SCIENCES

(FOUO 4/79)

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ECOLOGY

UDC 551.794(262.83)

LATE HOLOCENE HISTORY OF ARAL SEA STUDIED

Moscow VESTNIK MOSKOVSKOGO UNIVERSITETA. GEOGRAFIYA in Russian No 3,  
1979 pp 19-26

[Article by T. A. Abramova: "On the Late Holocene History of the Aral Sea"]

[Text] The history of the development of one of the largest closed-drainage water bodies of the arid zone of the USSR, the Aral Sea, has long attracted the attention of scientists. In recent years the problem of study of this unique basin has become especially urgent in connection with the intensifying effect of man's activity on the condition of the Aral.

At the present time the Aral Sea is experiencing a water balance deficit, calculated annually at 2.8 cubic kilometers [12]. By virtue of this the Aral has a natural tendency toward a drop in its level by 6.3 centimeters per year [13]. Among the factors making up the incoming water balance of the Aral Sea (atmospheric precipitation, groundwater, runoff of rivers), namely river runoff is the most significant component. The removal of the most substantial part of it for irrigation disturbs the balance of the whole ecosystem both of the water body itself and of the coastal region of the Aral Sea and can lead to very undesirable consequences.

In comparing the economic effect from the existence of the Aral Sea (fishing and so forth) and from the irrigation of the irrigated lands which are given life by the waters of the Aral rivers, certain scientists speak in favor of the latter [7]. However the disappearance or sharp reduction of the area of the Aral in addition to a loss of the unique water body of the desert zone will raise a whole series of very different problems, which can overturn all the prospective economic benefits. In particular, there may arise the threat of salination of the irrigated and cultivated lands of Central Asia and Kazakhstan owing to wind transfer of the huge mass of salts covering the drying surface of the sea bottom. There are many such problems.

In connection with this especial interest is taken on by the complex studies of the Holocene history of the Aral Sea and especially the segment of

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it closest to us, the Late Holocene period, when the condition of the water body began to be perceptibly affected by the anthropogenic factor. The obtained data can be used for forecasting future fluctuations in the level of the Aral Sea and connected changes in the natural environment both of the water body itself and of the adjacent territories.

On this level the results of a palinologic study of the Late Holocene bottom sediments of the Aral Sea can be of definite interest. Studied by us by the method of spore-pollen analysis were 54 samples taken in different parts of the water area, at depths of from 5 to 40 meters (samples taken by Ye.G. Mayev and V.I. Artamonov).

It is necessary to note first of all the high concentration of pollens and spores in the bottom sediments of the Aral, which is unusual for deposits of the arid zone of the south of the USSR. The concentration of microfossils in sediments of the Aral Sea comes to up to 300 grains per 1 gram of sediment, which exceeds 3-4-fold the content of pollen and spores in the sediments of the Caspian Sea which is close in a territorial respect. In addition, judging by the results of a study of cores located in different parts of the water area, the concentration of spollen and spores for the Aral Sea does not depend on the distance from shore. An analogous characteristic is noted by V.A. Vronskiy, who has also studied the bottom sediments of the Aral [6]. Apparently, this phenomenon is connected with the relatively small dimensions, the small amount of water and the hydrodynamic regime of the sea. The constant circular flow of the waters of an anti-cyclonic nature and the intensive tidal phenomena contribute to the mixing of the pollen and spores falling over the Aral and to their relatively uniform distribution in the bottom sediments.

What explanation is there for the unusually high saturation of the bottom deposits of the Aral with pollen and spores?

It is known that the finer the fraction of surrounding rock, the greater the concentration of microfossils in it. Among the sediments of the Aral, sandy material plays an insignificant role, but the bulk of the terrigenous substance is represented by aleurite and pelite fractions [3], as we saw in the case of the sediments we studied. Apparently, also significant is the shallowness of the water body, above the water area of which is established a rather intensive "pollen rain," comprising during a season  $11 \cdot 10^{16}$  grains on the surface of the basin [5]. Here, as shown by the calculations of V.A. Vronskiy, the air drift of pollen prevails. Thus, if during the summer period per 1 square centimeter of the surface of the Aral a total of 5 pollen grains is carried by water, carried by air is 167 grains, that is, 97 percent of all the pollen inflow [5].

The spectra of the sediments studied by us, revealed by 16 core samples in different parts of the basin and represented basically by clayey and aleuritic silts and clays, are characterized by a predominance of pollen of grass and shrub plants with insignificant participation of pollen of



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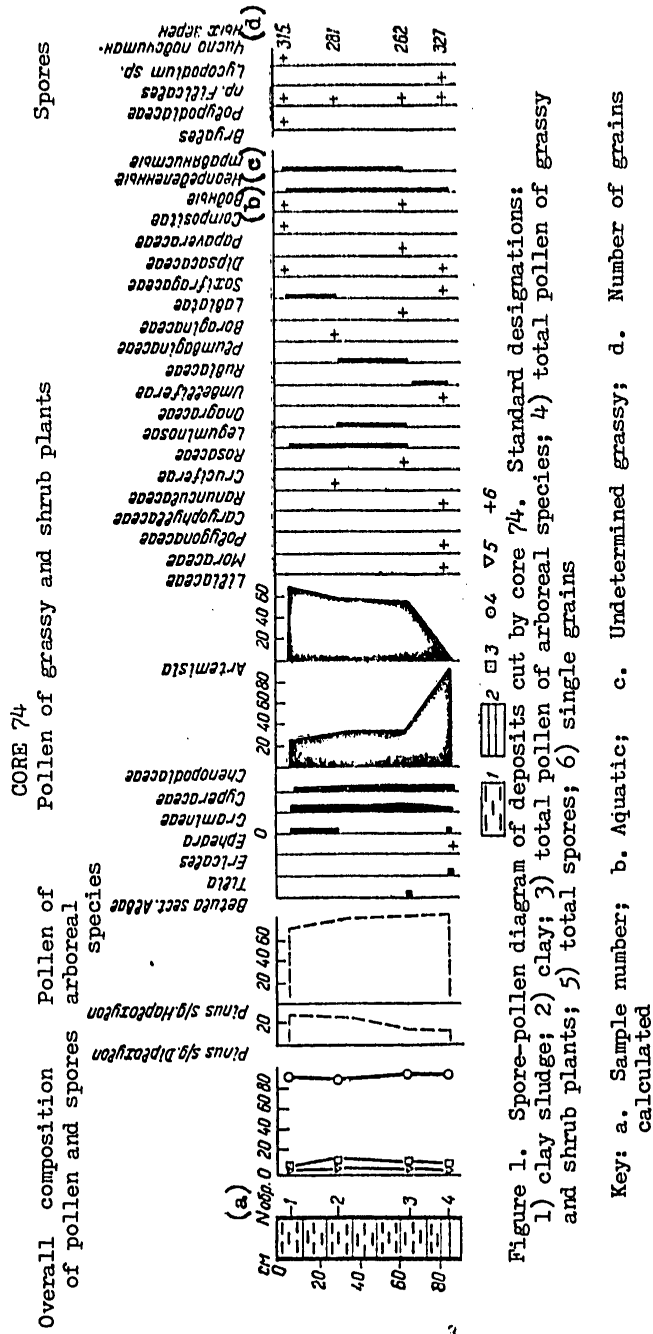


Figure 1. Spore-pollen diagram of deposits cut by core 74. Standard designations: 1) clay sludge; 2) clay; 3) total pollen of arboreal species; 4) total pollen of grassy and shrub plants; 5) total spores; 6) single grains

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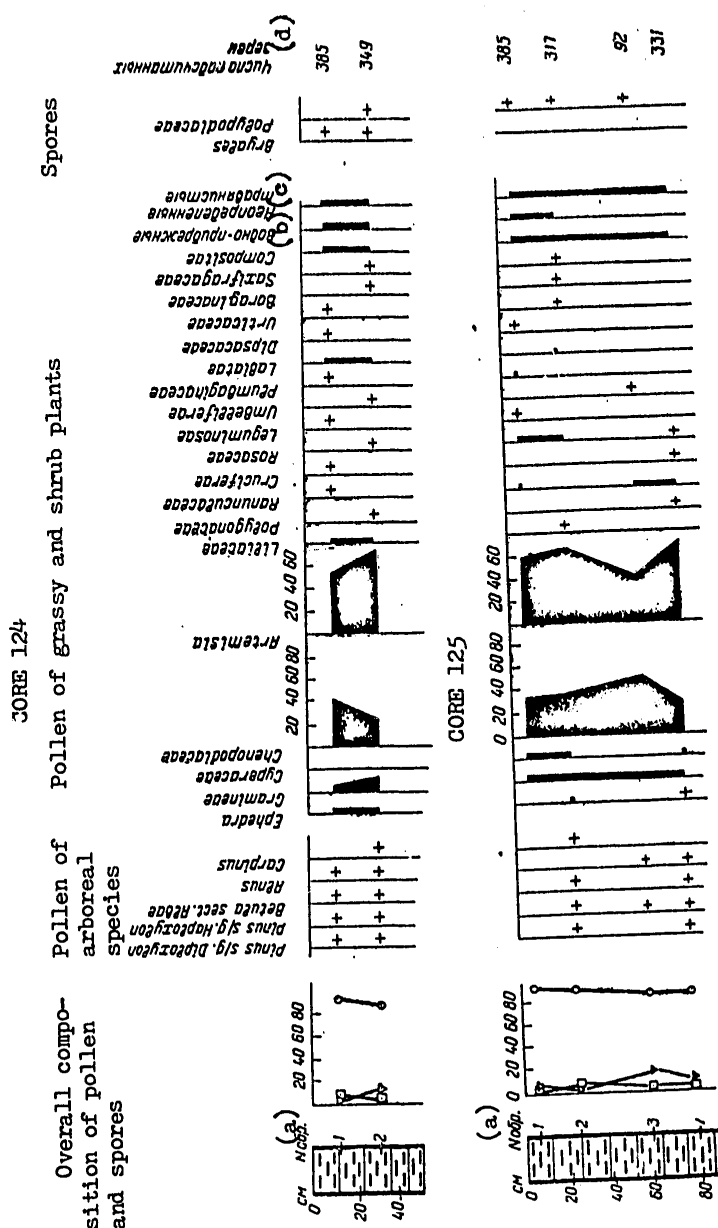


Figure 2. Spore-pollen diagram of deposits cut by cores 124, 125. For standard designations see figure 1.

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grassy and shrub plants with insignificant participation of pollen of arboreal species and spores (fig. 1). However the amount of the latter and the composition of the pollen of grassy plants do not remain unchanged throughout the whole section. At the same time the spectra of the upper layer of sediments investigated (figures 1, 2; intervals of 60 and 30 centimeters) are of the same type and make it possible to speak about a single palinocomplex of Late Holocene bottom deposits of the Aral Sea. The age of the studied sediments according to estimate of the speed of sedimentation and absolute datings (according to preliminary data) is computed to be 3,000-4,000 years [11].

Characteristic for the spectra of Late Holocene deposits of the Aral is the domination of pollen of grassy and shrub plants, comprising on the average 93-94 percent of the total number of grains calculated. Falling to the share of pollen of arboreal species is up to 13 percent (on the average 5-6 percent). Noted in this group is the pollen of pine, represented primarily by s/g. Haploxyton and to a smaller degree s/g. Diploxyton, the pollen of birch, sect. Albae, of alder, oak, linden, white beech and filbert. Predominant in a quantitative respect is the pollen of pine which, as is well known, is easily transported by air over significant distances.

In the group of spores comprising on the average 1-2 percent (in individual samples up to 12 percent), spores of green mosses dominate, and also noted are spores of polypody ferns (without the perispore, and therefore not allowing more detailed determinations), and individually the spores of Sphagnum and Lycopodium. The overwhelming part of the pollen of grassy and shrub plants falls to the share of pollen of xerophytes, among which dominating in the majority of samples is the pollen of wormwood (up to 73 percent of the pollen of grassy plants). Noted is the pollen of Graminae, sedge, Ephedra, leadworts, and Compositae. In addition the pollen of Graminae is contained in significant quantities, comprising in certain samples 18-20 and at maximum up to 37 percent. It is interesting to note that distinctly separated out among it is the pollen of cultivated Graminae, particularly Triticum and Zea. Also characteristic for Aral sediments is the presence in almost all samples of the pollen of aquatic and aquatic-littoral plants (water-plantain, pondweed, water lilies, cattails and others), comprising from 1-3 to 6 percent. Rather diverse is the make-up of the pollen of mixed grass, numbering more than 20 families: Liliaceae (lily), Polygonaceae (buckwheat), Caryophyllaceae (pink), Ranunculaceae (crowfoot), Cruciferae (mustard), Rosaceae (rose), Leguminosae (pulse family), Umbelliferae, Rubiaceae (madder), Boraginaceae (borage), mint family, Dipsacaceae (teasel), Papaveraceae (poppy), valerian, Saxifrage, plantain, willow herb, spurge, bluebell, nettle, and others.

In order to judge the character of the plant cover and climate of the Aral region in the Late Holocene period, it is necessary to compare the spectra of fossil bottom deposits of the Aral with spectra of its present-day sediments and the "pollen suspension" above its water area [6]. Noted is the similarity of all three groups of spectra, however, according to our data, established in the fossil spectra is the somewhat greater (by 3-4

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percent) participation of pollen of arboreal species and spores, which has significance for such an arid region as the Aral region, and also noted is a more diverse set of taxons of pollen of mixed grass and the greater quantitative participation of it in the spectra.

The data cited indicate that the plant cover of the Aral region in the Late Holocene period was less xerophytized and cenotically more diverse in comparison with its present-day vegetation. The latter is represented basically by complexes of halophytes, succulent halophytes, wormwoods and other types of xerophytic deserts. For instance, according to the data of B.A. Bykov [4], the plant cover of Kazakhstan is comprised of 84.5 percent species of grassy plants, 14 percent shrub and semishrub, and 1.5 percent arboreal varieties, which is adequately reflected by the spectra of the sediments reviewed. The edifiers of modern formations of the deserts of the Aral region most often are representatives of the goosefoot family, which also ties in well with the make-up of the reviewed spectra.

In the spectra of the palinocomplex of Late Holocene deposits of the Aral presented above there is a stable dominance of the pollen of wormwood, and the goosefoot family occupies a subordinate position. The described complex makes it possible to reconstruct the plant cover of the Late Holocene period, different to some degree from the modern vegetation of the region and giving evidence about the distribution in the Aral region of semidesert and semidesert-steppe formations with some participation also of forest cenoses in the plant cover. Pointing to the development of the latter is the presence of pollen of arboreal species, including broad-leaved species, the pollen of which, as is known, is spread basically next to the places of their vegetation, and the presence of spores of ferns, Sphagnum and Lycopodiums, and also the relative abundance and diversity in the group of forms of the pollen of mixed grasses, among which is established the pollen of taxons, peculiar to forest cenoses, and other signs.

Correspondingly also the climate of the Late Holocene period in the Aral region was somewhat milder--cooler and damper than the modern climate of the region, classified as the climate of inland deserts of the temperate zone.

Analysis of the palinologic data and a number of other characteristics (lithological, paleontological and others) shows that the studied deposits were formed in the transgressive phase of the Aral Sea. Indicating this from the palinologic standpoint are all the above-mentioned features of the spectra, and also the stable dominance in the spectra of the pollen of wormwood. Using the example of the Caspian and Aral seas [1, 6] it has been established that the regressive eras of these closed drainage water bodies were characterized by a sharp prevalence in the spectra of the pollen of goosefoot, the halophytic forms of which seeded the dried up littorals.

If a comparison is made of the data obtained by us with the palinologic-stratigraphic diagram of bottom sediments of the Aral Sea proposed by

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Yu. P. Khrustalev, S.A. Reznikov [13] and V.A. Vronskiy [6], the complex cited by us clearly ties in with the spectra of the Neo-Aral transgressive deposits. In this way, the spectra of the Neo-Aral transgressive deposits indicate that the Neo-Aral transgression was developed under the conditions of a certain cooling and humidification of the climate.

In the spore-pollen diagrams of the cores (see figures 1, 2) below the intervals mentioned by us certain changes in composition are established. Thus, in a number of cores (see figure 1) with the remaining unchanged ratio of the groups of components in the lower layers observed is a shift in the dominants among the pollen of grassy plants: instead of the pollen of wormwood, the pollen of goosefoot prevails. Noted in other cores (see figure 2, core 125) is an increase in the amount of pollen of goosefoot at the expense of a reduction in the amount of wormwood pollen. As we have already mentioned, an increase in the amount of pollen of goosefoot is characteristic for regressive stages of a water body. Apparently, the intervals with an increase in the amount of goosefoot pollen, which are insignificant in size (20-40 centimeters), can be attributed to the regressive layers of the Aral sediments.

In a number of cores (see figure 2, core 125), established below is an increase in the amount of pollen of arboreal species and spores (by 20 percent and more). It is possible that these spectra describe the transgressive Aral strata. Thus, in certain core samples (core 125 and others) there seem to be outlined according to the spore-pollen diagrams three phases of development of the plant cover of the Aral region in the Holocene period. However it is possible with the greatest certainty to describe the Late Holocene complex of the upper layers of the bottom sediments of the Aral.

It is interesting to compare the spectra of the Late Holocene deposits of the Aral Sea with the spectra of sediments of the Caspian synchronous with this (upper neo-Caspian stage up to 1-1.2 meters). The spectra disclose a significant similarity, featuring a dominance of pollen of grassy and shrub-like forms and an abundance of pollen of xerophytes [2].

However there are also certain differences. Thus, characteristic for spectra of the Aral is a more limited set of forms of pollen of arboreal species, a significant quantity of pollen of Graminae, among which is established the pollen of cultivated forms, and also the presence in almost all samples of the pollen of aquatic and littoral-aquatic plants. However these regional differences are minor. The Late Holocene palinocomplex of the Caspian Sea indicates that the vegetation of this period was horticulturally close to the modern plant cover of the Caspian region and had its characteristic features with a somewhat greater participation of forest phytocenoses and a greater diversity of grassy formations. The latter circumstances point to a certain moderation of continentality and an increase in the humidification of the climate of the region.

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Thus, palinologic data show that the trend and character of climatic changes in the Late Holocene were well-defined both for the Caspian and for the Aral basins.

However these changes in climate could have a different effect on the state of the levels of the water bodies. Differing radically in scale, genesis, regime and a number of other features, the Aral and the Caspian seas are characterized in the period of their parallel existence (Holocene period) by significant fluctuations in levels, which left traces in the form of terraces, ancient shore lines and forms. However researchers remark the different times of occurrence and antiphase nature sometimes as well of both changes over many centuries and changes within a century in the levels of these water bodies [10, 11].

It has been established that the Quaternary fluctuations of the level of the Caspian Sea were conditioned mainly by climatic factors. The Holocene transgressions and regressions of the Aral Sea were also affected by changes in climate. But they affected the water balance of the Caspian and the Aral and the status of their levels differently in connection with the different regime of the rivers feeding these water bodies. The catchment basins of the latter are in contrasting physico-geographical conditions (the European USSR and Central Asia) and have different components of their own feeding. Thus for the alpine Amu Dar'ya and Syr Dar'ya in addition to snow alimentation and atmospheric precipitation, an essential component of their runoff is glacial alimentation, which is inversely dependent on changes in climate, in contrast to the alimentation of lowland rivers. Therefore an increase in the moisture content in the limits of the catchment basins should lead to a considerably greater increase in the runoff in the Caspian than in the Aral. And conversely: with a lowering of the moisture content the discharge of the Caspian rivers should be reduced to a considerably greater degree than the runoff of rivers of the Aral [10].

But the climatic factors were not the determining ones for the Holocene transgressive-regressive cycles of the Aral Sea. The latter depended to a significant degree on the migration of the river beds of the Amu Dar'ya and the Syr Dar'ya [9]. And, finally, the changes in the level of the Aral in the last three millenia were affected by the anthropogenic factor--the development or decline (in periods of wars, epidemics, and others) of irrigated farming, which withdrew part of the runoff of the rivers feeding the Aral Sea [8, 9].

Thus, the fluctuations in the level of the Aral are a multilevel phenomenon, assimilating a whole complex of different factors and having a complex dependence on the changes in climate. The results of our palinologic studies show that despite the different times of occurrence of fluctuations of the levels of the Aral and Caspian seas in the Holocene period, the paleogeographic setting of the Aral-Caspian region in the Late Holocene period was fairly similar in its paleobotanic and paleoclimatic aspects. Important for us is the conclusion that the Late Holocene Neo-Aral transgression was developed under the conditions of a moderation of the

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continentality and a certain cooling and humidification of the climate. The modern climate of the Aral region is scarcely optimal for the status of its level. Against such an unfavorable climatic background with the existing natural tendency of this basin toward a lowering of its level the pronounced and uncontrolled taking of the waters of the Amu Dar'ya and the Syr Dar'ya for irrigation will inevitably lead to a catastrophic drop in the level of the Aral and subsequently, possibly, also to the end of the existence of the unique water body of the arid zone of the USSR. This unfavorable prognosis should be taken into account when planning further amounts of removal of the runoff of the Aral rivers for irrigation. Strict regulation of this process will help to preserve one of the most valuable geographic objects of our planet--the lake-sea zone of the desert.

## BIBLIOGRAPHY

1. Abramova, T.A., "Rekonstruktsiya paleogeograficheskikh usloviy epokh chetvertichnykh transgressiy i regressiy Kaspiyskogo morya" [Reconstruction of the Paleogeographic Conditions of the Age of Quarternary Transgressions and Regressions of the Caspian Sea], Author's Abstract of Candidate Dissertation, Moscow, 1974.
2. Abramova, T.A., "Change in the Humidification of the Caspian Region in the Holocene Period (According to Palinologic Data)," in the book: "Kolebaniya uvlazhneniya Aralo-Kaspiyskogo regiona v golotsene" [Fluctuations in Humidification of the Aral-Caspian Region in the Holocene Period], Moscow, 1977.
3. Brodskaya, N.G., "Bottom Deposits and Processes of Sediment Accumulation in the Aral Sea," TR. IN-TA GEOL. NAUK AN SSSR, 1952, No 115.
4. Bykov, B.A., "Introductory Outline of the Flora and Vegetation of Kazakhstan," in the book: "Rastitel'nyy pokrov Kazakhstana" [Plant Cover of Kazakhstan], Vol I, Alma-Ata, 1966.
5. Vronskiy, V.A., "On the Present-Day 'Pollen Rain' Over the Water Area of the Aral Sea," DAN SSSR, 1975, Vol 222, No. 1.
6. Vronskiy, V.A., "Marinopalinologiya yuzhnykh morey" [Marinopalinology of the Southern Seas], Rostov-na-donu, 1976.
7. Geller, S.Yu., "Certain Aspects of the Problem of the Aral Sea," in the book: "Problema Aral'skogo Morya" [Problem of the Aral Sea], Moscow, 1969.
8. Kvasov, D.D., "Reasons for Changes in the Level of the Aral Sea," in the book: "Kolebaniya uvlazhnennosti Aralo-Kaspiyskogo regiona v golotsene," Moscow, 1977.

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9. Kes', A.S., "Main Stages of Development of the Aral Sea," in the book: "Problema Aral'skogo morya," Moscow, 1969.
10. Mayev, Ye.G., Mayeva, S.A., "Chronology and Dynamics of Fluctuations in the Levels of the Caspian and Aral Seas in the Holocene Period," in the book: "Kolebaniya uvlazhnennosti Aralo-Kaspiyskogo regiona v golotsene," Moscow, 1977.
11. Mayeva, Ye.G., Kosarev, A.N., Mayev, Ye.G. "On the Connection Between the Fluctuations in the Levels of the Caspian and Aral Seas," VODNYYE RESURSY, 1974, No 2.
12. "Modern and Prospective Water and Salt Balance of Southern Seas of the USSR," TR. GOINa, 1972, No 108.
13. Khrustalev, Yu.P., Reznikov, S.A., Turovskiy, D.S., "Litologiya i geokhimiya donnykh osadkov Aral'skogo morya" [Lithology and Geochemistry of Bottom Sediments of the Aral Sea], Rostov-na-Donu, 1977.

Department of Geomorphology

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GENETICS

TRANSFORMATION OF RYE GAMETES BY MEANS OF COLCHICINE

Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 246, No 1, 1979 pp 210-213

[Article by Academician N. V. Tsitsin and M. V. Klyuchareva, Main Botanical Garden of the USSR Academy of Sciences, Moscow]

[Text] The finding of the optimal number of chromosomes determining economically important froth characteristics of plants is an important problem of biological sciences.

In cereals main characteristics of a species may be contained in two chromosomes only. With such a minimal number of chromosomes plants completely reproduce the specific nature of their species, their heredity.<sup>1</sup> Polyploidy does not introduce any real substantial changes in the plants' morphological structure. Only some quantitative characteristics change. Plants with a large number of chromosomes have a redundancy of genetic information.<sup>2</sup>

For the last few years literary data have appeared on the so-called redundant DNA which does not actualize itself during the organism's development and is ejected into the plasma.<sup>3</sup> There are also data attesting to the fact that with an increase of ploidy a threshold appears after which the number of DNA per one chromosome begins to go down.<sup>4</sup> Apparently, system regulators exist which control the DNA content in a cell when ploidy increases substantially.

Tetraploid rye does not differ in its morphological characteristics from diploid rye, yet its fertility is lower. We assume that the fertility of double tetraploid rye must be still lower.

The Department of Distant Hybridization of the Main Botanical Garden of the USSR Academy of Sciences has conducted experimental work aimed at obtaining double tetraploid rye. Essentially the possibility of receiving such rye has been investigated, since the attempts to double tetraploid rye have remained unsuccessful.

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Tetraploid rye of the "Start" and "Vyatka Moskovskaya" sorts were used for investigation. Germinated rye kernels were wetted in a 0.01 percent solution of colchicine. This concentration has proved to be the most effective: with a larger concentration the plants suffer enormously and perish, with a lesser one--the effect of colchicine is not perceptible. The kernels were kept in colchicine for 2 days, then they were transplanted in boxes and placed in the phytotron at a temperature of 15-20° C. After the plants took root and yielded 3-4 leaves, they received an injection of colchicine of the same concentration by means of a medical syringe. Each plant received 3 or 4 injections, so that the colchicine solution remains above the growing point. The plants did not suffer strong depression. They were growing and bushing. The bushing plants were lifted and again, with their roots and growing points, placed in the colchicine solution. The plants were ill for a long time after such a treatment, their root system was particularly hurt. Less than one half survived, and as a rule, those were considerably changed. In the spring the boxes with the plants were placed on the ground near to the phytotron. There they formed ears, were repollinated and formed grain.

Simultaneously with colchicization, cytological investigations of plants were conducted, particularly of those with perceptible morphological changes, such as thickened stems, broad leaves, deformations and sterile upper parts of the ears (photograph 1).

The investigation of the plants during the earliest stages of their growth, before the appearance of the first leaf, 2-3 days after the placement of germinated seeds in the colchicine solution, was conducted. Their growth was slowed down and swellings were formed both on the roots and near the growing points. The examination of this tissue in temporary preparations shows an accumulation of up to 70-80 and more chromosomes in the cells (photograph 2). It appears that these cells do not develop further. Nonetheless, plants with such swellings grow and are able to produce thickened stems, broad leaves and other aforementioned changes.

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Photograph 1. The rye plant  
after colchicine treatment



Photograph 2. Chromosomes in the  
cells from the swollen tissue

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Photograph 3. Double tetraploid pollen kernels (n=28)



Photograph 4. Double tetraploid and tetraploid pollen kernels within the limits of one anther

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When the plants began to form spikes, the chromosomes in pollen kernels were calculated during the division of mononuclear pollen grain in vegetative and generative nuclei. For this purpose one anther was carefully removed from each flower, without hurting the spike. Two remaining anthers were left for the pollination and fertilization of plants. Therefore we have all the investigated spikes with kernels at our disposal.

Cytological analysis shows that pollen kernels within the limits of one anther with the tetraploid chromosome set ( $n=14$ ) and the double tetraploid chromosome set ( $n=28$ ) have been detected in many spikes for which we have calculated the number of chromosomes.

Photograph 3 shows pollen kernels from the anther in which the double tetraploid chromosome set has been detected, and photograph 4--pollen kernels from the anthers which have tetraploid and double tetraploid pollen kernels. Consequently, the duplication process has reached also the reproductive sphere prior to the formation of the pollen. It is natural to assume that these spikes have also double tetraploid ovicells. With such myxoploid tissue, fertilization is possible not only with tetraploid pollen, but with double tetraploid pollen as well. Therefore, we have a right to expect that double tetraploid rye plants will appear in the posterity. The facts we have obtained have not yet been described.

Thus, as a result of colchicization with the application of the methodology described above, we have obtained, for the first time, plants with double tetraploid gametes in rye.

FOOTNOTES

1. N. V. Tsitsin, Byull. GBS AN SSSR, Vol 104, 80, 1977.
2. N. V. Tsitsin, "Distant Hybridization of Plants," Moscow, Nauka, 1978.
3. A. Lima-de-Faria, M. j. Moses, F. Cell Biol., Vol. 30, 1, 177 (1966).
4. M. A. Ali-Zade and E. M. Akhundova, "The Success of Polyploidy," Kiev, Naukova dumka, 1977, p. 190.

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INSTRUMENTS AND EQUIPMENT

UDC 612.822.3

NEW EIGHT-CHANNEL DEVICE FOR MAGNETIC TAPE RECORDING AND INPUT INTO COMPUTER PROCESSING OF ELECTROPHYSIOLOGICAL SIGNALS

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 29, No 2, 1979, pp 424-430 manuscript received 29 Mar 78

[Article by S. A. Gusainov, Ye. V. Servina and S. B. Vekshin, Institute of Higher Nervous Activity and Neurophysiology. USSR Academy of Sciences, Moscow]

[Text] The broad development of electronic computer technology, the introduction of new, effective methods of automated analysis of physiological information and, precisely, of separation of biorhythms from experimental time series, has promoted to the first level the problem of multi-channel recording of them in a form accessible for subsequent processing. Preparation of information recorded by traditional methods with the help of a recording instrument or kymograph on a paper tape for input into a computer (digitation of curves) involves high consumption of labor and leads to great error. On the other hand, modern computers either have in their makeup or permit the possibility of relatively simple switching in of a multi-channel analog-to-digital converter for immediate input of analog processes using special programs in the internal storage /1,2/ for further processing.

It is known that, in the overwhelming majority of physiological experiments, simultaneous recording is made of several parameters which are slow functions of time (for example, EEG, EKG, plethysmogram, oculogram, etc.). For their qualitative and rapid processing in the computer, these processes should be recorded on magnetic tape with the help of special multi-channel tape-recorders, able to record quite low frequency signals. Such stationary, expensive devices are not always accessible to the physiologist or physician and this often compels them to work in the "old-fashioned" way.

At the same time, requirements of experimentors for new or short-supply instruments can in many cases be satisfied by the energies of the engineering-technical personnel of the scientific unit. This does not exclude the task of developing relatively simple and easily-made devices for recording physiological processes on everyday tape-recorders--portable, not-in-short supply, inexpensive instruments /3,4/.

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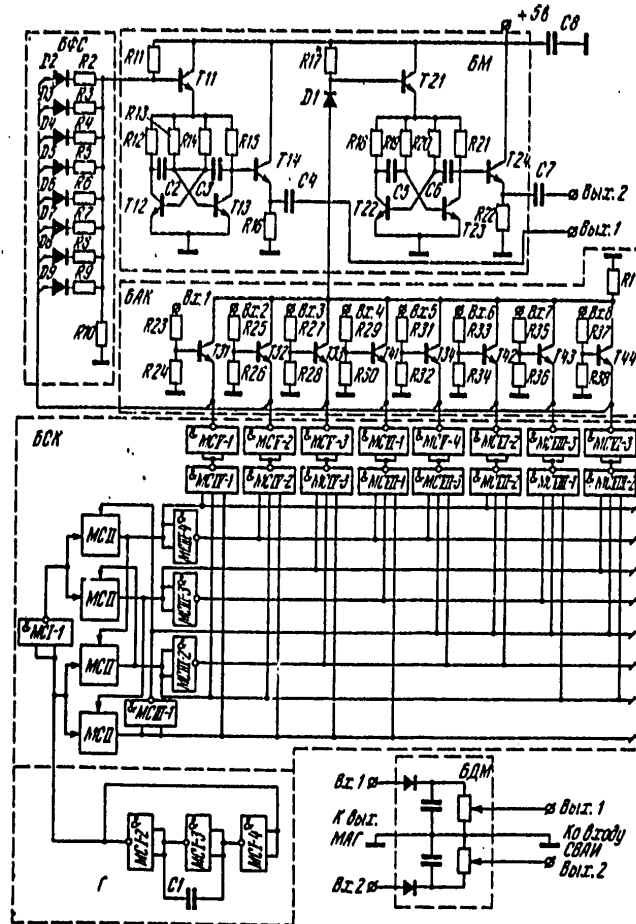


Рис. 1. Принципиальная схема устройства. MCI, III, V, VI — 155ЛА3; MCI V, VII, VI/I — 155ЛА4; T1 — T4 — К2НТ171; Д1 — Д9 — Д9Б; C1 — 10,0 мкФ; C2, C3, C5, C6 — 1000 пФ; C4, C7 — 0,33 мкФ; C8 — 10,0 мкФ; R1 — 10 к; R2 — 15; R3 — 130; R4 — 330; R5 — 560; R6 — 910; R7 — 1,5 к; R8 — 2,7 к; R9 — 6,4; R10 — 910; R11, R17 — 2,4 к; R12, R15, R18, R21 — 1,8 к; R13, R14, R19, R20 — 56 к; R16, R22 — 560; R23, R25, R27, R29, R31, R33, R35, R37 — 4,7 к; R24, R26, R28, R30, R32, R34, R36, R38 — 11 к

Fig. 1. Fundamental circuitry of the device

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The present article deals with a device—developed and prepared by the authors—for recording, on a stereophonic, ordinary tape-recorder (for example, "Jupiter-202-stereo"), eight experimental physiological processes with the intent of subsequent input of them into a computer for further analysis.

Below are considered the fundamental electrical circuit of the device, description of its work, diagrams of the plate assembly and, also, a short description of the program which services the process of input of the information into the computer and its correction.

The fundamental circuit of the device is illustrated in Fig. 1. The device contains the following functional blocks:

Analog gate block ( $\text{БAK}$ ), consisting of eight emitter followers ( $\text{ЭП}$ ) with an output load element  $\text{R1}$ , common to all. The recorded signals are fed to entries  $\text{Bx1-Bx8 ЭП}$ . The gates are alternately opened during switching of the feeder voltage to the collector of the transistor of the corresponding  $\text{ЭП}$ .

Analog gate scanning block ( $\text{БСК}$ ) which consists of a pulse generator ( $\Gamma$ ) which determines the frequency of inquiry of input signals, a counter, a decoder which converts the state of the counter into a signal at one of its entries, inverter bars whose output signal is the feeder voltage of the corresponding  $\text{ЭП}$  of block  $\text{БAK}$ .

Multistage signal formation block ( $\text{БФС}$ ) which is an eight-channel divider of the voltage formed by resistances  $\text{R2-R10}$ . With sequential delivery of equal magnitude voltage to the entry of a divider (from  $\text{R2}$  to  $\text{R9}$ ) a signal appears at its exit ( $\text{R10}$ ), sequentially diminishing to  $1/8$  of the maximum value of this voltage. Signals go to entry of  $\text{БФС}$  from exit  $\text{БСК}$ .

Modulator block ( $\text{БМ}$ ) consists of two identical modulators each of which is a generator of the carrier frequency (multivibrator). The signal at the exit of such a generator is proportional (practically equal) to the signal at the entry of the circuit. To exclude the influence of an external load each generator is switched to it through a compatible cascade, collected according to the circuit of the emitter follower. Signals proceed to entry of  $\text{БМ}$  from exits  $\text{БФС}$  and  $\text{БAK}$ .

Demodulation block ( $\text{БДМ}$ ) consists of two amplitude detectors and RC-filters. In the process of reproduction, the information being recorded on each of two tracks of the tape-recorder ( $\text{МАГ}$ ) goes to the entry of its modulator, whereby its amplitude can be adjusted to the necessary level. Further signals of both tracks are read by the computer through the system of analog information entry. The  $\text{БДМ}$  is constructively finished, separate from the device which forms the signals registered by the tape-recorder.

Fig. 2 depicts epures of the voltage at different points of the device,



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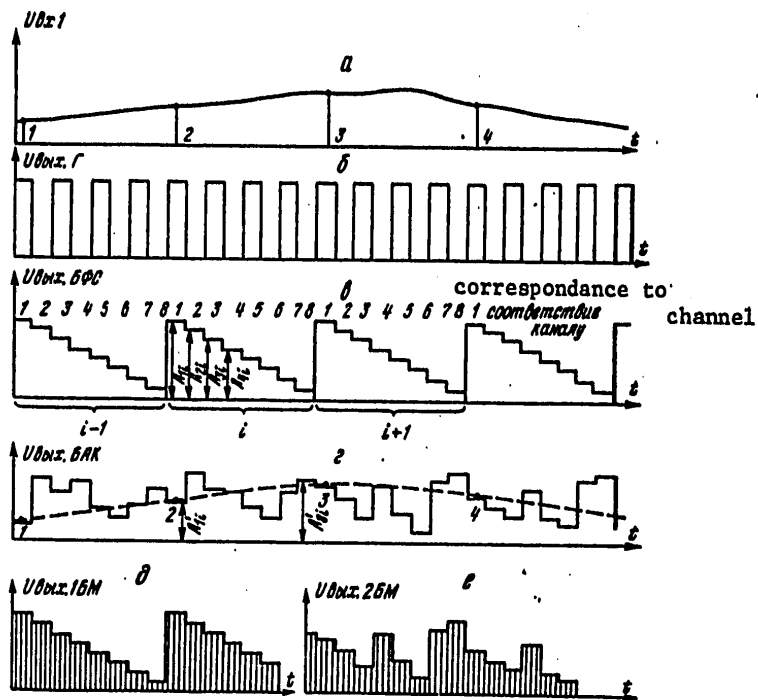


Fig. 2 Epures of voltages at various points of the device

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illustrating the process of conversion of the eight input signals into a single informational signal and, also, the structure of the auxiliary signal and its connection to the informational signal.

The work of the device proceeds in the following way. Generator  $\Gamma$  of block  $\bar{B}CK$  continually produces pulses (Fig. 2,  $\bar{G}$ ), which change the state of the counter. Corresponding to each of its eight states, a signal appears only at a definite output of the decoder. Since, physically, its amplitude is equal to zero, for its further use it is inverted on the inverter bar. In this way, a pulse with a voltage of about 4V appears at eight exits of the  $\bar{B}CK$ , in sequence at each. The described process is cyclically repeated. Pulses of voltage from the output of  $\bar{B}CK$  are used to feed the  $\bar{D}T \bar{B}AK$ . The eight recorded curves are supplied at the inputs of these  $\bar{D}T$ . Since all the  $\bar{D}T$  have one common exit, at a given moment the input signal which goes to the exit of the  $\bar{B}AK$  is only from that  $\bar{D}T$ , the feed to which is supplied from the  $\bar{B}CK$ , and the epure of the voltage at the output has the form depicted in Fig. 2,  $\bar{Z}$  (a solid line). This process is shaped by continuously-following pulses whose amplitudes are proportional to the amplitudes of sequentially switched-on, recorded experimental signals. Each eighth pulse has a relation to one and the same experimental process. For example, Fig. 2,  $\bar{a}$  depicts the recording process arriving at  $B \times 1 \bar{B}AK$ ; Fig. 2,  $\bar{z}$  (dotted) shows the line passing through the points of one informational signal which is related to it. From the output  $\bar{B}AK$ , a single informational signal reaches  $\bar{B}M$  where it carries out an amplitude modulation of the carrier frequency produced by the multi-vibrator, after which it (Fig. 2,  $\bar{e}$ ), through a compatible  $\bar{D}T$ , reaches the output of the device for recording on one of the tracks of the tape-recorder.

Parallel with formation of one informational signal there takes place formation of an auxiliary signal recorded simultaneously with the informational on the second track of the tape recorder and intended for execution of two important functions in the process of further handling of the information in the computer. The auxiliary signal has the shape of a staircase (Fig. 2,  $\bar{G}$ ). It is formed in the block  $\bar{B}\phi C$  from signals arriving from  $\bar{B}CK$ . For this, the  $\bar{B}\phi C$  contains an eight-entry divider with definitely selected coefficients of transmission ( $8/8, 7/8, \dots, 1/8$ ), and, at one and the same voltage at its entries, the output signal is changed proportional to the coefficients of the corresponding dividers. The further path of conversion of the auxiliary signal is analogous to the path of a single informational signal, namely, through block  $\bar{B}M$  to the entry of the tape-recorder. The shape of the ultimately formed auxiliary signal is presented in Fig. 2,  $\bar{d}$ .

The production of the recorded information is carried out in the following way. From the outputs of the tape recorder, informational and auxiliary signals, simultaneously through block  $\bar{B}M$ , reach the entrances of the system of lead-in of the analog information and then into the computer (in our case--EC-1020). Decoding in the machine proceeds via an algorithm

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which fulfills two functions: the function of correction of the amplitude of a single informational signal and the function of separating from it the experimental data belonging to each of the eight channels, control of the first channel and formation of the resulting mass of introduced information, which can be further processed by various methods.

For what reason is it necessary to have additional correction of the informational signal? The fact is, the processes of recording and reproducing pile substantial distortion upon the amplitude of the signal. The cause of this is the non-uniformity of the ferromagnetic layer of the recorder tape, the unevenness of its pressure on the recording and reproducing heads, the unevenness of rate of movement of the tape and its "wandering" in directions perpendicular to the movement, and so on /5/. All this leads to use of a complex scheme of correction which brings to naught the main virtue of the method of amplitude modulation--simplicity of technical use.

However, if a similar device is designed exclusively for input of recorded information into a computer, then its amplitude correction is realized simply enough by a program method in the presence of some excess and the assumption that factors which distort the processes of recording and reproduction equally affect both tracks at any given moment in time.

In our case, an excess of information is reached due to use of the auxiliary signal. Knowing that the auxiliary signal at the output of the device is stable in the process of recording onto the tape (i.e., amplitudes of stages identifying one and the same channel are equal to each other), and using the above-cited assumption, it is possible in the computer to reestablish the amplitude of the recorded experimental processes.

This is performed in the following way.

1. Separation is made of the data on amplitudes of all eight stages of the auxiliary signal in the first group which describe the first point in all eight channels, that is,  $A_{11}, A_{21} \dots A_{81}$

2. Since it is assumed that the first group is continually recorded without distortion

(that is:  $\frac{A_{11}}{E_{11}} = \frac{A_{21}}{E_{21}} = \dots = \frac{A_{81}}{E_{81}} = 1$  where  $E_{11}, E_{21} \dots E_{81}$

is the amplitude of the single informational signal which is accompanied in time by appearance of a definite stage in the auxiliary signal  $A_{11}, A_{21} \dots A_{81}$  respectively)

then, extending the same assumption to any j-group in the recording, it is possible to reestablish the true amplitude  $E_{ij}$  (where i is the number of the channel) by the following formula

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$$E'_{ij} = K_{ij} E_{ij}$$

where  $K_{ij} = \frac{A_{ij}}{A'_{ij}}$  is the coefficient of distortion, and  $E'_{ij}$  is the corresponding value of  $E_{ij}$ .

The algorithm of correction works in this way. The auxiliary signal is used for unequivocal identification by its own indices of the portions of the single informational signal and brings them to a definite (one of eight) experimental process.

The algorithm of formation of the eight information masses is constructed in the following way: the computer questions the auxiliary and informational signals with a definite frequency of quantization and constantly compares the current point of the auxiliary signal with the preceding, for equality within the limits of tolerance  $\xi$ . If equality is not fulfilled, then transition to the following channel is fixed, and the corresponding value of the informational signal is entered into the information mass corresponding to the preceding.

If the value of the auxiliary signal after switching is greater than the preceding, transition to the first channel is fixed. Hence, in case of reduction in work of the device or of the system of input of the analog signal, correct perception of the number of the channels is guaranteed in the remaining portion of the experimental recording. It must be noted that the number of points which define one stage of the auxiliary or informational signals depends on the frequency of interrogation of both channels during their input into the computer but this number should not be less than two.

Combined use in the algorithm of the program of input of the two considered basic rules of decoding of information, due attention to the rapid action of a computer, correct choice of carrier frequency of modulation during recording, makes it possible to create highly effective procedures in which both the correction of amplitude and, also, calculation of a single informational signal will take place in real time of input of the analog recording.

The device has been made in microcircuit series 155 and transistor assemblies type K2 NT171 with use of miniature mounted elements. In construction it is a single plate, 200 x 130 mm in size, with a two-sided printed mounting. Diagram of both sides is presented in Fig. 3 (a and b). Regulating elements are arranged from the side, illustrated in Fig. 3. The device can be attached inside the tape-recorder and can work from its source of power.

Basic working features of the device.

1. Number of simultaneously recording input signals—8

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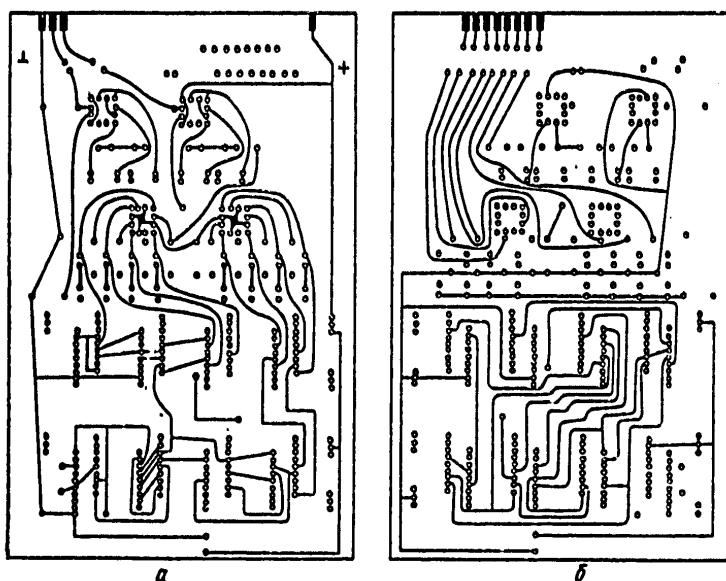


Fig. 3 Drawing of the printed plate. Explanation in text

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2. Frequency of quantification of the signal for any channel--up to 150 Hz
3. Carrier frequency for both channels--about 16 KHz
4. Voltage at entries of the device--from 0 to 3 V
5. Input resistance--15 com
6. Voltage at outputs of the device--from 0 to 1.5 V
7. Voltage of feed--5 V
8. Required power--0.75 wt

In case of necessity, if the parameters of the input signals permit lowering of frequency of quantification, on the basis of the principle of action and construction of the device considered in this article, it is not difficult to prepare an instrument which will allow recording, on an ordinary stereo tape-recorder, a larger number of experimental physiological processes.

#### BIBLIOGRAPHY

1. Gusainov, S. A. and Vekshin, S. B., in the book "Method and apparatus for study of psychophysiological characteristics of a human-operator" (in Russian). Moscow, "Nauka", 1977, p 29
2. Vekshin, S. B. and Gusainov, S. A., Algorithms and programs (in Russian). INFORM. BYUL. VNTIKsentra, No 1, 1977, p 39
3. Volkov, V. G., in the book "Electronic instruments for neurophysiological research" (in Russian). Moscow, "Nauka", 1969, p 23
4. Volkov, V. G., Ibid., 1969, p 92
5. Zakharov, Ye. A., in the book (see reference 1), p 17

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PHARMACOLOGY

UDC: 615.47:338.984.3"1976-1980"

FOURTH YEAR OF THE FIVE-YEAR PLAN FOR PHARMACOLOGY INDUSTRY REVIEWED

Moscow KHMINKO-FARMATSEVTICHESKIY ZHURNAL in Russian No 5, 1979 pp 3-10

[Article by A. K. Mel'nichenko, Minister of the Medical Industry]

[Text] Three years of the 10th Five-Year Plan are behind us. They were good years. Much was achieved. There were many changes for the better. The Soviet people and Party are enjoying an intense, full life; they are striving persistently to fulfill the socioeconomic program set forth by the 25th CPSU Congress (excerpt from speech by comrade L. I. Brezhnev, general secretary of the CC CPSU, chairman of the Presidium of the USSR Supreme Soviet, at a plenum of the CC CPSU on 27 November 1978).

Having successfully completed 3 years of the 10th Five-Year Plan, our country is entering into its 4th, next to the last, year. The Soviet people, implementing the decisions of the 25th CPSU Congress and subsequent plenums of the CC CPSU, are achieving new victories in all areas of building of communism.

The Soviet people were greatly inspired by the decisions of the November (1978) plenum of the CC CPSU and 10th session of the USSR Supreme Soviet, the profound and concise speech of comrade L. I. Brezhnev, general secretary of the CC CPSU and chairman of the Presidium of the USSR Supreme Soviet, at this plenum, pointing to the specific routes and main directions, on which we must concentrate in order to successfully implement the far-reaching program of socioeconomic change developed by the 25th CPSU Congress.

The plenum of the CC CPSU and session of the USSR Supreme Soviet were a major event in the life of our Party and state, an important landmark in the struggle of the Soviet people to fulfill the five-year plan. The adopted documents summarized the achievements of national labor over 3 years of the five-year plan and spelled out the main objectives for 1979.

The decisions of the plenum and session demonstrated, once more, the scientific nature, deep and comprehensive substantiation of the policies of our Party, as well as the fact that the Party has no other concern or other goals than

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growth of economic and spiritual assets of our homeland, its defense capability, upgrading the well-being of the working people, strengthening peace, friendship and collaboration among people on earth.

The elections of deputies to the USSR Supreme Soviet were held in an atmosphere of great political and industrial enthusiasm on 4 March of this year. The entire Soviet people unanimously voted for the candidates of the block of communists and non-Party members, thereby demonstrating the closest solidarity of the working people with the Communist Party, universal approval and warm support of its internal and external policies.

The state plan for economic and social development of the USSR and our country's state budget for 1979, which were approved by the plenum of the CC CPSU and legislatively confirmed by the highest body of power, the USSR Supreme Soviet, is a comprehensive program of continued efforts to implement the historical decisions of the 25th CPSU Congress.

Intensification of the struggle for effectiveness and quality of work is the most important objective of the 4th year of this five-year plan, and this also applies to subsequent years. This struggle, as indicated in the decree adopted by the plenum, should be pursued on a broad front, in industry, agriculture, transportation, construction and other branches of the economy, on all levels of industry and management. Special attention must be given to increasing the productivity of labor, introduction of advances in science and advanced knowhow, new engineering and technology, making use of available reserves and capabilities to increase the output and upgrade the technical level of production at minimal expense.

There are plans for accelerated development of branches that produce items in which there is currently a shortage in order to better meet the increasing demands of the public. There must also be further increase in production of drugs and medical equipment, with due consideration of the increasing need for these types of products, in view of the significant growth of the network of hospitals, polyclinics and other therapeutic and preventive institutions, development of medical science and improved organization of specialized medical care in our country.

All this places great responsibility on medical industry workers with regard to fulfilling the assignments for 1979 and the 10th Five-Year Plan, who must increase production and delivery of medical products, develop new, highly effective drugs and more refined medical equipment.

The 1979 plan provides for an increase in overall volume of production by almost 44%, as compared to 1975, and to provide for a more than 35% increase in productivity of labor, the Five-Year-Plan calling for 38.7 and 31.3% increases, respectively. There must be at least an 95% increment in medical production as a result of increase in productivity of labor.



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Special attention is given to increase in output of the most important types of products, in accordance with the tasks set forth in the decree of the CC CPSU and USSR Council of Ministers "On measures for continued improvement of public health care." In accordance with this decree, in 1979 it is planned to increase drug production by almost 1.5 times, as compared to 1975, chiefly by increasing production of drugs for the treatment of cardiovascular, oncological and endocrine diseases, products used in pediatric practice, long-acting sulfanilamides, x-ray contrast and other diagnostic products, psychotropic agents, semisynthetic antibiotics and steroid hormones.

In 1979, industrial production is being organized of more than 40 new drugs and about 80 other items used in medical practice. Public health will receive a number of new antibacterial, psychotropic and anti-inflammation agents, semisynthetic antibiotics, drugs for the treatment of cardiovascular and gastrointestinal diseases, for pediatric practice, as well as new medical apparatus, instruments, tools and equipment.

For this reason, persistent work is required to build up fixed assets, expedite technical refurbishment of industry, creation of better working and living conditions for the working people. There are plans to increase the fixed productive capital by almost 8% in 1979, as compared to last year, and this can only be achieved by fulfilling all of the specified assignments pertaining to the construction of new enterprises and remodeling existing ones, starting up enterprises important to this sector, accelerating socioeconomic development of enterprises, construction of health-improving and cultural institutions, as well as housing. In the current year, the plans call for construction of more than 100,000 square meters of housing alone.

Governed by the decisions of the 25th Party Congress, instructions of comrade L. I. Brezhnev, general secretary of the CC CPSU and chairman of the Presidium of the USSR Supreme Soviet, pertaining to economic questions and in response to adoption of the new constitution of the USSR and letter of the CC CPSU, USSR Council of Ministers, AUCCTU and CC Komsomol dated 14 January 1978, the workers in the medical industry are concentrating primarily on upgrading the effectiveness of production and quality of work, fulfillment of plans and socialist obligations in order to augment production and deliver of medical products to public health agencies and other consumers.

As a result of the broad socialist competition for a worthy celebration of the first anniversary of adoption of the new constitution of the USSR and 61st anniversary of the Great October Revolution, more than 24,000 outstanding workers, referable to 612 teams [brigades], 190 sectors and 56 shops, reported that they had completed the assignments for 3 years of the 10th Five-Year Plan as of 7 October 1978. The ministry as a whole, completed the assignments for the 3 years, according to volume of gross product, on 8 December 1978.

The workers in the health industry have also worked well since the start of the current five-year plan. In 3 years, there was more than a 33% increase

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In production at enterprises of the medical industry, versus 28.7% in the five-year plan, and productivity of labor increased by 26.7%, versus 23.4% under the plan. The increment of industrial production as a result of increased productivity of labor is in excess of 84%.

Production of vitamins, synthetic drugs, antibiotics, blood substitutes and organic products developed at the fastest rate. There has been an increase in production of raw material for drugs of plant origin.

The expansion of production at enterprises of the medical industry under the 10th Five-Year Plan is occurring mainly on the basis of intensification of production, more effective use of fixed assets, material and personnel resources, acceleration of scientific and technological progress, making new production capacities operational speedily, as well as improvement and refinement of organization, specialization and concentration of production.

In 1976-1978, our industry has set up the production of about 120 new drugs and more than 300 medical instruments, apparatus, equipment and items made of glass and polymers. We have organized industrial production of new agents for the treatment of cardiovascular diseases--nonachlazine, ethmozine, pamiidine, clopheline, psychotropic agents--prazidole, nialamide, carbidine, hormonal agents--phenoboline, lactine, antibiotics--ampiox, metacycline, carbenicillin, dichloxacillin, antibacterial agents--nitroxoline, quinoxidine, sulfalene, anti-influenza products--remantadine and others, as well as a number of important items of medical engineering, that are needed in therapeutic and preventive institutions of our country.

Several measures have been implemented to upgrade medical production, extend the shelf life of drugs and improve the reliability of medical equipment. Programs of complex standardization have been prepared and approved for some groups of medical items; more than 400 specifications and pharmacopeia listings have been revised, with addition of higher quality and technical requirements.

In the 3 years of the five-year plan, there has been an expansion of the material and technical base of the medical industry. Several major production capabilities have been constructed and made operational, which manufacture important medical products in the Olayfarm association, Usol'ye-Siberian Chemi-copharmaceutical Combine, Yoshkar-Olinskiy Vitamin Plant; drugs are being produced at the Darnitsa and Biostimulyator associations, and Kazan' Plant for Surgical Suturing Materials; medical equipment is produced at the Izyumskiy Optical Mechanics Plant, Rubinskiy Plant of Eyeglass Optics and others.

A total of 114 mechanized and 36 automatic lines have been made operational; 65 sectors and shops have undergone complex mechanization and automation.

On the whole, the increment of fixed assets constituted 26% over the 3-year period. An increase of almost 2000 tons of various drugs was obtained

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as a result only of technical refurbishment and implementation of organizational measures at operational enterprises of the chemicopharmaceutical industry.

A set of measures has been implemented in the system of the Ministry of the Medical Industry to upgrade management in this sector. There has been a change to management with a three-level system (ministry--All-Union industrial association--industrial association, enterprise). The creation of All-Union industrial associations, industrial and scientific-industrial associations and enlargement of many enterprises has improved management and increased the share of production at these enlarged enterprises; this has also increased concentration and specialization of production and, on this basis, it has been possible to make wiser use of fixed assets. All this resulted in increasing the return on investment by 8% over the 3-year period. There has been an increase in scope of work pertaining to development of automated management systems in our industry; computer technology is being adopted in many areas of activity of the medical industry.

Inventors and rationalizers have made a ponderable contribution to development of our industry, along with introduction of the results of scientific research and planning-designing organizations. As a result of the increased work of employees in our industry, about 600 inventions and 48,000 rationalization proposals have been used under the current five-year plan.

The successful fulfillment of planned assignments by the medical industry in 3 years of the 10th Five-Year Plan is the result of selfless labor of workers, technicians, engineers, scientists, designers, all groups at enterprises and institutions in our sector, as well as the great organizational work of Party, trade union and Komsomol organizations.

The teams of enterprises, associations, sovkhoses and organizations of this industry are working with a strong sense of responsibility for fulfilling the plan and their socialist obligations. After examining the results of the All-Union socialist competition for upgrading the effectiveness of production and quality of work, and the successful fulfillment of the 1978 plan, the CC CPSU, USSR Council of Ministers, AUCCTU and CC Komsomol judged that the following teams in the medical industry were the winners, and they were awarded the challenge Red Banners of the CC CPSU, USSR Council of Ministers, AUCCTU and CC Komsomol; they were also listed on the All-Union Board of Honor at the VDNKh [Exhibition of Achievements of the National Economy of the USSR]; Leningrad "Order of Red Banner of Labor" Oktyabr' Industrial Chemicopharmaceutical Association; Moscow "Order of Red Banner of Labor" Industrial Association of Drugs imeni L. Ya. Karpov; "Order of Red Banner of Labor" Plant of Medical Instruments imeni V. I. Lenin; All-Union Scientific Research Institute of Medical Instrument Building.

The teams of workers at the Yoshkar-Olinskiy Vitamin Plant, Klinskly "Honor Badge" Glass Plant and "Order of Red Banner of Labor"

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Chemicopharmaceutical Akrikhin Plant were awarded the challenge Red Banners of the CC CPSU, USSR Council of Ministers, AUCCTU and CC Komsomol.

The initiative of outstanding workers is actively supported by worker groups of our industry and disseminated broadly at several enterprises in Moscow, with regard to fulfilling the five-year assignments by the 110th anniversary of the birthday of V. I. Lenin. There has been wide deployment of socialist competition to upgrade the effectiveness of production and quality of work, for fulfillment of 1979 plans before the target date and overfulfillment thereof.

The socialist obligations assumed by the worker groups of enterprises, sov-khozes and organizations of the Ministry of the Medical Industry in 1979 include fulfillment before the target date of the state plan for 1979 on completion of production, as well as realization of additional medical production worth 15 million rubles by 30 December and before the end of the year; the assignments for 4 years of the five-year plan are proposed to be fulfilled by 1 December of this year, with regard to rate of growth in volume of production and productivity of labor; on the basis of acceleration of scientific and technological progress, organization of labor and management are to be refined, better use will be made of work time to increase productivity of labor by 7% in 1979, as compared to 1978, versus the target of 6.7%, providing an 85% increment in volume of production as a result of increased productivity of labor, and there will be implementation of a set of measures to further improve working, living and recreational conditions for the working people.

Shock workers and teams of communist labor play a leading role in achieving high production indices and increasing the effectiveness of socialist competition. At the present time, there are more than 76,000 workers in our industry with the honorary title of shock workers of communist labor. Last year, the title of enterprise of communist labor was again bestowed upon the teams of the "Order of Red Banner of Labor" Akrikhin Chemicopharmaceutical Plant, L'vov Chemicopharmaceutical Plant, Shchelkovskiy and Yoshkar-Olinskiy vitamin plants, as well as the Umanskiy Vitamin Plant imeni 25th CPSU Congress.

Many outstanding workers in our industry received state prizes for achieving the highest labor indices. Under the 10th Five-Year Plan, the title of Hero of Socialist Labor was conferred upon Lidiya Nikolayevna Tanasiyenko, operator at the Klinskiy "Order of Honor Badge" Glass Plant; she was among the first at this plant to service two glass-molding machines instead of the norm of one machine, and she fulfilled her personal plan for the 10th five years on 26 September 1978. The Order of Lenin was bestowed upon Lyubov' Antonovna Rusak, team leader packagers in the shop for production of prepared forms of antibiotics of the Minsk Minmedpreparaty Industrial Combine for Medical Products. The team she heads fulfilled honorably the planned assignments and the increased socialist obligations they assumed, and the entire production is delivered upon the first request. Ivan

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Mikhaylovich Balakhonov, lathe operator at the Krasnoyarsk "Order of Red Banner of Labor" Medical Product Plant, bearer of the Order of Outstanding [glorious] Labor, 3d class, fulfilled his five-year plan in June of last year. Anatoliy Gennad'yevich Korovin, optical mechanic at the Lening "Order of Lenin" and "Order of October Revolution" Krasnogvardeyets Industrial Combine, fulfilled his socialist obligations to complete the assignment for 3.5 years of the five-year plan by the first anniversary of adoption of the new USSR constitution; he is an active rationalizer and was awarded the Gold Medal of the USSR VDNKh and the prize of a Moskvich motor vehicle. State prizes have also been awarded for the selfless work of many outstanding workers in our industry.

Many outstanding workers and industrial innovators, whose work is an example for all those working in our industry, have displayed a creative approach to their jobs and examples of selfless labor. The worker groups of enterprises and industrial organizations, striving to be on a par with those who are in the lead in the competition, are persistently working to advance those who are behind up to the level of the outstanding ones.

It is very important that, in the worker groups, there is constant manifestation of concern about the socioeconomic development of enterprises, improvement of working conditions, safeguarding health, organizing life and recreation for the workers. This aids in retaining personnel, increases productivity of labor and successful fulfillment of production assignments and socialist obligations.

At the same time, when making an objective examination of the situation in our sector, in the light of the decisions of the November (1978) plenum of the CC CPSU and thorough analysis of what has been accomplished, we must also take into consideration the existing flaws. By far not all of the All-Union industrial associations and enterprises, organizations under their jurisdiction are working with equal success, and they do not always implement the necessary steps for intensification of production on the basis of continued refinement of production processes, implementation of rhythmic work, according to plan, in each sector, shop and enterprise as a whole, for upgrading sophistication and quality of work, reasonable use of all material and manpower resources.

Unfortunately, there are still enterprises in our industry that do not fulfill the state plan according to some technical or economical indices. This applies, first of all, to the Tuymazinskiy Medical Glass Plant imeni 50th Anniversary of the USSR, Poltava Medical Glass Plant and several others, on the work of which depends, to a large extent, successful fulfillment of planned assignments of chemicopharmaceutical plants and supplying the pharmacy network with medical products made of glass. At the Usol'ye-Sibirskiy Chemicopharmaceutical Combine, the effectiveness of production is being upgraded too slowly; there are also serious flaws in the work of certain other enterprises of the chemicopharmaceutical industry.

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Failure to fulfill the plan of listed product delivery inspires much concern. For example, in 1978, there was a shortfall in delivery to consumers of injectable solutions of novocain, magnesium sulfate, eufhylline and phosphestrol by the Novokuznetsk Organika Industrial Chemicopharmaceutical Association due to problems in organizing production and inadequate material and technical supplies; the Kazan' Tatkhimfarmpreparaty Industrial Chemicopharmaceutical Association failed to fulfill the delivery plan referable to 20 drug items. There have also been shortfalls in delivery of drugs by certain other chemicopharmaceutical plants.

Of course, failure to fulfill plans and irregular delivery of medical products according to signed contracts affected the prompt supply to the public and public health service of certain important drugs and other medical items, and this elicited justified complaints about the operation of the medical industry.

For several years, the sovkhoses and procurement offices of the All-Union association for production, procurement and processing of medicinal plants failed to fulfill their planned assignments referable to production and procurement of medicinal plant raw material on the list, in spite of the increase in production of plant raw material and procurement of wild plants as a whole, and this creates considerable difficulties in the operation of enterprises that produce drugs.

The main concern of each All-Union industrial association should be to upgrade responsibility for fulfilling contractual obligations. It is imperative to upgrade the performance of all planning and management agencies to the level of the high requirements spelled out in Party lines for the purpose of resolving pressing economic problems.

At some enterprises of our industry, full use is still not being made of production capabilities; more refined technological processes are being introduced too slowly, sophistication of production is at a low level, inadequately economic use is being made of manpower and material resources. Dissimilar expenditure of raw material, materials, as well as manpower, is being practiced in the production of the same types of items at different plants.

The minimal funds allocated for development of the medical industry are not always utilized reasonably. The plan for major construction is not being fulfilled by many enterprises, with regard to both the general volume and building-installation work. The situation is particularly unsatisfactory with regard to erection of projects at the Chimkent Chemicopharmaceutical Plant imeni F. E. Dzerzhinskiy, the Saranskiy Medical Product Plant, the Minmedpreparaty Association, Ufimy Vitamin Plant and several others. Housing has not been made operational at the Kurganskiy Sintez Combine of Medical Products and Equipment. The priority tasks for the ministry, All-Union industrial associations, enterprises and organizations of our industry are to eliminate the flaws in major construction, complete utilization of

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allocated capital investments, prompt operation of new projects and assimilation of new production capabilities, reduction of volume of incomplete construction projects and uninstalled equipment, repair and technical renovation of existing enterprises, and implementation of complex development of enterprises.

Governed by the decree approved by the November (1978) plenum of the CC CPSU, conclusions and directives spelled out in the speech of comrade L. I. Brezhnev, general secretary of the CCPSU and chairman of the Presidium of the USSR Supreme Soviet, at this plenum, and the decisions of the 10th session of the USSR Supreme Soviet, the Ministry of the Medical Industry is taking steps to eliminate the existing flaws in the performance of this industry, to concentrate its efforts on continued refinement of planning and management, upgrading the role of All-Union industrial associations, expediting scientific and technological progress, increasing the effectiveness of production and improving the quality of all work in order to fulfill and overfulfill the 1979 planned assignments by each industrial enterprise and for all technical and economic indices, as well as to satisfy more fully the requests of consumers for products manufactured by this industry.

In fulfilling these tasks, the medical industry workers must devote special attention to comprehensive use of intensive factors of development of production, constant increase in productivity of labor, further reduction of the time within which scientific advances and advanced knowhow are adopted in industry, development and assimilation of new types of medical products, improvement of the quality of manufactured products, performance of contractual obligations with respect to delivery thereof to public health agencies and other consumers. Efforts should be concentrated on solving key problems in our industry; steps must be taken to eliminate the "weak points," to find additional reserves and capabilities to accelerate production and increase the productivity of labor at each work place. It is very important to create everywhere an environment of creative search for innovations and advanced knowhow, everything that would aid in making fuller use of available resources, fulfillment and overfulfillment of planned assignments. In this regard, it is particularly important to intensify economic practices, to strengthen cost accounting on all levels and, first of all, to consistently adhere to plan discipline.

This work would be inconceivable without a decisive war against uneconomic practices, unproductive costs and losses, as well as without constant refinement of technology and sophistication of production, sparing expenditure of all material, financial and manpower resources, proper organization and strictest disciplines in all sectors of management activity.

At the present time, the fate of the annual plans and obligations is being decided at each work place, in each production sector. And success in this matter will depend largely on the scope of socialist competition, its effectiveness, broad dissemination and rapid introduction of advanced knowhow. Management of All-Union industrial associations, enterprises and scientific

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institutions of this industry, together with Party, trade union and other public organizations must constantly refine and develop socialist competition, actively support outstanding workers and innovators, provide the conditions for fulfillment and overfulfillment of plans and socialist obligations, implement effective steps for lagging enterprises to catch up with the leading ones.

As they implement the specific program elaborated by the November (1978) plenum of the CC CPSU for implementation of the decisions of the 25th Party Congress, from the start of 1979 the workers in the medical industry have been working with great enthusiasm to fulfill the plans of the 4th year of the 10th Five-Year Plan.

Remarkable cadres of blue collar workers, technicians, engineers, scientists and designers have developed and are working in this industry, and they realize, with full awareness of the scope and difficulty of the tasks put to the medical industry, that their work is directed toward performing one of the most important social tasks, that of protecting the health of the Soviet people; they are applying every effort to make a worthy contribution to the success of this work.

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PHARMACOLOGY

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METHODS OF SCREENING PRODUCTS FOR THE TREATMENT OF ALCOHOLISM

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[Article by Yu. V. Burov and V. N. Zhukov, Institute of Pharmacology, USSR Academy of Medical Sciences, Moscow, submitted 11 Jul 78]

[Text] Current methods of treating alcoholism consist of a set of therapeutic measures, the most important of which is pharmacotherapy. However, the pharmacological agents used for this purpose do not satisfy the needs of clinicians fully enough or in all cases; the latter require products that would have specific properties for a therapeutic effect at different stages of alcoholism. For this reason, it is presently an extremely pressing task to search for new, effective pharmacological agents with such properties, but methodologically it has not been sufficiently developed [1]. In order to resolve this problem, a systematized and purposeful screening must be made of the compounds studied, according to their effects on the main manifestations of developing and formed alcoholism. Detection of the required pharmacological properties in various chemical compounds involves the need to investigate the effects of these compounds on various aspects of a pathological process due to alcohol, with as much consideration as possible of the different elements of pathogenesis of alcoholism and its manifestations, as well as the acute effects of alcohol. This view essentially determined the choice of experimental tests that reflect, to some extent, states in animals that are observed in man during contact with alcohol, in order to conduct a special screening of substances that could be used for the treatment of alcoholism.

The proposed system of tests is directed toward demonstration of the capacity to prevent or attenuate pathological desire for alcohol, decrease or total abstinence from chronic alcohol consumption to arrest alcohol withdrawal symptoms and remove alcoholic intoxication; in addition, the proposed tests make it possible to tentatively evaluate some of the probable mechanism of "anti-alcohol" action of the agents under study.

Small laboratory animals--mongrel mice and rats--should be used in the proposed system of tests. The use of animals of the same species, but of special genetic strains, is not desirable for these tests, due to the metabolic distinctions of such animals and, in particular, the great differences in

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activity of enzymes involved in metabolism of ethanol [2], which affects the level of intake of alcohol. For example, C57Bl mice tend more to consume alcohol, while KR and DBA mice avoid intake thereof; Long-Evans and Uch B rats tend to consume alcohol more than Spraque-Dowley and UchA rats [1, 3, 4]. For this reason, it is wiser to use animals of special strains for the study of specific aspects of pathogenesis of alcoholism, genetic predisposition, etc. Other animal species (monkeys, dwarf pigs, dogs, rabbits, cats) are unsuitable for screening that requires a large number of animals; hamsters are not convenient due to the marked seasonal fluctuations in their behavior and metabolism, while in guinea pigs the activity of alcohol dehydrogenase is lower than in mice and rats, and they tend less to consume alcohol [1, 5].

## I. Demonstration of Capacity to Attenuate Acute Alcoholic Intoxication

Test A: Effect of agent studied on duration of lateral position induced by narcotic dose of ethanol.

Test B: Effect of agent studied on survival after intake of ethanol in LD<sub>50</sub>.

## Experimental Section

Mice weighing 18-22 g and rats weighing 180-200 g were used.

The ambient temperature is kept constant. In test A, the agent studied is given 15 min after intraperitoneal administration of 25% ethanol in a dosage of 4.5 g/kg, after which the rats remain in lateral position for 90±30 min; for mice, this dosage is 6.0 g/kg, and they remain in lateral position for 117±19 min. In test B, the tested product is given 30 min after administration of LD<sub>50</sub> ethanol (for rats, LD<sub>50</sub> of ethanol is 9.3 g/kg and for mice, 9.8 g/kg). At least 20 animals should be used in each test; the number of animals indicated here and below is above the minimum number of animals required for statistical processing, which is suggested in the relevant handbooks [6]. This circumstance is related to the rather wide scatter of results of administration of ethanol, which is probably attributable to variability of its metabolism and differences in individual sensitivity of different animals to alcohol. In tests A and B, there must be a control for the lateral position and LD<sub>50</sub> in other animal groups. The need for such a control is due to the seasonal fluctuations and age-related differences in animal sensitivity to alcohol.

In all of the tests in which injections are given, we use the intraperitoneal method of administering ethanol in the form of 25% solution. Intravenous injection and intake by mouth are inconvenient for ethanol since, in the first place, they do not permit a broad enough range of doses. In the second place, intravenous injection of large volumes of ethanol solution can impair hemodynamics, on the one hand, and high concentrations of ethanol with the use of large doses can induce hemolysis, on the other; intake by mouth does not provide for a stable enough effect of ethanol as a function of time,

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and this is related to the dissimilar rate of absorption thereof. It is not desirable to use ethanol in concentrations of over 25% for intraperitoneal injection, since there could be a severe nociceptive reaction, injury to the peritoneum with production of hemorrhagic exudate in the peritoneal cavity. It is convenient to use the following formula to calculate the volume of 25% ethanol (V) in accordance with the required dose (D), with consideration of the animal's weight (M):

$$V \text{ (ml)} = D \text{ (g/kg)} \cdot M \text{ (g)} / 250.$$

## Interpretation of Obtained Data

Shorter duration of lateral position of the animal will be indicative of the capacity to attenuate alcoholic intoxication in test B and increased survival time will serve as the same indication in test B. A quantitative estimation of the effect of a product can be made by comparing the confidence range of duration of lateral position in the control and experimental groups of animals in test A. In test B, increase or decrease in number of surviving animals is considered [7].

## II. Demonstration of Capacity to Retard Development of Alcohol Addiction

Test C: The effect of the agent under study on dynamics of alcohol intake and percentage of animals that begin to consume alcohol, with statistical significance (in the case of freedom of choice between 15% ethanol and water) after the first 10 days of contact with ethanol.

Test D: Influence of the agent on dynamics of alcohol intake and percentage of animals that begin to consume alcohol, with statistical significance, against the background of chronic stress over a 10-day period (with freedom of choice between 15% ethanol and water) after the first 10 days of contact with ethanol.

## Experimental Section

Rats weighing 180-250 g are used.

For tests C and D, the animals are kept in individual cages throughout the experiment, with free access to 15% ethanol, water and dry feed.\*

A comparison of the results obtained on different animals is made on the basis of intake of 15% ethanol per kg weight per day. In test C, only "drinking" rats (intake of at least 2 ml/kg of 15% ethanol per day) are taken for subsequent injections, on the basis of the data on 10-day intake

\*Here and in all of the following tests in which alcohol intake is studied in the presence of free access to ethanol and water, only standard dry feed is used: feed in pellet form for laboratory animals, in accordance with the recommendations of the USSR Ministry of Health.

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of alcohol (background); these animals are then divided into equivalent groups (control and experimental) according to the amount of alcohol consumed by each animal; in test D, all of the animals participated in the entire experiment, including the "nondrinking" ones; after the first 10 days of contact with alcohol (background) they are also divided into equivalent groups, after which they are submitted to stress. For the control group of animals in tests C and D, distilled water is given by intraperitoneal injections in the same volumes as the solutions of tested agents. In test D, chronic stress is produced by means of daily (for 10 days) 10-min delivery of nociceptive electrical stimuli to the paws through an electrode floor (parameters: 50 Hz pulsed current lasting 1 s at 1-s intervals; 50-65 V, depending on the animals' reaction). In test D, the agent studied is administered after the stress stimulus. Two groups of animals are used in each test (at least 20 rats at a time). The first group of animals (control) is given injections of distilled water daily for 2 weeks (or 10 days in the case of stress) 10 days after putting the animals in individual cages with free access to alcohol and water. The second group of animals (experimental) is given the tested agent under analogous conditions, in the same volume and at the same times. In each group, we count the rats that consumed at least 2 ml 15% ethanol daily in the first 10 days (background), then separately for the 2d and 3d weeks, or 10 days in the presence of stress (injections), and in the 4th week (injections discontinued). The number of animals that consumed ethanol for the first 10 days is taken as 100%, in relation to which we determine the percentage of rats that "take to drink" in the 2d, 3d (or in 10 days in the presence of stress) and 4th weeks. A comparison is made of these percentages in the control and experimental groups of rats. The dynamics of alcohol intake are calculated for the animals that "take to drink" on a weekly basis. For this purpose, a comparison is made of the mean daily intake of ethanol by different rats within each of the periods of injections and the week after they are discontinued to the mean daily intake of alcohol in the first 10 days (background). Statistical processing can be performed according to Fisher or by means of calculation of confidence ranges of alcohol intake by different animals at each of the periods considered [7].

The need for chronic stress in test B is attributable to the fact that alcoholic motivation may be based on negative emotions; thus, the objective of this test is to detect agents capable of attenuating alcoholic motivation enhanced by emotional stress. When an agent is found to have a depressing effect on alcoholic motivation, one should differentiate between the specificity of its "antialcohol" effect and possible tranquilizing effect on stress using tests that detect tranquilizing properties of agents [8-10]. Screening of animals according to the findings for the first 10 days of contact with alcohol is done because rats ordinarily show virtually no change in their attitude toward alcohol after this period. Without preliminary consideration of this period and selection of equivalent animal groups according to doses of alcohol consumed, there is usually a scatter of experimental data, which does not permit consideration of the effect of the agent under study. The choice of 15% ethanol solution to produce the model of alcoholism in rats here and in the next experiments was motivated

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primarily by the need for the animals to ingest maximum doses of ethanol for a long period of time. This is the maximum concentration of ethanol that the rats consume willingly; in higher concentrations, they virtually refuse to do so. Moreover, in the population of "alcoholic" rats, 8-10% of the animals consume 50-70 ml/kg of 15% alcohol per day. If low concentrations of ethanol, for example 5%, are used in this case, the animals would have to drink 150-200 ml/kg, which exceeds the physiological capacity for fluid intake by the animals. The use of dry standard feed is necessary because differences in the diet and moisture content of feed have a substantial effect on fluid intake.

## Interpretation of Obtained Data

In both tests, a decrease in intake of ethanol, as compared to the control, and lower percentage of animals that "took to drink" will be indicative of the depressing effect of the tested agent on development of alcohol addiction.

## III. Demonstration of Capacity to Reduce Alcohol Intake by "Chronic Alcoholic" Rats

Test A: Effect of the agent in question on alcohol intake by animals that consumed it chronically (at least 4 and at least 8 months) in stable amounts (ethanol consumed per kg weight per day) with freedom of choice between 15% ethanol and water.

## Experimental Section

The animals used are rats weighing 250-500 g.

Experiments are conducted on at least 2 groups of animals: those that consistently consume alcohol in relatively low amounts (20-30 ml/kg 15% ethanol per day) and large amounts (50-60 ml/kg 15% ethanol per day), with at least 20 rats per group (10 in the control and 10 in the experiment). A comparison is made of alcohol intake before administration of the agent (1 week before), during administration thereof (2 weeks) and after discontinuing it (1 week). The control group of animals is given distilled water at the same times and in the same volumes. Determination is made of mean daily ethanol intake by each animal in each of the above weeks; we then calculate mean alcohol intake per group, per week, and compare the data on intake in 1 week (before the injections) to the data for each of the subsequent weeks; alcohol intake for the 1st week is taken as 100%, and we calculate the dynamics of intake for all subsequent weeks (as percentages); statistical processing of the results can be performed by the method of Meddis [11], which involves the use of the following equation, transformed for our case:

$$Z = 2R_1 - 3n/\sqrt{n}$$

where  $R_1$  or  $R_2$  are the sums of ranks;  $n$  is the number of animals. With  $Z \geq 2.53$ , the reliability of difference is  $p \leq 0.01$  and with  $Z \geq 1.57$  the reliability of difference is  $p \leq 0.05$  (see Table).

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Estimates of alcohol intake by group of animals against the background of injections of tested agent, as compared to initial level

Number of animals <i>n</i>	Mean daily ethanol intake (mℓ 15% solution) per kg weight			
	First week (base level)		Second week (injections)	
	intake	rank R <sub>1</sub>	intake	rank R <sub>2</sub>
1	21	2	16	1
1	19	1.5	20	1.5
1	23	2	18	1
1	25	2	20	1
1	24	2	10	1
1	25	1	28	2
1	19	2	6	1
1	21	2	10	1
1	23	2	4	1
1	23	2	17	1
10	22.3 mean group intake	18.5	14.9 mean group intake	11.5

Note: When comparing ethanol intake in the 1st and 2d week by each animal, the lower mean daily amount is given the rank of 1 and the higher, the rank of 2; a difference in rank is established when the mean daily ethanol intake by an animal in the 1st week differs from intake in the 2d week by at least 2 mℓ/kg 15% ethanol solution; otherwise equal ranks are given, 1.5.

In the above table,  $Z = 2 \cdot 18.5 - 10 \cdot 3 / 10 = 2.12$ ; thus, ethanol intake for in the 1st week (22.3 mℓ/kg 15% solution) is reliably ( $p < 0.05$ ) higher than ethanol intake during the period of injections (14.9 mℓ/kg 15% solution).

Different groups of animals, according to amount of alcohol intake, must be used because of the possibility of development of a dissimilar effect in animals who "drink a little" and "drink a lot" and this could be related to the dissimilar rate of ethanol metabolism in these animals, or difference in degree of euphoria, which depends on individual distinctions. Experiments are conducted on groups of animals having contact with alcohol for different times (at least 4 months and at least 8 months) because, in the former case, the animals apparently present a distinctive analogue of developed "psychological" dependence, but not developed physical dependence, since they consume ethanol stably for 3 months but discontinuation of intake does not lead to a switch to other narcotics when there is free access to the latter and water. Rats that consistently consumed alcohol for at least

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8 months switch to other narcotics under analogous conditions, so that apparently these animals have already developed physical dependence as well.

Interpretation of Obtained Data

A decrease in alcohol intake against the background of administration of the tested agent will be indicative of a capacity to attenuate alcohol addiction in the case of formed alcoholic motivation. Decreased alcohol intake after discontinuing the tested agent will be indicative of its lasting therapeutic effect.

IV. Demonstration of Capacity to Retard Development of Physical Alcohol Dependence

Test F: Influence of the agent under study (when given against the background of alcohol) on consequences of alcohol deprivation with regard to animal behavior.

Experimental Section

Mice weighing 18-22 g are used in these tests.

The agent in question is given to the animals daily against the background of 6-day exposure to an atmosphere with ethanol fumes, using the method of Goldstein [12-14]. A record is made of severity of seizures, tremor and mortality rate after the animals are exposed to ordinary conditions. A control group of animals is needed; they are kept under analogous conditions but without administration of the tested agent.

Interpretation of Obtained Data

Attenuation of seizures and tremor, lower mortality rate (as compared to the control group) would be indicative of less marked physical dependence on alcohol, related to the effect of the tested agent.

V. Demonstration of Capacity to Attenuate Withdrawal Symptoms

Test G: A test is used that is similar to test F, the only difference being that the agent in question is given after the animals are moved from an atmosphere with ethanol fumes to ordinary conditions.

Experimental Section

Mice weighing 18-22 g are used in these tests.

After determining that the tested agent retards development of physical dependence (test F) and attenuates withdrawal symptoms (test G), the specificity of its action must be differentiated from the anticonvulsive effect (at least with the corazole seizure test, which is used in screening psychopharmacological agents).

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Interpretation of Obtained Data

Attenuation of seizures, tremor and lower mortality will be indicative of the capacity of the tested agent to attenuate alcohol withdrawal symptoms.

VI. Demonstration of Specificity of the Effect on Processes of Ethanol Metabolism (Differentiation Between Central and Peripheral Types of Action of an Agent)

Test H: Influence of the agent on the effect of ethanol in narcotic and subnarcotic doses.

Test I: Influence of the agent on the effect of acetaldehyde in narcotic and subnarcotic doses.

Experimental Section

Mice weighing 18-22 g are used for these tests.

A constant ambient temperature is maintained. Tests H and I involve administration of the agent studied 30 min prior to administration of 25% ethanol or 5% acetaldehyde (the narcotic dose of ethanol with which the lateral position is maintained for  $32 \pm 10$  min is 4.5 g/kg and the subnarcotic dose is 3.7 g/kg; the narcotic dose of acetaldehyde with which the lateral position lasts  $7.5 \pm 2.5$  min is 450 mg/kg and the subnarcotic dose is 290 mg/kg). It is necessary each time to have a control of the effects of ethanol and acetaldehyde in narcotic and subnarcotic doses.

Interpretation of Obtained Data

In test H, the prolonged effect of a narcotic dose of ethanol in the absence of potentiation of the effect of ethanol in subnarcotic doses is indicative of mainly specific capacity of the tested agent to extend presence of ethanol in the body due to blocking of peripheral mechanisms of catabolism of alcohol. A combination of extending and potentiating effects of the tested agent on the effect of ethanol is indicative of a nonspecific, general (central) depressing effect of the former. Shortening of the period of alcohol narcosis is indicative of the arousing (possibly accelerating metabolism) effect of the tested agent; interpretation of the results of test I is similar to that described for ethanol (test H). A comparison of the results of tests H and I permits determination of the stages of alcohol metabolism influenced by the tested agent and how this occurs.

VII. Demonstration of Specificity of Depressing or Stimulating [Arousing] Effect on the Effects of Alcohol and Acetaldehyde

Test J: Influence of the agent on the effects of sodium thiopental in narcotic and subnarcotic doses.



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Experimental Section

The experimental method has been described in detail elsewhere [15]. Mice weighing 18-22 g are used.

Interpretation of Obtained Data

The information about the influence of the tested agent on the effects of sodium thiopental must be compared to the results of tests H and I; demonstration of a general depressing action of the agent on the effects of sodium thiopental is indicative of nonspecificity of such effects on the action of ethanol or acetaldehyde (if such was demonstrated in tests H and I) and vice versa.

In order to solve the problem of finding pharmacological agents with probable "antialcoholic" properties, it is desirable, first of all, to delineate the most rational routes of synthesis and screening of chemical compounds to be studied. We believe that a search for such agents should be pursued primarily among the classes of biologically active compounds that have neurotropic activity or that interfere in metabolism of neuromediators of the central nervous system, since such agents most probably can have an influence on the emotional sphere and, in particular, processes of alcoholic motivation. In addition, it is desirable to search for more effective and less toxic agents than are already used for the treatment of alcoholism. This applies to agents of the disulfiram type, which are capable of inhibition aldehyde dehydrogenase. Also of interest are agents that influence ethanol metabolism at other stages, for example, inhibitors of alcohol dehydrogenase (of the pyrazole type), as well as agents that could activate the above-mentioned enzymes.

For special screening, one must have a tentative idea in advance about the effective and lethal doses of an agent. For this reason, the first study of the properties of a new compound should be made in accordance with the first stage of conventional screening, which is used for demonstration of central neurotropic activity: observation of animal behavior against the background of the tested agent in logarithmically increasing doses of 10, 20, 40, 80, 160 mg/kg, etc. [15]. Having information about the tentative toxicity of an agent, one can determine working doses thereof for special screening. The effective doses of an agent can be determined relatively easily for tests A, B, H, I and J (if the required effect is demonstrable by these tests). Such doses may be the working ones of a given agent for the other special screening tests. In the latter case, one should also have a tentative idea about the duration of action of an agent, which is determined by analogy to the method used to determine the duration of neurotropic effect of a new compound (methods of "prolongation" and "potentiation" of narcotic effects of sodium thiopental [15]), the only difference being that ethanol is given in narcotic and subnarcotic doses 15, 30, 60, 120, 180 and 240 min after administration of the tested agent. The foregoing applies primarily to agents that affect ethanol metabolism. Most probably, such testing is not

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mandatory for agents that may have an influence on alcoholic motivation. For this reason, the choice of dosage of an agent for tests C, D and E is empirical to some extent.

In conclusion, it should be noted that the basic principles of screening "anti-alcoholic" agents may apply in the search for new chemical compounds, which could be useful for the treatment of other addictions. In this case, however, the above tests must be modified for use in drug addiction, i.e., the relevant drug [narcotic] should be used in the tests instead of alcohol. It must be borne in mind that certain tests must be excluded for a number of reasons. For example, if the drug that induces addiction cannot be changed to the gas phase, or if it is not absorbed in pulmonary alveoli, it is impossible or purposeless to expose animals to the fumes of this drug (analogues of tests F and G). At the same time, the use of tests related to ethanol metabolism (test I) is excluded for screening that has been modified for a particular drug.

BIBLIOGRAPHY

1. Borisov, M. M., and Mufazalova, T. P. KHIM.-FARM. ZH. [Chemico-pharmaceutical Journal], No 3, 1978, pp 44-48.
2. McClearn, G. E. in "International Congress of Pharmacology," 6th, proceedings, Oxford, Vol 3, 1976, pp 69-66.
3. Geiger, J. F., and Barker, L. M. QUART. J. STUD. ALCOHOL, Vol 37, 1976, pp 950-958.
4. Hederra, A.; Aldunate, J.; Segovia-Riquelme, N.; et al. in "Rutgers Center of Alcohol Studies," New Brunswick, New York, 1975, p 159.
5. Ishimoto, J. NIHON UNIV. MED. J., Vol 33, 1974, pp 24-32.
6. Belen'kiy, M. L. "Elements of Quantitative Evaluation of Pharmacological Effects," Leningrad, 1963.
7. Plokhinskiy, N. A. "Biometry," Moscow, 1970.
8. Burov, Yu. V., and Salimov, R. M. ZH. VYSSH. NERNV. DEYAT. [Journal of Higher Nervous Activity], No 4, 1974, pp 825-832.
9. Burov, Yu. V.; Salimov, R. M.; and Speranskaya, N. P. BYULL. EKSPER. BIOL. [Bulletin of Experimental Biology], No 2, 1976, pp 186-188.
10. Vikhyayev, Yu. I., and Klygul', T. A. ZH. NEVROPATOL. I PSIKHIATR. [Journal of Neuropathology and Psychiatry], No 1, 1966, pp 123-129.
11. Meddis, R. BRIT. J. PSYCHOL., Vol 66, 1975, pp 225-227.

FOR OFFICIAL USE ONLY

12. Goldstein, D. B., and Pal, N. SCIENCE, Vol 172, 1971, pp 288-290.
  13. Goldstein, D. B. J. PHARMACOL. EXP. THER., Vol 180, 1972, pp 203-215.
  14. Idem, Ibid, Vol 190, 1974, pp 377-383.
  15. Rayevskiy, K. S. "Pharmacology of Neuroleptics," Moscow, 1976, pp 81-108.
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PHYSIOLOGY

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DYNAMICS OF ELECTRICAL ACTIVITY OF THE VISUAL CORTEX AND HIPPOCAMPUS  
DURING PROLONGED IMMOBILIZATION

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 29, No 2, 1979  
pp 337-344, manuscript received 24 Oct 77

[Article by I. A. Kolomeytseva, Institute of Higher Nervous Activity and  
Neurophysiology, USSR Academy of Sciences, Moscow]

[Text] The topic problem, neuroses as psychogenic diseases of man, is known to be turning into one of the most important problems in medical theory and practise. Since the etiopathogenesis of neuroses exhibits, in complex interdependence, disturbances not only of mental functions but, also, of simpler forms of behavior, accompanying damage to a number of bodily systems, there is no doubt that it is possible to model some forms of the disease in animals. This is even more the case, since, in the light of I. P. Pavlov's teaching, neuroses are classified as functional disturbances, disruptions of the analyto-synthetic activity of the cerebral cortex. If one looks upon behavior during neurosis in the plan of an intricate complex of pathologically-stable conditioned reflexes /9, 17, 18-21, 25/, then study--in different animal species--of patterns of their formation dynamically, as a function of typological features of the nervous system, is plainly becoming necessary. I. P. Pavlov noted /9/ that "resolution of many questions of the etiology, mechanism and, ultimately, therapy of neuroses in people is in the hands of the experimenter on animals".

In the present work, the method of immobilization of rats in special containers, a method which has recommended itself well in the laboratories of K. Hecht /10, 24/, has been used as the stressing factor. On the one hand, model of hypokinetic stress has been used as a sufficiently effective way to produce, in the animals, prolonged neurotic disturbances, and, on the other hand, the study of the subsequent hypodynamia, in and of itself, is extremely important in a practical plan in connection with the ever-broadening research on space, the ocean, the Arctic, and so on.

Combined study, with the help of various procedures, of the changes arising in the body of animals during hypokinesias of various duration /1, 10, 15, 22, 26/ showed that, as the result of immobilization, the rats manifest disturbance of higher nervous activity, an increase in blood pressure, a

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rise in content of sugar in the blood, a decrease in weight of the animals, etc. It was noted that, during prolonged hypokinesia, disturbances in the central nervous system (CNS) precede the changes in visceral functions.

Important within the framework of this model is the question of the electrophysiological correlates of the disturbances of behavior and of higher nervous activity, which were found earlier with the help of a conditioned-reflex method. The task of the present work included tracing the character of the changes in bioelectrical activity of the visual cortex and dorsal hippocampus, of several vegetative indices, of motor activity and functioning of the brain systems of the awake state and sleep against a background of action of the hypokinetic stress.

## PROCEDURE

Rigid immobilization was produced in seven outbred rats in a special frame which made it possible to keep a chock with electrodes on the head of an animal. The immobilization was protracted 16 hours a day for 5 days. Every day, 2 hours after ending the immobilization of the rats, recordings were made--in a special chambers under conditions of free behavior--of the EEG of the visual cortex and of the dorsal hippocampus, electrocardiograms (EKG) and electromyograms (EMG) of the cervical muscles. Monopolar recording of the biocurrents was accomplished with the help of silver and steel electrodes on an 8-channel encephalograph, "Medikor" (Hungary). The EMG and EKG were registered, bipolar, with electrodes sewn into the neck muscles. In the background and in the evoked EEG, during the awake state, the energy capacities of the delta-, theta- and alpha-frequencies, the level of synchronization and the number of sensory post-discharges (epoch of analysis, 30 sec) were tabulated. For the evoked activity, use was made of a flash of light with energy of 0.45 j and frequency of 0.5 Hz. Continuous polygraphic recording for 2 hours made it possible to observe the dynamics of change of the various phases of sleep and awake state, to register latent periods of onset of the different phases of sleep, the number of awakenings, completed cycles, frequency of interchangeability, their percentage ratio, intensity of muscular tone and frequency of heart contractions. In addition to the quantitative evaluation of the character of the EEG, qualitative analysis of it at different stages of sleep was carried out. The level of synchronization was calculated as the ratio of the summary energy capacity of all frequencies at the time of action of the light flash to the summary energy capacity in the background EEG for 30 sec. Observation of each animal was extended over 13 days: 4 days before the action, 5 days in the process of stressing and 4 days after removal of immobilization.

## RESULTS OF STUDIES

After placing the animal in the chamber, the intensity of orientation and hygienic reactions gradually decreased depending on the degree it was accustomed to the apparatus. After 15-20 min, as a rule, motor activity

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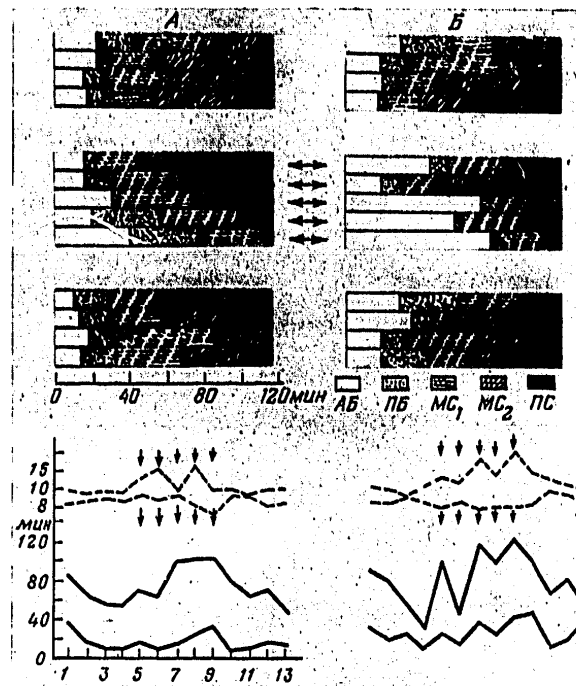


Fig. 1. Top--duration of individual phases of sleep and awake state in two groups of animals (A and B).  
 Top to bottom: before, during and after removal of immobilization. The first four columns--day of observation, the next five--tests carried out during immobilization, the next four--recording of EEG after removal of immobilization. A --active, P --passive awake state; MC<sub>1</sub>--dozing; MC<sub>2</sub>--deep slow sleep and C--paradoxal sleep. Abscissa, time min.  
 Bottom--some characteristic sleeps in the process of action of a stressing factor.  
 Top to bottom: number of arousals, number of normal cycles, latent period of first falling asleep; abscissa, number of tests; Ordinate, time min. Arrows--tests carried out during immobilization.

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stopped, the animal took a comfortable pose and fell asleep. Since there was ambiguity in the course of awake state of a rat, it was expedient to divide this phase in two: an active awake state when movements of various kind were seen and a passive awake state when motor activity was absent but there were no signs of sleep on the EEG.

Normally, as can be seen from the literature and our data, there is noted-- depending on degree of sleep of the rats-- a gradual transition in the EEG of the visual cortex from polymorphic desynchronized activity to more and more synchronized activity, with increase in amplitudes and decrease of frequency. Depending on degree of increase in specific weight of the slow synchronized activity, the sleep deepened. Each normal cycle, as a rule, ended with an episode of paradoxal sleep with a theta-rhythm, clearly expressed in the cortex and dorsal hippocampus, persisting 2-5 min in the rats, accompanied by a lowering of tone in the neck musculature and by change in heart rhythm. In its turn, the slow sleep, most exhibited in rats, was heterogeneous in its depth and EEG character and within it could be separated at least three phases: a) beginning of sleep with appearance of individual episodes of synchronized high-amplitude activity; b) dozing with increase in specific weight of this synchronized activity and rise in its amplitudes and, finally, c) deep, slow sleep with manifestation of high-amplitude delta-activity. Normally, in one cycle, there were two or three episodes of slow activity, each cycle was completed with paradoxal sleep, after which there entered electrographic or behavioral arousal, and, then, all was repeated again. Altogether, in 2 hours of observation in the normal state, there were seen in the rats two or three cycles of slow sleep, finished by paradoxal sleep. Just as in our previous studies /6/, the animals taken for the experiment, initially were not in a homogeneous group, as regards behavioral and electrographic indices: group A-- quieter and equable animals with some predominance of an inhibitory process and well-expressed sensory post-discharge in the visual cortex and group B, where the animals were more lively, easily excited, with poorly-expressed sensory post-discharge. And, nevertheless, during the control observation, for a number of indices of sleep, the latent period of going asleep, number of completed cycles, number of arousals, latent period of onset of the first episode of paradoxal sleep, and so on, both these groups differed little from each other. In both groups, depending on degree of adaptation of the animals to the situation of the experiment, there was seen a gradual shortening of the latent periods of falling asleep, increase in duration of slow and of paradoxal sleep and, on the 4th day of observation, all recorded indices reached stable figures (Fig. 1).

After a 16-hour fixation in the special frame and starting 2 hours after this, essential changes were seen in the recorded indices. On the first day of immobilization, acceleration of the heart rhythm in the rats was recorded from 400-440 to 470-500 beats/min during the awake state and from 350 to 380 during slow sleep. Depending on the degree of prolongation of the tests with immobilization, no further acceleration occurred, as a rule,

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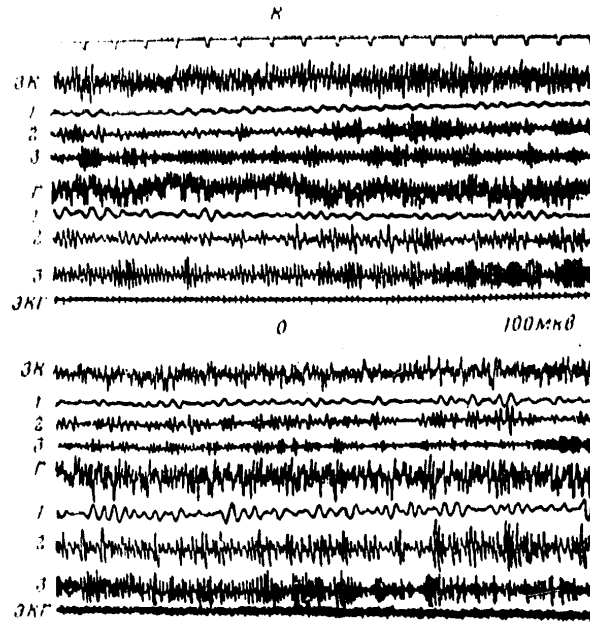


Fig. 2. Episode of paradoxal sleep under normal conditions (K) and during the action of a stressing factor (O). Top to bottom: time marker, EEG of visual cortex (3K), EEG of dorsal hippocampus (Г), EMG and EKG together. 1,2,3--frequency composition of delta-, theta- and alpha-range. Attention is attracted by absence of a myogram of the neck muscles during paradoxal sleep under normal conditions and the less expressed theta rhythm in the 3K and dorsal hippocampus during substantial steadiness of the EMG in the stressed animal.

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but changes were seen in the pulse frequency in the process of deepening of sleep, not correlated with the phases of sleep. During bioelectrical activity of the visual cortex and dorsal hippocampus, depending on the degree of intensification of the neurotic state, there was a rise in the energy power of frequency, predominantly of the alpha- and theta- range. The level of synchronization decreased on the average from  $1.2 \pm 0.04$  to  $0.7 \pm 0.03$ , the number of post-discharges on the average decreased from four or five, in response to one light flash, to two.

It is seen from Fig. 1 that, in group A after the first day of immobilization, the percentage ratio of the phases of wakefulness and sleep, as compared with the previous control experiment, did not change appreciably. Duration of the paradoxal phase was increased somewhat and the number of awakenings grew (Fig. 1, graph below). Depending on the degree of prolongation of the tests with immobilization, a gradual decrease was seen in this group in the duration of the different phases of sleep due to increasing the time of active and passive awake states, slow sleep became more superficial and awakening was seen more often against this background. At the conclusion of the period of immobilization, the deep phases of sleep disappeared almost completely, and the number of complete cycles, ending with paradoxal sleep, decreased to a minimum (Fig. 1, graph, bottom).

In the animals of group B, changes in EEG and behavior—even on the first day after immobilization—were substantially more pronounced than in Group A. Due to prevalence, basically, of an active awake state there were a decrease in duration of deep phases of sleep (Fig. 1, top), a 3-fold increase in the latent period of falling asleep and of onset of the first episode of paradoxal sleep. The number of awakenings rose by a factor of 1.5 while the number of normally completed cycles was substantially decreased (Fig. 1, lower graph). Depending on degree of prolongation of the experiments under immobilization, there was seen in this group an unstable picture of changes of the ratio of sleep and awake state. Thus, days with prevalence of the process of awakening and absence of deep sleep phases alternated with days where duration of all phases of sleep rose sharply (Fig. 1, top). However, a significant number of awakenings on the second day of immobilization stress, not preceded by normal episodes of paradoxal sleep, pointed to the absence of completeness of these extended episodes of sleep. At the end of the study, depending on degree of prolongation of the tests with immobilization, the animals of this group hardly slept, the time of their being awake increased 4-fold, and the duration of sleep decreased 15-fold (Fig. 1, above).

In addition, during this neuroticization, not only was there a change, at the end of five days, especially in group B, in the duration of the separate phases of sleep, and a protraction of the times of their onset, but, also, as a rule, the quality of the sleep itself began to change. Thus, whereas in the control experiments the development of a distinct theta-rhythm in the studied structure during onset of paradoxal sleep was usually

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Fig. 3. Cyclogram of sleep during a 2-hour observation period. Top--normal (K); bottom--under the action of immobilization (O). On the ordinate axis: 1--active (dotted line) and passive (solid line) awake state; 2--start of dozing; 3--dozing; 4--slow sleep; 5--paradoxal sleep. On the abscissa axis--time, min.

accompanied by decrease in tone of the neck muscles and a bradycardia (Fig. 2, K), the result of immobilization was that the paradoxal sleep not infrequently was broken down into small, 5-to-7-second segments, interrupted by episodes of slow sleep. Apparently, this suggested that such sleep was of inadequate depth and these episodes were not accompanied by decrease in muscle tone and there was no onset of a deeper phase with a clearly-expressed hippocampal theta-rhythm. On the whole as a result of the hypokinetic stress, the sleep became more disperse, superficial, interrupted by a significant number of awakenings (Fig. 3, two lower cyclograms). In a number of the animals, at the end of the observation, there was a sharp change in behavior in the chamber; there appeared, in the process of awakening, episodes of rigidity, spasms of separate muscle groups; aggression built up, vocal reactions appeared.

Study of the EEG and behavior over a 4-day period after removal of the immobilization indicated that the rate and degree of restoration of the picture of behavior and the EEG also depended on the initial functional character of the CNS. Thus, whereas, with removal of immobilization in group A, the basic characteristics of sleep and awake state almost completely normalized at the end of the fourth day, in group B there was continued persistence of the instability of these states. Alternation of days was observed, with prevalence or clear incompleteness of the deep phases of sleep (Fig. 1); sleep as a whole remained more superficial and complete restoration did not occur.

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## DISCUSSION OF RESULTS

The changes, described above, in EEG-indices and behavior in rats under hypokinetic stress, led to a rise in the energy capacity, predominantly of the theta-range of frequencies, to a lowering of the level of synchronization with fading out of the sensory discharges of the post-action in the visual cortex to light, to manifestation of chaos in the separate rhythms. Shortening of duration of sleep is seen due to delayed falling asleep and frequent awakenings at various stages of sleep. There is seen an increase of superficial and shortening of deeper stages of sleep, especially the paradoxal, and, also, a depth of sleep not corresponding to the frequency of heart contractions, a disturbance of correlation between the phase of sleep and the status of muscle tone. The depth of the recorded disturbances and the rate of recovery depended on the initial functional state of the CNS. Thus, in animals of group B, with predominance of the process of the awake state, with predominantly desynchronized background EEG and a poorly expressed sensory post-discharge, firm immobilization evoked clearer disturbances of behavior than in animals of group A with a more synchronized background EEG, a well expressed sensory post-discharge in the cortex.

Whereas in animals of group A, after removal of immobilization, correspondence of the various phases of sleep and wakefulness had almost completely normalized after 4 days, a number of indices had still not reached normal in rats of group B in that time. These facts confirm data obtained earlier by us in studies of higher nervous activity and behavior of rats under normal conditions and under conditions of presentation to it of stressing factors in the form of acute extinguishing, "collisions" and fine differentiation. Thereby was noted a different degree of disturbance of conditioned reflex activity and of the EEG as a function of the initial picture for these indices prior to the action /6/. Weakening was found, in animals of group B, of both nervous processes with predominance of the process of excitation. The data, presented above, with respect to dominance, in animals of group B, of higher frequencies in the EEG of the visual cortex and hippocampus, the lowering of the level of synchronization, point to the presence, in these animals, of a raised activated background, to the predominance of tone of the subcortical formations, to strengthening of the system of arousal /23/. These animals appeared more injured under the action of stressing factors.

It appeared in our experiments that, along with curtailment of deep phases of sleep on separate days of tests during prolongation of the stressing action, there sometimes took place a lengthening of the predominantly paradoxal phase of sleep. These observations, in correspondence with literature data /4, 19, 20 and 25/, permit the assumption that, in this case, the paradoxal phase of sleep set in, filling the role of an adaptational-protective mechanism which provides "neutralization" /4/ of the nervous system from the action of emotional stress. The basic role of the paradoxal

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phase of sleep, precisely under the conditions of adaptation to conflict situations, is stressed in work with deprivations of this phase where existence of a so-called mechanism of restoration was found /13, 14, 16, 19/.

An interesting situation is the change occurring in the quantitative characteristics of sleep and, also, the lowering in quality of the separate phases of sleep. This is met, often enough, in the clinical neurological literature /4/ and a production of similar changes, experimentally, in animals substantially broadens the possibility for study of disturbances of sleep.

Analysis of our data on change of basic characteristics of the bioelectrical activity of brain structures during the awake state and sleep in animals subjected to chronic immobilization stress, calls attention to a definite similarity of these data to results obtained in a neuroses clinic and, experimentally, in healthy people under stress situations /2,3,7,8,12/.

These comparisons convince us of the need to model experimental neuroses in animals. Even more convincing is the fact that the clinic deals in the majority of cases with already-established forms of pathological dominants /8,11/, as a rule, for a long time and being complicated by somatic disturbances of a secondary nature. It is, of course, possible, experimentally, to vary, from the outset, the force and quality of the stressing action, to trace, dynamically, the sequelae of the influence of the stressing factors on the body, to elucidate the dependence of severity and character of damages to this or that function on the features of the nervous system, to apply different kinds of physiological or pharmacological defense, and so on.

CONCLUSIONS

1. During acute hypokinetic stress in rats, the background EEG of the visual cortex and hippocampus of the animals displays an increased energy capacity of the predominantly theta-range of frequencies, there is a decrease in the level of synchronization in response to light and frequent change in the separate rhythms occurs.
2. Rather superficial phases of sleep predominate in the experimental animals, the duration of the separate phases is shortened due to delayed falling asleep and frequent awakenings.
3. Along with change in the quantitative characteristics of sleep, change in its quality in the stressed animals is observed: the phases of sleep-in-being are, in a number of cases incomplete, there is seen a dissociation between muscle tone, frequency of cardiac contractions and the electrographic picture of sleep (the paradoxal phase).
4. The severity of these disturbances was a function of the individual features of the higher nervous activity of the animals.

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BIBLIOGRAPHY

1. Abramov, Yu. B., Stress and its pathogenetic mechanisms (in Russian) MATER. VSES. SIMP. Kishinev, "Shtiintsa", 1973, p 46
2. Bobkova, V. V., Features of the electrical activity of the brain in neurological states (in Russian). Doctorate dissertation, Leningrad. Psychoneurological Institute imeni V. M. Bekhterev, 1971
3. Bundzen, P. V., In the collection: Antartika (in Russian), Moscow, "Nauka", No 11, 1972, p 20
4. Veyn, A. M., Disturbances of sleep and the awake state (in Russian). Moscow, "Meditsina", 1974
5. Koval'zon, V. M., Mechanisms of sleep (in Russian). MATER. SIMP. Leningrad, "Nauka", 1971, p 82
6. Kolomeytseva, I. A. ZH. VYSSH. NERVN. DEYAT. (in Russian), Vol 25, No 3, 1975, p 505
7. Myager, V. K., Diencephalic disturbances and neuroses (in Russian). Leningrad, "Meditsina", 1976
8. Myasishchev, V. N., Personality and neuroses (in Russian). Leningrad, "Meditsina", 1960
9. Pavlov, I. P., Complete collected works (in Russian). Moscow-Leningrad, 1951, p 191
10. Poppei, M., Hecht, K. and Morits, V., ZH. VYSSH. NERVN. DEYAT (in Russian), Vol 27, No 2, 1977, p 348
11. Ukhtomskiy, A. A., Complete collected works (in Russian) Leningrad, "Meditsina", 1950, p 163
12. Yakovleva, Ye. K. and Zachepitskiy, R. A., (in Russian). ZH. NEVROPATOL. I PSIKHIATR., Vol 61, No 10, 1961, p 1528
13. Cartwright, R. G., ARCH. GEN. PSYCHIAT., Vol 66, 1966, p 297
14. Chester, P. and Michael, B., PHYSIOL. AND BEHAV., Vol 13, No 6, 1974 p 813
15. Denton, B., Allen, B. and Charlohe, C., J. GEN. PSYCHOL., Vol 9, No 2, 1974, p 231
16. Dement, W. C., SCIENCE, Vol 131, No 3415, 1960, p 1705
17. Eiff, R. W. THERAPIEWOCHE (in German). Vol 26, No 1, 1976, p 9

FOR OFFICIAL USE ONLY

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18. Eysenck, H. J., BEHAV. RES. AND THERAP., Vol 14, No 4, 1976, p 251
19. Greenberg, R., Pearlman, C., Fingar, K. and Kantrowitz, J., BRIT. J. MED. PSYCHOL., Vol 43, 1970, p 1
20. Hartmann, E., Backeland, F. and Zwillings, G., AMER. J. PSYCHIAT., Vol 127, No 8, 1971, p 1001
21. Kunz, V. and Laborit, H., AGRESSOLOGIE (in French), Vol 15, No 16, 1974, p 381
22. Mateeff, D. and Georgieva, N., ACTA PHYSIOL. ET PHARMACOL. BULG., Vol 2, 1974, p 37
23. Mendels, J. and Hawkins, D., ARCH. GEN. PSYCHIAT., Vol 16, 1967, p 536
24. Poppei, M. and Hecht, K., ACTA BIOL. MED. GERM. (in German), Vol 27, 1971, p 297
25. Ramon, G. and Chester, P., PERSPECT. BIOL. AND MED., Vol 17, 1974, p 513
26. Wilson, L. M., Wilson, J. R. and Diraka, L. V., PHYSIOL. AND BEHAV., Vol 15, No 6, 1975, p 653

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

UDC 001.89

PROBLEMS OF SCIENTIFIC AND TECHNICAL SOCIETIES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 24-30

[Article by A. Yu. Ishlinskiy, academician, and N. N. Gritsenko]

[Text] Acceleration of scientific and technical progress depends a great deal on the results of fundamental and applied research and the utilization of these findings in the national economy. The 25th CPSU Congress, by defining the role of the USSR Academy of Sciences as a center of theoretical research and coordinator of all scientific work in the land, also indicated the need of significant expansion of the ranks of participants of scientific inquiry.

Among the organizations leading the great theoretical and applied scientific quest are the scientific and technical societies of the USSR: they unite about 9,000,000 members in their ranks. Their influence covers many spheres of science and technology and national production.

The more than 110-year history of scientific and technical societies has been continuously linked with the formation and evolution of domestic science and technology, with names of such outstanding Russian and Soviet scientists as D. I. Mendeleev, A. N. Krylov, A. S. Popov, A. A. Baykov, G. M. Krzhizhanovskiy, S. I. Vavilov, I. M. Gubkin, I. P. Bardin and many others. The Russian Revolution brought radical changes to the activities of scientific and technical societies. National scientific and technical activity first received intensified support of the State. By decree of the Russian Federation Sovnarkom signed by V. I. Lenin, the formation of scientific and technical societies was encouraged and they were given all conditions necessary for operation. From small associations of scientists and specialists to massive social organizations, from isolated laboratory research to the participation in solving large-scale national economic problems--this is the path taken by societies in the years of Soviet power.

The All-Union Council of Scientific and Technical Societies now encompasses 23 scientific and technical societies (according to production sectors). At enterprises, construction sites, mine shafts, in scientific institutions, collective farms, educational institutions there are about 115,000 primary society organizations. In the republics, krays and oblasts there are more than 2,000 administrations of sector societies and 148 intersectorial councils of scientific and technical societies. To

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develop scientific and technical and economic problems in councils and administrations of scientific and technical societies over 81,000 national sections and committees have been set up, including 16 intersectorial national committees in the All-Union Council of Scientific and Technical Societies.

Scientific and technical societies, as part of the system supporting the linkage of science and production, are faced with important problems. They have been defined by the CC CPSU in the greeting sent to the 5th All-Union Congress of scientific and technical societies. In the greeting the need is particularly emphasized of strengthening the link of science and production, reducing time and raising quality of research and planning work, effective use of findings in the national economy. The efforts of scientific and technical societies, it was stressed in the Letter of CC CPSU, USSR Council of Ministers, AUCCTU, and CC Komsomol "On opening of socialist competition to meet and surpass the quota of 1978 and intensify the struggle for increased efficiency of production and work quality", should be aimed at maximum concentration of scientific and technical personnel and material resources in decisive directions of science and technology, increased efficiency and quality of fundamental research.

In the activities of scientific and technical societies is realized one of the major assumptions of our Constitution that social organizations actively participate in the control of State and social affairs, in the solution of economic, political and socio-cultural questions, and also the right of the working classes to the freedom of scientific and technical creativity is embodied in practice.

Today over 53,000 persons of primary organizations of scientific and technical societies perform the functions of manufacturing and technical councils of enterprises and organizations. Some 493,000 national creative associations of scientific and technical societies (bureaux of economic analysis and technical information, councils of scientific and technical societies, scientific research laboratories and institutes, creative teams) create the possibility for 3,000,000 people to actively participate by their own creative labor in the solution of the most essential problems of production.

Societies each year hold thousands of scientific and technical conferences and meetings, organize competitions and inspections. As these steps are taken, proposals and recommendations are made, many of them being realized and yielding a significant national-economic effect. Thus in 1972-1977 alone, the All-Union Council of scientific and technical societies contributed proposals on 27 large-scale scientific and technical problems to CC CPSU, USSR Council of Ministers, USSR State Planning Committee and State Committee on Science and Technology, including on the reduction in industry of heavy manual labor and work on dangerous conditions, on acceleration of incorporation and application of the findings of scientific research and planning developments, the use of polymer materials in the national economy, raising wear resistance of machinery and equipment, creation of defect-free technologies, protection of the sea and



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shoreline from contamination, efficient utilization in industry of fuel, electrical and thermal energy, etc. The Central Administrations of scientific and technical societies have elaborated recommendations in improvement of container and package shipments in maritime transport, mechanization and automation of industrial processes in postal communications, incorporation of comprehensive mechanization and automation in production of welded structural units, in mechanization of work on repair and maintenance of wells and petroleum equipment, etc.

Scientific and technical societies actively participate in the elaboration of plans of new technology, perform national monitoring over their performance. At meetings of the presidium of the All-Union Council of scientific and technical societies are regularly discussed the results of performance of the State plan of development of science and technology, causes hindering the performance of individual plan assignments are analyzed, measures are outlined for intensification of the role of administrations and councils of scientific and technical societies in this work. In all sectors society-organized inspections in cooperation with ministries and profsoyuzes look at performance of plans for new technology in which about 4,000,000 persons participate. During the course of a year participants of inspections introduce over 2,000,000 proposals aimed at better and faster solution of questions of creating and incorporating new technology.

An important place in the work of organizations of scientific and technical societies is held by the creative activities of scientific and technical engineering society. The personal and collective creative plans of members of scientific and technical societies serve as the basis for this.

The All-Union Council of scientific and technical societies take direct participation in the organization of the All-Union socialist competition for successful fulfillment of comprehensive programs on major scientific and technical problems. In accordance with conditions of this competition, State Committee on Science and Technology and All-Union Council of scientific and technical societies prepare proposals for USSR Council of Ministers and AUCCTU on awarding competition winners with the Red Banners of CC CPSU, USSR Council of Ministers, AUCCTU, and CC Komsomol. The State Committee on Science and Technology and presidium of the All-Union Council of scientific and technical societies set up a joint commission to examine materials presented by ministries and agencies, CC of profsoyuzes and central boards of scientific and technical societies on the results of this competition and to prepare suggestions on recognition of winners.

By placing an importance on the association of efforts of all those participating in comprehensive programs on major scientific and technical problems developed for the first time in this five-year plan, the staff of State Committee on Science and Technology and the presidium of the All-Union Council of scientific and technical societies approved the initiative of the scientific and technical society of the All-Union Scientific Research Institute of Hoisting and Transportation Machine Construction (VNIIPtmash) which, via the newspaper Izvestiya called for the

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organization of socialist competition for an early, effective and qualitative performance of these programs based on agreements on creative cooperation. The presidium of the All-Union Council of scientific and technical societies and the editors of the newspaper Izvestiya awarded an honorary diploma and souvenir to encourage collective groups and individual competitors making a significant contribution to the performance of scientific and technical programs. The first results show the tremendous significance of this movement. Thus periods of many studies on scientific and technical programs have been greatly reduced; as a result the final result is closer and it is not small. The national economic effect, for example, of incorporating machinery and equipment created in the program in which VNIIPtmash participates is about 50,000,000 rubles. Their productivity has grown by a factor of 1.5, which will ensure replacement of heavy manual labor in loading and unloading, hoisting and transport and warehousing work.

Societies devote much attention to the propaganda of the latest achievements in science, technology and advanced experimentation. The daily work in this field is done by 48 technical houses of scientific and technical societies, houses of culture and technology. Organizations of scientific and technical societies are publishers and co-publishers of 77 scientific and technical and industrial journals ("Stal", "Koks i khimiya", "Sudostroyeniye", "Gidrotekhnicheskoye stroitel'stvo", "Gornyy zhurnal", "Radiotekhnika", etc.). The All-Union Council of scientific and technical societies publishes the journal "Tekhnika i nauka", whose topics are totally dedicated to participation of scientific and technical societies in solving problems of acceleration of scientific and technical progress.

At the present time in administrations and councils, primary organizations, houses of technology of scientific and technical societies work over 3600 national universities of technical progress, economic and agricultural knowledge with a total number of more than 900,000 students. The educational process is supervised by the scientific and technical societies themselves or by scientific and technical societies in cooperation with organizations of the Znaniye Society. Over 6,000,000 people attend courses, seminars and schools organized by administrations and councils of scientific and technical societies.

Scientific and technical societies have wide international ties. The closest cooperation was established with scientific and technical societies of the socialist countries. This cooperation is aimed at solving specific technical and economic problems noted by the Comprehensive Program of Socialist Economic Integrations of the member countries of CMEA. In recent years ties of scientific and technical societies with scientific and technical societies of developing and capitalist countries have been expanded.

Many sector scientific and technical societies of the USSR include members and actively participate in organizations such as the International Gas Union, International Welding Institute, International Union of National Transportation, Federation of European Chemical Societies, etc. All-Union Council of scientific and technical societies is a member of the World Federation of Engineering Organizations, and the chairman of the All-Union Council was elected to be its vice president.

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The diversity of problems being solved by scientific and technical societies makes it natural and necessary for them to interact with diverse organizations, mainly with USSR Academy of Sciences and academies of union republics.

In 1918, the Soviet of Peoples' Commissars published a decree "On confirmation of the scientific and technical division in the Higher Soviet of the National Economy". This was done to concentrate all scientific and technical experimental affairs of the Russian Soviet Federated Socialist Republic, bring science and technology closer to production, distribution between scientific and technical institutions, societies, laboratories, institutes, experimental plants, etc. of the special assignments of Soviet authority. The cooperation between the Academy of Sciences and scientific and technical societies which began then has evolved continuously.

In 1967 a joint resolution was adopted by the presidia of USSR Academy of Sciences and All-Union Council of scientific and technical societies on intensification of ties between these organizations. It gave a more goal-oriented character to the collaboration. Members of scientific and technical societies were more often attracted to participate in the work of science councils, sessions, conferences, meetings and symposia held by the Academy of Sciences. The interest of scientists in the activities of scientific and technical societies, use of the potential of scientific and technical societies in discussion of plans and results of scientific research work, in experimental industrial testing and incorporation of scientific findings in production was increased.

Among the fruitful joint ventures one may name the conference "Problems of scientific organization of control of socialist industry" (organized by USSR Academy of Sciences and All-Union Council in 1972), the symposium "Problems of influence of the environment on biological objects and use of computer technology to solve them" (organized by science councils of USSR Academy of Sciences on problems of the biosphere, on the comprehensive problem of cybernetics, and All-Union Council in 1975), the scientific and technical seminar "Simulation of the mechanics of friction and wear in machinery, equipment and instruments" (organized by science councils of USSR Academy of Sciences on the comprehensive problem of cybernetics, on friction and lubricants and All-Union Council scientific and technical societies in 1976, and so forth.

Close contacts have been established between sector scientific and technical societies and division of USSR Academy of Sciences. Thus, scientific and technical societies of energy and electrotechnical industry and the Division of Physico-Technical Problems of Energy of USSR Academy of Sciences work together to solve problems such as outlook for development of energy, improvement of the country's fuel and energy balance, to solve questions of construction of the Sayano-Shushenskaya GES and to develop the Kansk-Achinsk coal basin.

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since the adoption of the joint resolution on cooperation, of course, much has changed and new, extremely useful forms of interaction have developed between the Academy of Sciences and scientific and technical societies.

A meeting in 1976 between A. P. Aleksandrov, academician and president of USSR Academy of Sciences, V. A. Kotel'nikov, academician and vice-president of USSR Academy of Sciences and managers of scientific and technical societies--members of the presidium of the All-Union Council--representatives of central boards, republican councils, problems committees of the All-Union Council was very important to the development of inter-relationships. While noting the need for further intensification of ties between USSR Academy of Sciences and scientific and technical societies, A. P. Aleksandrov especially emphasized the great role played by scientific and technical societies in strengthening ties of science and production in the conduct of extra-agency scientific and technical expertise and in the development of a comprehensive approach to the solution of problems of a scientific and technical nature.

Ties of scientific and technical societies with Academies of Sciences of the Ukraine, Belorussia, Latvia, Kirgiziya, Estonia and the Siberian Division of USSR Academy of Sciences have recently become much stronger.

Thus in 1977, on the initiative of the Novosibirsk obkom of CPSU, Siberian Division of USSR Academy of Sciences, All-Union Council of scientific and technical societies and the newspaper Trud, a seminar was held in Novosibirsk at which was discussed advanced experience of work on strengthening ties of science and production. Using many examples, seminar participants showed the effectiveness of friendship of science and production and the positive role of scientific and technical societies as unique coordinating councils in the strengthening of this union.

In April 1978, an out-of-town session of the presidium of the Kirgiz Academy of Sciences and the presidium of the republican council of scientific and technical societies was held in Frunze. The administration of scientific and technical societies of the machine construction industry of Kirgiziya presented for consideration a list of scientific and technical problems to determine the participation possibilities of the Kirgiz Academy of Sciences in their solution. As a result, institutes of the Kirgiz Academy of Sciences and Frunze Polytechnic Institute were given proposals to elaborate a unified comprehensive program of major problems of machine construction of the republic on the basis of this list. This work will be done by the efforts of existing scientific research laboratories at enterprises, as well as laboratories which will be set up, in coordinating their activities with academic and sectorial institutes on the basis of agreements on creative cooperation. Monitoring of the realization of the comprehensive program will be done by the primary organizations of scientific and technical societies of sector institutes and enterprises.

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Problems presented by modern life are closely interwoven with problems of the near and distant future. To view the past and provide access to future scientific quests is a major problem of scientific and technical societies. This is why it is very important to intensify the scientific side in activities of scientific and technical societies. This can be done most effectively only with the aid of USSR Academy of Sciences and academies of union republics, and above all, by direct attraction of scientists to the work of societies. Today organizations of scientific and technical societies have more than 500 active academicians and corresponding members of USSR Academy of Sciences and academies of sciences of union republics, over 26,000 doctors and candidates of sciences.

Many noted scientists have been elected as managers of scientific and technical societies organs. Academician S. I. Vol'fkovich heads the All-Union Chemical Society imeni D. I. Mendeleev; academician N. N. Isanin--the Society of Shipbuilding Industry imeni A. N. Krylov; V. I. Siforov, corresponding member of USSR Academy of Sciences --the Society of Radiotechnology, Electronics and Communications imeni A. S. Popova; N. N. Kovalev, corresponding member of USSR Academy of Sciences--the Society of Energy and Electrotechnical Industry. The vice-presidents of the academies of sciences of the republics, R. B. Baratov, O. O. Ovezgel'dyyev and O. D. Alimov have been elected as chairmen of republican councils of scientific and technical societies of Tadzhikistan, Turkmeniya and Kirgiziya, respectively.

Famous scientists head problems committees of the All-Union Council of scientific and technical societies. Academician B. N. Laskorin is chairman of the committee on problems of environmental protection. Work is done within this committee on the struggle with noise, atmospheric conservation, water and soil conservation, protection of agricultural crops, desalinization of salt water and purification of stagnant water, disposal of wastes of production in underground galleries; proposals are being elaborated on conservation and improvement of the environment; medical and biological aspects of environmental protection are being examined.

The committee on applied methods of mathematics and computer technology, headed by N. N. Moiseyev, corresponding member of USSR Academy of Sciences, is elaborating recommendations on vital problems of future development of automated control systems. G. S. Pospelov, corresponding member of USSR Academy of Sciences, heads up a committee on scientific and technical information.

Other problems committees of the All-Union Council of scientific and technical societies work in close contact with the Academy of Sciences and its science councils. Thus, the committee on automation and mechanization of industrial processes, which is headed by professor L. I. Volchkevich, takes an active part in the shaping of scientific foundations of automation and mechanization of production, including the creation of highly effective controlled technological processes.

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The committee on problems of wear resistance and friction headed by professor I. V. Kragel'skiy is occupied with problems of friction theory, prediction of useful life of machinery and equipment and ensuring the reliability of operation under extreme conditions. Much attention is given to the creation of standardized media and testing methods for friction and wear, and enhancement of qualifications of specialists in tribotechnics, lubrication technology and lubricants.

The enormous network of scientific and technical societies encompasses the entire territory of the Soviet Union. Having their own "divisions" at each enterprise and combining the most active scientists, specialists and innovators, the societies can successfully fulfill a coordinating role on questions of a scientific and technical nature. Scientific and technical societies should in fact become a national sector of science, a reference base of the Academy of Sciences and the USSR State Committee on Science and Technology.

Incorporation of achievements of science into practice should become the main aspect of cooperation of scientific and technical societies and USSR Academy of Sciences. For success of this matter, wider attraction of organizations of scientific and technical societies to participation in drawing up scientific research plans is necessary. This will permit research to be brought closer to practical needs, will make possible not only the outlining of spheres of utilization of scientific findings but, in some cases, the defining of specific production where the incorporation will be made. The earlier that industrialists recognize the essence of scientific developments, the more time they will have for technical and technological preparation and, what is just as important, for psychological adjustment. Scientific and technical societies have already proven more than once that they can handle this job--where they have appeared as initiators and executors of agreements on creative cooperation between scientific and manufacturing collectives.

Drawing up a joint plan of scientific sessions, conferences, meetings, symposia and seminars on questions of general interest is very useful. Reciprocal representation in managing organs of divisions of the Academy of Sciences and scientific and technical societies is also an important step towards establishing direct contacts between them. A yearly examination of the results of scientific research work and the results of their incorporation into production could be done at a joint session of the presidia of USSR Academy of Sciences and the All-Union Council of scientific and technical societies.

An important factor of cooperation can be the participation of members of scientific and technical societies in the discussion of materials of abstract journals, in shaping scientific publication plans and in lay editing.

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One aspect of joint work should be the wide propaganda of scientific achievements. This duty is bound by a resolution of CC CPSU "On the status and measures of improvement of lecture propaganda" in which it says that scientific and technical societies and USSR Academy of Sciences, All-Union Society Znaniye and All-Union Society of Inventors and Efficiency Experts are urged to take steps toward further development of natural science and scientific and technical propaganda, to intensify coordination of activities in the field. Scientists should speak before scientific and technical societies more frequently. Specialists will be better informed, will more clearly present strategic trends of scientific quest and will be able to convince his own creative activity and that of his team about it.

Cooperation of scientific and technical societies with USSR Academy of Sciences and academies of the republics and their close interaction will promote a rise in efficiency of scientific research and accelerated practical utilization of their results.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

NEW JOURNAL ON ACADEMY OF SCIENCE ORGANIZATIONAL AND PLANNING PROBLEMS

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 108-113

[Meeting of editors and active contributors of Vestnik Akademii nauk SSSR with representatives of scientific society]

[Text] At the end of last year, a meeting was held at the Moscow House of Scholars between editors and authors of Vestnik Akademii nauk SSSR and representatives of scientific society of the capital.

As he opened the evening, A. V. Nedospasov, deputy chief editor of the journal, recalled that among the hundreds of scientific periodicals appearing in our country, Vestnik holds a special place. When Vestnik was created, the status of a new academic journal, unusual at that time, was defined. In the first issue of January, 1931, the following communication to the readership was printed:

"Until now there has been no periodical of the Academy of Sciences dealing with scientific organizational and planning problems. This gap is easy to explain from a historical standpoint. The Academy did not give adequate berth to the most profitable structure of scientific research work and the corresponding structure of scientific institutions, nor to the plan of scientific work and its relationship to the needs of our construction. Vestnik, in turn, should be an organ which sheds light on the most interesting topics in the scientific activities of the Academy, explaining its work in organizing scientific labor.

"In beginning to publish a new journal, the Academy of Sciences is convinced that the scientific life of our country should be built on new, planned socialist foundations. The primary goal of Vestnik Akademii nauk SSSR is to promote the development of these foundations in science and thereby aid in the general matter of socialist construction".

Vestnik Akademii nauk SSR, as its founders intended, should also become an organ which sheds light on the most significant events in science and questions of organizing scientific labor. These vital problems are addressed by the articles of academicians V. P. Volgin, A. F. Ioffe and S. F. Ol'denburg in the first issue.

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As time has passed, Vestnik has departed somewhat from scientific organizational problems, giving more attention to specific scientific findings obtained by academy scientists. But in recent years new problems have appeared, especially the promotion of increased efficiency of scientific labor; this made the editorship change the direction of the journal some years ago.

A special section appeared in Vestnik dealing with organization and effectiveness of scientific research. Each year in this section are printed 10-20 articles. Readers have been very interested in articles published there by academicians S. T. Belyayev, V. A. Engel'gardt, A. I. Tselikov, A. L. Kursanov and other authors.

The journal publishes research abstracts on scientific organization, psychology of scientific creativity. Vestnik began to more widely represent sector and vuz science. The number of publications on the history of domestic science has recently undergone a considerable increase; more books of interest to the scientific worker have been reviewed.

The Presidium of USSR Academy of Sciences has a large scientific organizational job. The editors of Vestnik now give more material on scientific organizational decisions of the Presidium and its meetings than in prior years. Reports, scientific communications, Presidium resolutions and material of general collections of the academy are quite fully published in the journal.

At one session of the editorial board, academician P. L. Kapitsa thus formulated the principle of selection of material in Vestnik: print in particular only what can not be printed in other scientific journals. The editorial board and editorship try to follow this principle.

A. V. Nedospasov then presented data describing what portion of the journal would be occupied by the main headings of Vestnik and analyzed the authorial composition of the journal. He noted in particular that almost half the scientific reviews published by Vestnik were penned by some of the greatest Soviet scientists--academicians and corresponding members of USSR Academy of Sciences. (Scientific reviews generally make up an important part of the journal and do much to shape its appearance. Academician V. P. Glushko very aptly noted: eliminate reviews and you turn the journal into an organizational and administrative publication).

It may be claimed that all sections and divisions of the academy are well represented by their materials in the pages of the journal and have equal opportunities to appear in Vestnik. This also determines the breadth, if not the variety, of its topics. But variety seems to be inevitable in a journal like this.

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In general, however, the editor's office and editorial staff try to place materials which are interesting to a wide audience. This is very important for the scientific public of the country. We have over a million scientific workers, and a printed medium which would be addressed to them would have to discuss problems bothering them--there is none. Literaturnaya Gazeta regularly places materials associated with organization of scientific labor, seemingly only because our science does not have a sufficiently representative medium. Vestnik can probably not be this kind of scientific benchmark, but the editorial staff is trying to have the journal deal with issues of public concern.

A. V. Nedospasov noted that in its time, Vestnik had published responses of noted scientists to editorial questions. Statements of outstanding Soviet scientists were exceedingly interesting, sometimes truly remarkable; they certainly deserved the attention of a wide audience. That is the kind of audience which Vestnik Akademii nauk seeks.

Members of the academy should appear more frequently on the pages of their journal and raise the most acute issues facing scientists. These problems, problems which today disturb scientific circles, problems with which it would be interesting to appear in the pages of Vestnik--that is the topic of tonight's meeting of the editorial staff and the active authors of the journal.

S. P. Kapitsa spoke about science's place in modern society. This problem has two aspects: questions inwardly facing science which mainly disturb scientists themselves and questions having a more general scientific and social significance.

In Vestnik, said S. P. Kapitsa, the first circle of questions is much wider. It would be nice if the journal gave more attention to the influence of science on all aspects of modern life: culture, material production, education. Serious attention is merited, for example, by the linkage of science and higher education. We must assume that higher education belongs more than we customarily think to the body of science.

A very important question that goes beyond the framework of "shop" interests of science is the new style of work which consists in the appearance of scientific complexes and unique devices. How can they be utilized most efficiently in the interests of all of society?

In recent years, Vestnik has strongly changed its content. This reflects changes in modern science, scientific policy, and the appearance of complicated scientific and organizational problems of our time.

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In recent years scientific centers in the developing nations have been established which even 10-20 years ago had no such science at all. These countries need recommendations in scientific policy. In the opinion of S. M. Kapitsa, these recommendations can be given in publications of Vestnik. The journal can promote the development of value criteria of scientific activities.

The official medium of our academy is very capable of doing a great deal to popularize scientific knowledge and for propaganda of scientific goals and values. Questions of scientific ethics here, unfortunately, are rarely discussed. They must be resolved and raised on the pages of the journal, digging out the value of past experience, from biographies of our remarkable scientists.

Academician N. M. Emanuel' noted that Vestnik Akademii nauk SSSR is becoming more interesting.

If you look through sets of the journal for all its years of publication, you see the great and remarkable path traveled by our academy, our science. Vestnik is its chronicle, its history.

How the Academy of Sciences lived and lives, on what problems it worked and now works, how it decides as an organization, the names of the people who shape it--this all, unfortunately, is forgotten very quickly. But the Vestnik Akademii nauk lets us keep priceless information.

The value of Vestnik lies far beyond the historical and archival framework and this must be considered by the editorial staff. The journal should and can show the role of the academy, of all of Soviet science in resolving world-wide problems which are now facing mankind. These are problems of the environment, food, raw materials, energy and finally, problems of population and health.

Advanced scientific and technical ideas and important applied results often remain unknown due to bureaucratic constraints, due to the provincial approach of managers of some institutions of science. The journal of the Academy of Sciences can control this evil and speak decisively against bureaucracy.

N. M. Emanuel' then touched on the role of the journal in revealing bright new ideas and proposals which can speed up scientific and technical progress. These ideas must be propagandized and, if need be, protected. They must be boldly discussed in the journal.

USSR Academy of Sciences is a widely recognized domestic and world center of scientific thought. Everything new that is born in this science center should be raised by the journal, propagandized and made a property of our society.

Academician M. S. Gilyarov. Vestnik is mainly a semiofficial publication, a medium of the Presidium of USSR Academy of Sciences. That is why it

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informs readers on what the academy scholars are working at a given time. When the Vestnik places information on Presidium meetings, on general sessions of the academy, the reader can imagine the range of questions on which the attention of scientists is focused. This is very important: to inform the scientific public about the main planned work.

But true scientific discoveries are not always in the plans. There was probably no way to plan the discovery, for example, of the law of conservation of energy. If, let us say, in the 18th century they had planned scientific research, it would have been strange and untimely to study the repulsion of elder globules charged with electricity. Everyone would have said it was much more important to study the design of carriages....

For any unplanned creativity, including scientific, leisure time is very important. We pay almost no attention to this issue. Vestnik, meanwhile, can and should bring up questions tied with leisure time of scholars, their casual associations and their unplanned creativity.

M. S. Gilyarov supported the editorial staff's desire to publish scientific art works such as the books of A. Morua, recollections of scientists such as the book of I. Yu. Krachkovskiy--such materials help shape scientific Weltanschauung. In conclusion he noted the problem of complex research. The pages of Vestnik should illuminate those new trends arising at the boundary of science as a result of creative cooperation of scientists of various specializations.

Academician A. L. Kursanov. Vestnik Akademii nauk SSSR was thought up as a bureaucratic journal. But time is marching forward. Now it should devote a significant portion of its volume to broader topics. One of them is the issue of scientific personnel and their training, especially the problem of post-graduate work.

The institute of post-graduate work in our country has played a large role. But, as A. L. Kursanov feels, it is no longer the best method of educating scientists. New forms of personnel training of high qualification--on-the-job training, dissertation defense during planned work--are highly recommended. This topic is important in the journal for our science because questions of age, selection of personnel, requirements--are principle issues.

A. L. Kursanov noted the variety of materials of Vestnik. The journal is read with interest. In any issue, every reader will find at least one or two articles which kindle his interest.

A good journal should have its own appearance--print what others do not publish. Vestnik can still go beyond its strict academic guidelines to widely and thoroughly reflect the life of all science, not only its academic staff. It suffices to mention the questions of scientific ethics. That is our daily routine, it creates the atmosphere of a scientific institutions regardless of its bureaucratic affiliation.

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Academician A. A. Krasnovskiy. The informational value of Vestnik, which informs about academy life, is beyond a doubt. But it is much more important for the journal to become a natural forum for the discussion of vital issues of labor organization of scientists, laboratories and institutes. In the final analysis, our most acute question is that of efficiency of scientific work, that is, organization of science.

You can list many very acute problems that should be discussed. For example, the problem of interrelationships of academy and universities and vuzes is very important. Since he was laboratory chief in an academic institute and professor of Moscow University for many years, A. A. Krasnovskiy continued, "I know about the existence of bureaucratic friction that hinders efficient interaction of academic and vuz science. It would be good to discuss this issue in the pages of a journal".

The problem of "aging" of our scientific institutions is closely linked with the previous question. We all get older each year and the average age of institute scientists rises. This is a regular phenomenon. Thus closer contacts between the Academy of Sciences and the "providers of scientific youth" are necessary--Moscow University and other vuzes. It is important not only to draw talented graduates into academic institutes, but also to look for new forms of interaction of academic institutes with vuz departments. It would be very interesting to examine this organizational problem in the pages of the journal.

Vestnik is a journal with a distribution of 50,000 copies; it probably can not appeal to a very wide readership--it should reflect the essential problems of development of USSR Academy of Sciences. Do we have to prove within the academy that science is a useful thing necessary to the national economy? No, and that is obvious. Questions should be resolved: how can certain means which our state gives the academy for the development of fundamental research be used more efficiently?

Writer B. G. Volodin feels that there are no especially specific materials at all which can be printed in a single edition alone. Any journal must try to take the most interesting things and beat its competition. The journal must be, in this sense, risky and combative and, if one can say this about journal, it should "elbow its way". Thus even for an official medium like Vestnik Akademii nauk SSSR, there can be no serious thematic constraints: all of scientific life and people are its domain.

Naturally in any theme or material, the journal can and must preserve its specific nature. But certain general scientific problems can also be viewed in the massive Literaturnaya Gazeta as well as in Vestnik, which deals with the academic audience at another level--by using complex scientific terminology, scientific fundamentality of presentation. For the scientific reader this has an advantage: Vestnik can do things that a newspaper can not.

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B. G. Volodin then paused on the content of the literary pages of Vestnik and highly evaluated the recollections of academician I. M. Frank about Igor' Yevgen'yevich Tamm printed in the journal. In B. G. Volodin's opinion, the recollections of scientists are very necessary in the pages of an academic journal, because every issue of the journal is an integral work. In any literary work, some part of the journal devoted to general interest should give the reader an emotional discharge. Editorial staff workers who, with the authors, prepare recollections for print, can aid scientists in retelling in simple and comprehensible language about their work and themselves, in order to overcome constraint of presentation.

In conclusion, B. G. Volodin recommended the expansion of the range of questions discussed in the journal while retaining Vestnik's intrinsic level of materials. This will permit an increase in the journal's scientific audience, and may even win over non-scientists. There would be nothing wrong if men of letters wish to read Vestnik Akademii nauk.

N. N. Moiseyev, corresponding member of the USSR Academy of Sciences. Not long ago Vestnik published an article by S. V. Meyen, B. S. Sokolov and Yu. A. Shreyder on non-traditional biology, a very controversial article. It evoked, does evoke and will evoke discussions. But the editorial staff was right in printing this article. Obviously they should not stop here. It would be extremely interesting to give space to representatives of classical biology who would probably not agree with many assumptions made in the article. Such publications can enlarge the readership and elevate the journal's authority.

All questions of ecology are now receiving a lot of discussion; there are many different trends, tendencies and viewpoints. But we have not discussed these questions very much. It is useful to raise them in Vestnik--the journal is not a narrow professional one, but it is still not designed for a wide audience.

A. A. Krasnovskiy interjected that this was not the task of biological journals.

N. N. Moiseyev. Special biological journals do not engage in ecology, but we are talking about the complex set of social and biological problems. It is an interdisciplinary question, a question for Vestnik.

It would be interesting to imagine a discussion on the approach to problems of climatology. Today all climatologists can be divided into two groups: some feel that a warm-up is coming, while others cite arguments in favor of a cool-down. Specialists write equations and discuss individual formulas, arguing about the nature of specific effects, but on the whole the problem is almost not discussed. It does, however, lie beyond the limits of a narrow professional guideline.

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In conclusion, N. N. Moiseyev paused on the approach to modern ecological problems from the standpoint of general human culture. Apparently, he said, other than Vestnik the academy has not printed publication which could raise this important and complex issue.

A. N. Luk. Half a century ago, the 20 year old Evariste Galois was killed in a duel. On the night before the duel he wrote a letter in which he set forth one of the most important divisions of mathematics. The tragic death of Galois deprived science of future discoveries which he might have made. But in fact science was not deprived of them since these discoveries were later made by other scientists. Scientists are expendable--this point of view does exist.

After the death of another genius, Galois' contemporary Franz Schubert, the "Unfinished Symphony" remained. If the composer actually was unable to complete it (thought some experts feel it is a fully finished work), it is destined to remain unfinished forever.

Many seem to view the basic distinction between scientific creativity and artistic creativity as follows: artistic works are unique. If Pushkin had not conceded the subject of "Dead Souls" to Gogol, a completely different work would have arisen. If Mendeleev had not discovered the periodic system, someone else would have....

Nonetheless, in science the paths and fates of discoveries are unique; scientific creativity is unique. The path chosen by the scientist to get to a discovery determines the evaluation of the role and scope of what is done, as well as a representation of future applications of new ideas.

Without Pavlov, for example, the study of higher nervous activity would also reflect objective reality, but in other terms and using other devices. Physiology of higher nervous activity would be somewhat different.

It is certain that the personality of the scientist is reflected in the results of his labor. The story about this, the attempt to resolve a serious psychological problem of creativity, seems to be much more interesting than ordinary scientific memoirs.

Yu. A. Shreyder. One of the important functions of a journal is that it shapes the modern scientific paradigm. An official medium of the USSR Academy of Sciences not only prints protocols of meetings but essentially expresses the collegiate opinion of domestic science.

About 15 years ago, for example, questions of ecology were not considered particularly important, while today they have stepped into the foreground. When Vestnik Akademii nauk places them before the scientific public, this creates a notion about the day's scientific paradigm.

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In closing the session, A. V. Nedospasov thanked the speakers and attendees, on behalf of the editorial staff and editorship, for their interest and attention to the journal. Many important questions raised in the speeches of today's participants, he said, will be reflected in the pages of Vestnik Akademii nauk SSSR.

Dear readers, the editorial staff and editorship of Vestnik are extremely interested in your evaluation of material printed in the journal, proposals aimed at expanding its thematics. We will be grateful for discussion topics suggested, for articles and other materials and new journal headings.

We invite you to continue discussion of today's Vestnik and new trends of our journal begun at the evening spent at the Moscow House of Scientists.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

A. P. ALEKSANDROV

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 p 118

[Article commemorating A. P. Aleksandrov's receipt of the Vavilov Medal]

[Text] At a session of the Presidium of the USSR Academy of Sciences, academician A. P. Aleksandrov, president of the USSR Academy of Sciences was presented the All-Union Society Znaniye's medal imeni S. I. Vavilov which was awarded to him.

The Vavilov Medal--the leading award for services in propaganda of political and scientific knowledge--was instituted in 1969. By now more than 200 outstanding scientists in our country and in other socialist countries actively engaged in propaganda of science have received it.



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Some scientists of capitalist countries have also been recipients of this medal.

Presentation of the Vavilov Medal to academician A. P. Aleksandrov, president of the USSR Academy of Sciences, is recognition of its active line in propaganda of modern scientific knowledge, an important thing for the growth of culture of the population of our country.

The brilliant speeches of A. P. Aleksandrov before the most diversified audience, profoundly illuminating issues of scientific evolution and scientific and technical progress, have always elicited tremendous interest of listeners, stated academician N. G. Basov, chairman of the board of the Znaniye society while presenting the award.

N. G. Basov wished A. P. Aleksandrov health, successes in work and further participation in the activities of the Znaniye Society.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

FEDOR VASIL'YEVICH BUNKIN

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 117-118

[Article commemorating F. V. Bunkin's 50th birthday]

[Text] By ukase of the Presidium of the USSR Supreme Soviet dated 22 Jan 79, Fedor Vasil'yevich Bunkin, corresponding member of USSR Academy of Sciences, was awarded the Order of the Labor Red Banner for services in development of radiophysics and electronics, training of scientific personnel and in connection with his 50th birthday.

The name of F. B. Bunkin, it says in the greetings of the Presidium of USSR Academy of Sciences sent to the celebrant, is closely linked with the development and successes of radiophysics in our country. His work in classical electrodynamics, statistical radiophysics and quantum electronics is a great contribution to theoretical radiophysics and the solution of many practical problems.

F. B. Bunkin formulated and solved the problem of delayed emission of electrons in an intense electromagnetic field; he developed a method of solving problems of emission in anisotropic media. There is important theoretical and practical value in research done under his supervision on interaction of powerful electromagnetic emission with a substance as a result of which new physical effects were discovered: propagation of optical discharges in gaseous media under conditions of "slow combustion", low-threshold breakthrough of gas by emission of IR range near solid targets, etc.



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The scientific activities of F. B. Bunkin have been combined with scientific organizational work in the post of chairman of the USSR Academy of Sciences Science Council on "Coherent and nonlinear optics". He has given much attention to training of scientific personnel at Moscow Physico-technical Institute.

The Presidium of USSR Academy of Sciences wished F. B. Bunkin good health and new creative successes.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

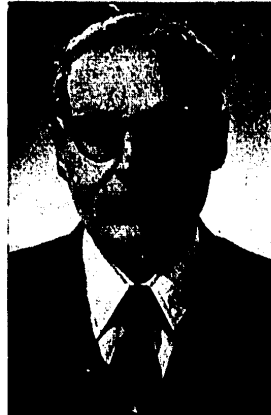
GRIGORIY GRIGOR'YEVICH DEVYATYKH

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 115

[Article commemorating G. G. Devyatykh's 60th birthday]

[Text] For great service in development of chemical science, training of scientific personnel and in connection with his 60th birthday, Grigoriy Grigor'yevich Devyatykh is awarded the Order of the October Revolution, by ukase of the Presidium of the USSR Supreme Soviet dated 1 Dec 78.

A noted Soviet scientist in inorganic chemistry, chemistry and technology of highly pure substances, academician G. G. Devyatykh made an enormous contribution to the solution of the problem of fission of stable isotopes of the light elements. He organized a wide front of fundamental and applied research to create methods of obtaining particularly pure substances, making possible the adjustment of production of several major materials for new techniques. Particularly well known are the studies of G. G. Devyatykh in the field of deep purification of substances by the method of counterflow crystallization from a melt. His fundamental research of means of producing especially pure highly volatile inorganic compounds--hydrides and halogenides of various elements and organic metal compounds--helped create the technology of semiconductor epitaxial layers. Under his supervision and with his direct participation were obtained the first domestic lightguides having small optical losses.



In collaboration with academician G. A. Razuvayev, G. G. Devyatykh was an organizer of Gor'kiy's Institute of Chemistry and has worked for many years as a deputy director. He is chairman of the USSR Academy of Sciences Science Council on Physical Chemistry and Technology of High Purity Substances; he initiated the creation of the permanent All-Union Exhibit and Collection of High Purity Substances.

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Great scientific, industrial and active scientific organizational work is successfully combined by G. G. Devyatykh with pedagogic activity: he heads the Department of Inorganic Chemistry at Gor'kiy State University imeni Lobachevskiy.

The USSR Academy of Sciences Presidium cordially wished the celebrant a happy 60th birthday and 35th year of scientific, pedagogic and civic activity, wishing him good health, inexhaustable energy and future creative success to the benefit of our great Motherland.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

NIKOLAY PROKOF'YEVICH FEDORENKO

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 p 122

[Article commemorating Fedorenko's receipt of Krzhizhanovskiy Prize]

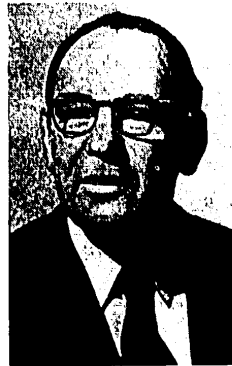
[Text] The Presidium of the USSR Academy of Sciences awarded the Prize imeni G. M. Krzhizhanovskiy for 1978, amounting to 2000 rubles, to academician Nikolay Prokof'yevich Fedorenko for his monograph "Optimization of Economics".

The monograph is a deep scientific study of the most urgent problems of modern Soviet economic science. For the first time in a single place, using unified methods, are examined problems of controlling the economy in the chain formed by enterprise--association--sector---national economy. The author studied in detail questions of organization of automated control systems for production at the level of enterprises and associations and means of improving these systems. Especial attention was given to analysis of problems of optimization of planning of control at the sector level.

The author studied trends of comprehensive improvement of a system of control of a socialist national economy on the basis of utilization of the latest economic and mathematical methods and models and electronic computer technology.

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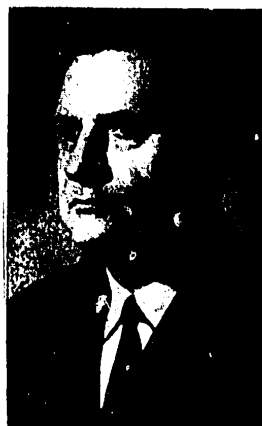
VASILIIY VLADIMIROVICH KORSHAK

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 116-117

[Article commemorating V. V. Korshak's 70th birthday]

[Text] For great service in the development of chemical science, training of scientific personnel and in connection with his 70th birthday, academician Vasiliiy Vladimirovich Korshak was awarded the Order of Lenin by ukase of the Presidium of the USSR Supreme Soviet.

V. V. Korshak is one of the founders of chemistry of high molecular compounds and the greatest expert in this field of science. The scientist and his school in some of these polymers have studied in detail thermostable high molecular compounds containing aromatic carbo- and heterocycles in the primary macromolecular chains, as well as elemental organic fragments. In a systematic study of the relationship of the thermal characteristics of these polymers as a function of their structure, V. V. Korshak based his theory of thermal stability of polymers, as well as the concept of chain distinction of high molecular compounds, which has tremendous meaning for the understanding of the specifics of its structure. The results of research represent a substantive contribution to the development of the field of synthetic, polyamide and polyester fibers. New thermally stable polymers have been sent to industry.



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Under the supervision of V. V. Korshak, the first USSR production of thermally stable antifriction self-lubricating plastics--ASP plastics--was set up and successfully developed. Their application in various sectors of industry yields a tremendous national economic and economic effect. Developments aimed at creating polymers for medicine led to the production of "Cyacrin" glue, thrombus resistant materials based on karbin and membranes used in blood oxygenators.

V. V. Korshak has given much effort and attention to scientific organizational activities as chairman of the USSR Academy of Sciences Science Council on High Molecular Compounds, chief editor of the journal Vysokomolekulyarnnye Soyedineniya, and chairman of the Expert Council of VAK for Organic Chemistry.

The Presidium of the USSR Academy of Sciences, in its greetings, wished the celebrant good health, happiness and further creative successes to the benefit of our Motherland.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

LEV ALEKSANDROVICH MELENT'YEV

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 115-116

[Article commemorating L. A. Melent'yev's 70th birthday]

[Text] For great service in the development of power engineering and in connection with his 70th birthday, academician Lev Aleksandrovich Melent'yev was awarded the Order of Lenin by ukase of the USSR Supreme Soviet Presidium dated 8 Dec 78.

The fundamental research of L. A. Melent'yev, hero of socialist labor, in district heating, fuel-energy balance theory, systems analysis and mathematical simulation in power engineering, it states in the greetings of the USSR Academy of Sciences Presidium sent to the celebrant, are widely known here and abroad.

One of the disciples of G. M. Krzhizhanovskiy, L. A. Melent'yev set the foundation for a great trend in energy science --a complex approach to the study, planning and prediction of development of power engineering. His name is linked with the latest achievements of Soviet science in this trend. He trained many scientists and created a school of systems research in power engineering.



L. A. Melent'yev devotes a great deal of effort and energy to scientific organization work. He was an organizer of the Siberian Engineering Institute of the USSR Academy of Sciences Siberian Division which, under his supervision, shortly became one of the leading scientific research institutions in the land. At the same time, while serving as chairman of the Presidium of the Eastern Siberian branch of USSR Academy of Sciences Siberian Division, L. A. Melent'yev did a great deal to establish other

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academic institutes in Irkutsk. As chairman of the USSR Academy of Sciences Science Council on Complex Problems of Power Engineering and deputy academic secretary of the Division of Physico-technical Problems of Engineering of USSR Academy of Sciences, he has guided and coordinated fundamental research on complex problems of energy, theory and methods of control of large energy systems.

L. A. Melent'yev made a great contribution to the solution of practical problems of development of the fuel-energy complex of the country.

The Presidium of the USSR Academy of Sciences wished the celebrant good health, happiness and new creative successes.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

MIKHAIL YAKOVLEVICH MIKHEL'SON (1912-1978)

Leningrad JURNAL EVOLYUTSIONNOY BIOKHIMII I FIZIOLOGII in Russian No 3, 1979  
pp 315-317

[Obituary]

[Text] Prof Mikhail Yakovlevich Mikhel'son, head of the laboratory of pharmacology at the Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR AS [Academy of Sciences], chairman of the pharmacology section of the Scientific Council of the USSR AS for complex problems of human and animal physiology, doctor of medical sciences and member of the CPSU since 1941, passed away on 16 August 1978.

In spite of many years of serious illness, M. Ya. Mikhel'son pursued active scientific and scientific public work to the last day of his life. Articles prepared with his participation are still being published. The ideas of M. Ya. Mikhel'son continue to guide the work of the laboratory he organized.

M. Ya. Mikhel'son was born in Petersburg on 7 April 1912 to the family of a physician. He started his scientific work while still a student at the State Institute of Medical Sciences (presently the Leningrad Sanitation and Hygiene Medical Institute) under the guidance of Prof Yu. M. Uflyand. In 1932, he published his first scientific work. After graduating from that institute, M. Ya. Mikhel'son worked for about 2 years in the physiology laboratory of K. M. Bykov at the Leningrad Institute of Experimental Biology and Medicine. He began to work with pharmacology in 1935, after becoming an assistant on the chair of pharmacology at Gor'kiy Medical Institute, which was headed by N. P. Nekhoroshev, and then on the chair of pharmacology at the Leningrad Pediatric Medical Institute headed by V. M. Karasik. In 1937, M. Ya. Mikhel'son defended his candidatorial dissertation entitled "Correlation Between Nueral and Humoral Stimuli of Canine Salivary Glands."

M. Ya. Mikhel'son was a docent on the chair of pharmacology of the Naval Medical Academy, headed by Prof N. V. Lazarev, honored scientist of the RSFSR, starting in 1941 and from 1945 on he was second professor on that chair. His work in the laboratory of N. V. Lazarev played a large role in shaping M. Ya. Mikhel'son as a scientist. The personality of N. V. Lazarev also played a role, for he was a man of rare mind and talent, with broad scientific

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interests, and so did the entire atmosphere of vital scientific creativity, mutual goodwill and warm friendship that prevailed in that department. When M. Ya. Mikhel'son became the head of the laboratory, he was also able to generate the same atmosphere there.

During the years of the Great Patriotic War, Maj Med Serv M. Ya. Mikhel'son fulfilled important tasks referable to increasing the combat fitness of the personnel of the Northern Fleet. He was awarded the Order of the Red Star and many medals, including the medal For Defense of the Soviet Polar Region.

After the war, in 1946, M. Ya. Mikhel'son defended his doctoral dissertation entitled "Effects of Narcotics on Cholinesterase," the contents of which were published in the form of a monograph in 1948. This work was the start of his in-depth and systematic study of cholinergic mechanisms of transmission of neural excitation. When M. Ya. Mikhel'son began to teach toxicology in 1950 at the First Leningrad Medical Institute, his enthusiasm and personal charm enabled him to assemble a large team of coworkers. The outcome of this stage of his work was the book "Physiological Role of Acetylcholine and the Search for New Drugs" (Leningrad, 1957). This book demonstrated the important role of cholinergic systems in higher nervous activity; it dealt comprehensively with the significance of change in a molecule of substance to its effect on cholinoreceptors in the central nervous system and on the periphery. In a joint project with synthetic chemists, he succeeded in developing and handing over to clinical practice several new drugs (gangleron, mesphenal, arpenal, subecholine, merpanite and others), on the basis of investigation of the link between chemical structure of agents and their pharmacological action.

In 1957, Academician L. A. Orbeli invited M. Ya. Mikhel'son to the newly founded Institute of Evolutionary Physiology imeni I. M. Sechenov, USSR AS. There he organized a laboratory of pharmacology of biologically active substances, which he headed for 20 years. He began intensive work in the field of comparative and evolutionary pharmacology of cholinergic systems. M. Ya. Mikhel'son considered it the task of evolutionary pharmacology to establish the laws of development of chemical sensitivity of organs and tissues in the course of evolution of the animal kingdom. He believed that evolutionary pharmacology should use the same methodological procedures that L. A. Orbeli had named for evolutionary physiology: comparative, ontogenetic and "pathological." M. Ya. Mikhel'son undertook a systematic study of cholinoreceptive properties of muscles of representatives of vertebrates and invertebrates on different steps of evolutionary development, as well as the study of changes in cholinoreception of muscles after denervation, inspired by the basically important works of A. G. Ginetsinskiy, who discovered a change in sensitivity of skeletal muscles to acetylcholine in the course of development and after denervation. Mikhel'son made broad use in his research of the study of correlation between structure, electron structure and physicochemical properties of physiologically active substances, on the one hand, and nature and force of their effects on biological structures and functions, on the other. His joint work with chemists inspired him to delve into all of the fine aspects of modern conceptions of organic chemistry on

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the electron structure of substances. In the course of these investigations, the hypothesis was expounded that there is gradual grouping of different cholinoreceptors in oligomeric structures--dimers at the earlier stages of evolutionary development--and tetrameric structures at the later stages. The conception of tetrameric structure of cholinoreceptors of skeletal muscles of vertebrates, expounded by M. Ya. Mikhel'son and N. V. Khromov-Borisov in 1966, gained direct experimental confirmation in foreign studies of biochemical isolation of cholinoreceptors (Change et al., 1971; Miledy and Potter, 1971, and others).

The research conducted during this period was reflected in the book of M. Ya. Mikhel'son, authored in collaboration with E. V. Zeymal', entitled "Acetylcholine. Molecular Mechanism of Its Action" (Leningrad, Nauka, 1970), an enlarged edition of which was published in English (1973).

In the last few years, along with research on cholinoreceptors, there was deployment of investigation of reception of other mediators in the laboratory of M. Ya. Mikhel'son. Intensive investigation of central regulation of respiration and vascular tonus demonstrated the role of cholinergic, as well as catecholaminergic, structures of the brain stem. Comparative pharmacological studies revealed the consistent changes in their role in the course of vertebrate evolution. M. Ya. Mikhel'son was very interested in the study of various receptors of the same mediator on the membrane of mollusk neurons and muscle cells of echinoderms, as well as the stereoselectivity of cholinoreceptors and change therein in the course of evolution.

M. Ya. Mikhel'son can justifiably be considered the founder of evolutionary pharmacology. He was the editor of a two-volume work entitled "Comparative Pharmacology," which was published by Pergamon Press in 1973. M. Ya. Mikhel'son, who was a first rate organizer, conducted several international symposiums on comparative pharmacology (Basel, 1963; Leningrad, 1975, and others).

M. Ya. Mikhel'son authored about 200 works. He was an excellent lecturer. He tried to discuss complex matters simply and vividly, and he succeeded in this.

M. Ya. Mikhel'son had the capacity to attract people, to infect them with his fervent interest in science. Many young people always worked for him.

Mikhail Yakovlevich continued to work to the very last day, overcoming his increasing physical ailment with his will power. Illness could not change his passionate interest in science. He never lost the capacity to be thrilled with a clever experiment or a new interesting finding. Until the very end, science was the main thing in his life.

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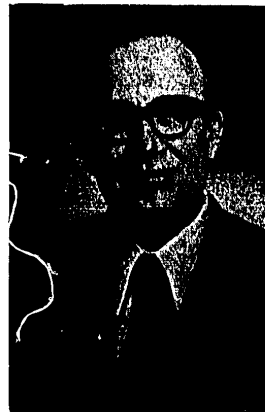
SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

ALEKSANDR ANDREYEVICH SAMARSKIY

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 p 114

[Article commemorating A. A. Samarskiy's 60th birthday]

[Text] By ukase of the Presidium of the USSR Supreme Soviet dated 19 Feb 79, for great services in the development of mathematical physics and computer mathematics, training of scientific personnel and in connection with his 60th birthday, Aleksandr Andreyevich Samarskiy was awarded the title of Hero of Socialist Labor with presentation to him of the Order of Lenin and the gold "Hammer and Sickle" medal.



A. A. Samarskiy is a noted Soviet scientist, a great mathematician whose work is widely known here and abroad. He made a fundamental contribution to mathematical physics; he is one of the founders of modern computer mathematics. Modern methods of mathematical simulation on computer of physical phenomena, processes and structures developed under his leadership have found wide application in nuclear physics, in solving problems of controlled thermonuclear synthesis, in the study of plasma physics, problems of MHD conversion of energy and other problems having important national economic value.

A. A. Samarskiy is the organizer of a great scientific school in computer mathematics. Much of his effort and energy he devotes to training scientific personnel at MGU and at Moscow Physico-technical Institute.

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A. A. Samarskiy's organizational activities are widely known: for many years he has headed a section at the Institute of Applied Mathematics imeni M. V. Keldysh, USSR Academy of Sciences; he chairs a section called "Computer physics" of the Science Council on the Complex Problem 'Plasma Physics'" of the USSR Academy of Sciences; he is a member of the scientific methods Council on Mathematics at the USSR Ministry of Higher and Middle Special Education and is an organizer of all-union and international schools in computer mathematics.

A. A. Samarskiy belongs to the generation of Soviet scientists who protected our Motherland with weapon in hand during WWII.

In a greeting sent to the celebrant, the USSR Academy of Sciences Presidium wished Aleksandr Andreyevich Samarskiy good health, fortune and new creative successes to the benefit of Soviet science.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

NIKOLAY NIKOLAYEVICH TSVELEV

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 p 120

[Article commemorating Tsvelev's receipt of Komarov Prize]

[Text] By decision of the Presidium of the USSR Academy of Sciences, the 1978 Prize imeni V. L. Komarov, of 2000 rubles, was awarded to Nikolay Nikolayevich Tsvelev, doctor of biological sciences (Botanical Institute imeni V. L. Komarov, USSR Academy of Sciences) for his monograph "Cereals of the USSR".



The prize-winning monograph is a fundamental labor at systematizing cereals, one of the largest families and most important to man among the higher vegetables. In the monograph is given a description of the features of vegetative and generative structure of cereals and existing views on their nature. This work is an enormous contribution to the theory of evolution of Angiospermae, especially monocotyledons. By using the entire wealth of available data on cereals, including anatomical, cytological, biochemical; and by tracing the evolution of living forms of these plants, the author has built an original theory of their origin and evolution; he shows the independence of cereal families, the mosaic nature of evolution of this taxon, and the value and role of polyploidy and hybridogenesis in their evolution.

The monograph contains information on systematization, ecology and geography of 1407 cereal species growing in the USSR; the modern taxonomy of all cereal crops cultivated in our country is illuminated: this makes this work a valuable handbook for geneticists in choosing selection material.

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SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

ISAAK MIKHAYLOVICH TSIDIL'KOVSKIY

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 p 119

[Article commemorating I. M. Tsidil'kovskiy's receipt of Ioffe Prize]

[Text] The Presidium of the USSR Academy of Sciences awarded the Prize imeni A. F. Ioffe for 1978 in the amount of 2,000 rubles to Isaak Mikhaylovich Tsidil'kovskiy, doctor of physico-mathematical sciences (USSR Academy of Sciences' Institute of Metal Physics/Ukrainian Science Center) for his monograph "Electrons and holes in semiconductors".



I. M. Tsidil'kovskiy's monograph "Electrons and holes in semiconductors" deals with the presentation of methods and results of theoretical calculations of the zonal structure of semiconductors, analysis of charge-carrier dynamics in semiconductors, as well as experimental methods of investigation of the basic parameters of zonal theory and dynamic characteristics of electrons and holes. The encyclopedic scope of the monograph is combined with the mathematical rigidity of presentation.

The monograph received wide recognition from Soviet and foreign physicists. In 1976 it was published in Poland and Pergamon Press is preparing its translation into English.

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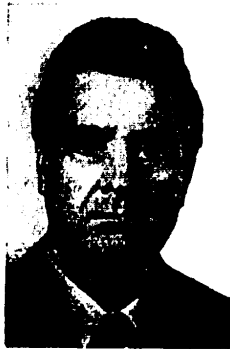
SCIENTISTS AND SCIENTIFIC ORGANIZATIONS

ALEKSEY MITROFANOVICH KUTEPOV, LEV SAMOYLOVICH STERMAN AND NIKOLAY GAVRILOVICH STYUSHIN

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 119-120

[Article commemorating their receipt of the Polzunov Prize]

[Text] The Presidium of the USSR Academy of Sciences awarded the Prize imeni I. I. Polzunov for 1978, amounting to 2000 rubles, to Aleksey Mitrofanovich Kutepov, doctor of technical sciences (Ministry of Higher and Middle Special Education, RSFSR), Lev Samoylovich Sterman, doctor of technical sciences (Moscow Energy Institute) and Nikolay Gavrilovich Styushin, candidate of technical sciences (Moscow Institute of Chemical Machine Construction) for their monograph "Hydrodynamics and heat exchange in steam formation".



A. M. Kutepov



L. S. Sterman



N. G. Styushin

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The monograph contains a great deal of factual material on questions of hydrodynamics and heat exchange in two-phase media. It makes wide use of the results of many years of research by the authors. Their theoretical work has substantively evolved the general theory of hydrodynamic and heat-exchange processes in two-phase media, and it has been successfully used in theory and has been employed in several textbooks.

Relationships and theoretical methods proposed at one time by the authors of the book made it possible to greatly reduce metal consumption and improve technical and economic indicators of evaporators, steam formers and steam generators of thermoelectric power plants and chemical technological equipment. The book is useful to power engineers, specialists in chemical technology, petroleum, food and several other sectors of industry, as well as a textbook for students majoring in thermotechnical, thermophysical and chemical sciences in institutions of higher learning.

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NIKOLAY SERGEYVICH ZAYTSEV, SVETLANA PAVLOVNA GAVRILOVA and RAISA MIKHAYLOVNA YASHINA

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 p 121

[Article commemorating their receipt of Obruchev Prize]

[Text] The Presidium of the USSR Academy of Sciences awarded the Prize imeni V. A. Obruchev for 1978, amounting to 1000 rubles, to Nikolay Sergeevich Zaytsev, candidate of geological and mineralogical sciences (USSR Academy of Sciences' Geological Institute), Svetlana Pavlovna Gavrilova, candidate of geological and mineralogical sciences (Institute of Mineralogy, Geochemistry and Crystallochemistry of Rare Elements) and Raisa Mikhaylovna Yashina, candidate of geological and mineralogical sciences (USSR Academy of Sciences' Institute of Geology of Ore Deposits, Petrography, Mineralogy and Geochemistry) for a series of studies dealing with issues of regional and general geology, tectonics, magmatism and minerals of Siberia and Mongolia.

The prize-winning studies have made a large contribution to the elaboration of a general theory of development and structural formation of the earth's crust.



N. S. Zaytsev



S. P. Gavrilova



R. M. Yashina

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In a joint monograph "Granitoid and alkaline formations in structures of Western and Northern Mongolia", a wide range of questions is examined pertaining to geology, petrology, geochemistry and some metallogeny of Paleozoic intrusive rock and their structural arrangement. Based on original material, specific magmatic formations, their composition, structure, tectonic position, petrochemical and metallogenic features are described; this is important since certain minerals are associated with these rocks.

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AWARD OF USSR ACADEMY OF SCIENCES MEDALS AND PRIZES TO YOUNG SCIENTISTS AND STUDENTS OF INSTITUTIONS OF HIGHER LEARNING

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 123-124

[Article on 1978 academy awards]

[Text] The Presidium of the USSR Academy of Sciences awarded in 1978 USSR Academy of Sciences medals and 200 ruble prizes to young scientists.

N. G. Taganov (USSR Academy of Sciences' Institute of Chemical Physics) in the section "Chemico-technological and biological sciences" for the study "Molecular-mass distribution of polymers as a device to study the mechanics of ion polymerization".

In this study, for the first time the method of molecular-mass distribution (MMR) is used for quantitative study of various reactions simultaneously occurring in the complicated polymerization process. A comparison of experimental data with the findings of theoretical analysis of the system in question permitted the author to determine the constants of reaction velocity such as chain growth, deactivation of active polymerization centers and chain transfer to polymer with discontinuity. The study opens new prospects for the use of the MMR method for more detailed study of the mechanics of polymerization.

G. P. Kudryavtseva (Moscow University) in the section "Earth science" for a series of studies on "Elaboration of methods for studying the composition, structure and properties of natural ferrites and oxides and their incorporation into use".

G. P. Kudryavtseva elaborated, improved and detailed methods of studying natural ferrite-oxides, investigated and analyzed compositions, structure and properties of these mineral compounds. The resulting data have a practical value for geophysical research, for proper interpretation of negative anomalies over geological bodies, for the technology of iron ore concentration, for paleomagnetic research, the study of semiconductor compounds, for production of special composite materials, etc.

S. I. Vasil'tsov (USSR Academy of Sciences' Institute of International Worker Movement) for his monograph "Working parties and elections in Italy, 1953-1976".

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In the monograph the crisis of the social system in post-war Italy is shown from Marxist and Leninist positions; socio-political processes and displacements in Italian society are investigated. Based on analysis of elections and information of statistical and sociological character, the first comprehensive study is made of political activity of the Italian working classes. Using comprehensive factual material, scientific justification is given to the conclusion on the loss of prestige of bourgeois parties and growing influence of the communist party in Italy.

The Presidium of the USSR Academy of Sciences awarded in 1978 USSR Academy of Sciences medals and 200 ruble prizes to students of institutions of higher learning.

V. N. Litvinenko (fifth year student, Novosibirsk University) in the section "Physico-technical and mathematical sciences" for the study "Synchrotron resonances at zero chromatism" and S. P. Suyetin (fifth year student, Moscow University) for the study "Similarity of rational approximations of polynomial expansions in regions of meromorphy of a desired function".

At the center of attention of Litvinenko's study are the causes inducing the appearance of synchrotron resonances at zero chromatism and their neutralization. Cases where the equilibrium orbit of the beam passes at an angle to the resonator axis and the case of dispersion in the accelerating structure are investigated. The net results permitted an explanation of synchrotron resonances at zero chromatism observed in the SPEAR II accumulator. Observation data of such resonances in the VEPP-3 accumulator are cited. Estimates are given for the maximally permissible orbital distortions in accelerating resonators for the VEPP-4 accumulator. A simple method of suppressing such resonances is proposed.

S. P. Suyetin's study investigates questions of similarity of rational approximations of expansions of analytical functions in series with respect to orthogonal polynomials and Faber polynomials. Theorems are proven on the uniform similarity of corresponding approximations in canonical regions of meromorphy of a desired function. It is shown that poles of a function may be found as limits of poles of approximating rational functions. The net results substantively develop clinical research relating to Padé approximations of power series and represent a major contribution to the theory of approximations of functions of a complex variable by rational functions.

I. M. Safronova (sixth year student, Kiev Polytechnic Institute) in the section "Chemico-technological and biological sciences" for the study "Explanation of the role of low-valence particles in the process of copper corrosion in acid solutions".

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The study contains new data on the mechanics of corrosion of copper indicating the catalytic nature of this process.

L. Yu. Yakovleva (fifth year student, Department of Geology, Moscow University) in the section "Earth science" for her study "Granite and pyroxene equilibria at high pressures RT gradients under platforms".

As a result of complex experimental work, the author created a diagram geothermobarometer to determine temperature and pressure of diproxene equilibrium in deep granite peridotites encountered in the form of xenoliths in kimberlite pipes. On the basis of the diagram on compositions of natural orthopyroxenes from the kimberlitic pipes of Yakutiya and South Africa, gradients of temperature are estimated in the upper mantle with an increase in lithostatic pressure under the corresponding platforms.

A. I. Stupnitskiy (third year student, Department of Economics, Kiev University) in the section "Social sciences" for his study "Modern bourgeois state--the tool of monopolies in the struggle to obtain super-profits and intensify the exploitation of the working classes (as shown by the USA)".

Marxist and Leninist viewpoints are used to investigate the role of the bourgeois state in the system of exploitation of the working classes. Based on domestic and foreign sources, the author examines diverse methods currently used by the US monopolistic bourgeois to subordinate the state mechanism to its own interest. Primary attention is given to analysis of financial and tax policies of the monopolistic bourgeoisie.

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USSR STATE COMMITTEE ON INVENTIONS AND DISCOVERIES

Moscow VESTNIK AKADEMII NAUK SSSR in Russian No 5, 1979 pp 125-127

[Article listing new inventions and discoveries]

[Text] New discoveries have been recorded:

N. M. Zhavoronkov, V. B. Lazarev and I. S. Shaplygin: "Pattern of change in electrical conductivity of mixed oxides of platinic metals".

Formula of discovery. A previously unknown pattern of change of electrical conductivity of mixed oxides of platinic metals was experimentally established: for a compound consisting of platinic metal--non-noble metal--oxygen, the nature of change of electrical conductivity is determined by the electron configuration of the platinic metal ion and corresponds to the nature of change of electrical conductivity of a compound consisting of platinic metal--oxygen.

Priority of discovery: 20 May 74.

Diploma No. 197. Claim NO. OT-9401.

The pattern discovered has great value for solid-state physical chemistry: it permits development of a theoretically new approach to the relationship of properties of a complex substance as a function of the properties of a simple substance and the structure of atoms entering into this substance. The practical value of the discovery is that it makes possible a scientifically based search for new promising materials with particular electrical properties and indicates means of purposeful change of the properties of these materials.

V. M. Strutinskiy: "Phenomenon of formation of intensely deformed heavy atomic nuclei in quasistationary state".

Formula of discovery. A previously unknown phenomenon is established for the formation of intensely deformed heavy atomic nuclei in a quasistationary state induced by the formation in nuclei with a number of nucleons 230-250 of an envelope structure when nuclei attain deformation with respect to the axes on the order of  $1.8-2$ , especially during fission ("two-hump fission barrier").

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Priority of discovery: 25 Apr 66.

Diploma NO. 200. Claim NO. OT-8731.

The phenomenon discovered played a decisive role in confirming new scientific notions on the process of fission of heavy nuclei and stimulated much theoretical research and experiments. Practical value of the discovery lies in the fact that the discovery property of fission of heavy atomic nuclei ("two-hump fission barrier") and the theory of envelopes in deformed nuclei lying at its base are used for quantitative description of the process of fission, properties of stability of maximally heavy nuclei, and also to predict the properties of hypothetical superheavy elements.

V. G. Zinov, A. D. Konin and A. I. Mukhin: "Phenomenon of change of relative intensity of X-ray lines of the K-series of a mu mesonic atom".

Formula of discovery. A previously unknown phenomenon was experimentally established for change in relative intensity of X-ray lines of the K-series of a mu mesonic atom caused by capture of muons at molecular levels when a chemical element enters into reaction.

Priority of discovery: 1 Mar 75.

Diploma No. 201. Claim No. OT-8230.

The discovery evolves notions on the interaction of negative muons with chemically bound atoms. The results of the discovery can be used practically in determining the characteristics of chemical bonds and their effect on the physical and chemical properties of a substance.

I. B. Bersuker: "Phenomenon of tunnel spallation of energy levels of multiatomic systems in a state of electron degeneration".

Formula of discovery. A previously unknown phenomenon was established of spallation of energy levels of multiatomic systems in a state of electron degeneration or quasi-degeneration due to tunnel transitions between their equivalent distorted configurations formed by electron oscillation interaction.

Priority of discovery: 12 Sep 60.

Diploma No. 202. Claim No. OT-9264.

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On basis of the discovery, a series of effects and patterns has been revealed and predicted in the spectra of electron paramagnetic resonance, in absorption of microwaves and ultrasound, in ferroelectric structural phase transitions and crystals. Practical utilization of the discovered phenomenon is possible. The author of the discovery has proposed a microwave maser with low saturation and wide dynamic range, a polarizer and an analyzer of ultraacoustic oscillations.

D. N. Kursanov, Z. N. Parnes, G. I. Bolestova, N. M. Loym, M. I. Kalinkin, G. D. Kolomnikova, V. A. Tsyryapkin and Yu. I. Lyakhovetskiy: "Phenomenon of electrophilic ion hydration of organic compounds".

Formula of discovery. A previously unknown phenomenon was established for electrophilic ionic hydration of organic compounds in media containing proton and hydride-ion donors caused by the irreversible interaction of the nascent carbenium ion with the hydride-ion donor.

Priority of discovery: 19 Jun 65 for experimental discovery of the phenomenon and 20 Nov 73 for its theoretical explanation.

Diploma No. 204. Claim No. OT-9231.

The discovery makes fundamental changes in notions about possible means of hydration of organic compounds. Its practical value lies in the significant expansion of possibilities of organic synthesis. On the basis of the phenomenon of electrophilic ionic hydration, the authors of the discovery made several inventions.

A. N. Kost, R. S. Sagitullin and S. P. Gromov: "Phenomenon of isomerizational recyclization of nitrous hetero-aromatic compounds".

Formula of discovery. A previously unknown phenomenon was experimentally established for isomerizational recyclization of nitrous hetero-aromatic compounds containing an electron-deficient nucleus and electron-surplus fragment consisting in the formation of other hetero- or carbocyclic compounds due to the opening of the electron-deficient nucleus with discontinuity of the C-N bond and subsequent closing of the cycle to the electron-surplus portion of the molecule forming a C-C bond.

Priority of discovery: 8 Jan 75.

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Diploma No. 205. Claim No. OT-9467.

The discovery of the phenomenon of isomerization recyclization and explanation of conditions under which it is realized permitted the establishment of regroupings previously unknown in organic chemistry and the creation of new methods of conversion of organic matter. The practical value of the discovery is in the development of new technological processes of chemical reprocessing of pyridine bases which can be used as starting material for production of alkylanilines. On the basis of the established effect the authors of the discovery made several inventions.

I. M. Lifshits, A. F. Andreyev, B. N. Yesel'son, V. N. Grigor'yev and V. A. Mikheyev: "Phenomenon of quantum diffusion in crystals".

Formula of discovery: A previously unknown phenomenon was established for quantum diffusion in crystals consisting in the fact that in quantum crystals at low temperature there occurs a transfer of matter via free motion of delocalized quasiparticles in the crystal lattice leading to an abrupt increase in the coefficient of diffusion (when the temperature is raised) reaching a value inversely proportional to the concentration of quasiparticles.

Priority of discovery: 15 Jan 69 for theoretical explanation and 29 Nov 72 for experimental confirmation.

Diploma No. 206. Claim No. OT-9443.

The discovery introduces fundamental changes in the notions of structure and dynamics of crystals at low temperatures. It led to formation and development of a new branch of solid-state physics--physics of quantum crystals. Practical value of the discovery consists in the fact that it makes it possible to implement theoretically new methods of dissolving light impurities of the hydrogen type and its isotopes in crystal lattices of heavy metals.

L. M. Brekhovskikh, V. G. Kort, M. N. Koshlyakov and L. M. Pomin: "Phenomenon of formation of traveling synoptic eddies in open ocean".

Formula of discovery. A previously unknown phenomenon was experimentally established for formation in the open ocean of traveling synoptic eddies consisting in the fact that throughout the depth of the ocean there occurs formation of systems of moving cyclonic and anticyclonic eddies with dimensions in the tens and hundreds of kilometers and kinetic energy exceeding that of the large scale currents.

Priority of discovery: 5 Jan 71.

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Diploma No. 207. Claim No. OT-9487.

The discovery gave rise to a new trend in experimental and theoretical research of the mechanics of generation of synoptic ocean eddies and their interaction with movements of other scales. It led to a change in notions about internal dynamics of the ocean and the mechanics of formation of general circulation of waters in the ocean. Practical application of the discovery consists in the possibility of creating a theoretical model of synoptic variability of conditions in the ocean and elaboration of methods of calculation and prognosis of current velocity, distribution of water temperature, concentration of dissolved substances, biological productivity of waters and transfer of passive impurities by currents.

M. V. Volkov and O. V. Oganessian: "Phenomenon of complete regeneration of cartilage of injured joints of man and animals".

Formula of discovery. A previously unknown phenomenon was established for complete regeneration of cartilage of injured joints of man and animals (mammals) occurring under conditions which assure normal physiological movements and exclude reciprocal pathological pressure of joint ends, and leading to recovery of lost functions of joints.

Priority of discovery: 3 Jul 68.

Diploma No. 208. Claim NO. OT-9515.

The discovered phenomenon altered the earlier notion about regeneration of articular cartilage. The discovery creates a basis for elaboration of promising methods of prophylaxis and treatment of joint injuries. Authors of the discovery used it to elaborate methods and devices for surgical treatment of injuries and diseases of the joints.

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SIXTH INTERNATIONAL SYMPOSIUM ON 'BRAIN AND BEHAVIOR'

Moscow ZHURNAL VYSSHEY NERVNOY DEYATEL'NOSTI in Russian Vol 29, No 2, 1979  
p 439

[Article by P. V. Simonov]

[Text] In accord with the plan for multilateral cooperation on the topic problem, "Neurophysiology and Higher Nervous Activity" (Intermozg), the Sixth International Symposium on "Brain and Behavior" was held in Dilizhan, 25 September-1 October 1978. Neurophysiologists from the Peoples Republic of Bulgaria, the Hungarian Peoples Republic, the German Democratic Republic, the Polish Peoples Republic, the Soviet Union and Czechoslovakia participated in its work. Included in the number of symposium participants were leading specialists of a number of socialist countries: Acad., Hungarian Academy of Sciences, K. Lissak, Corr.-Membs., Czechoslovak AS, L. Viklicki and I. Dostalek, Professors E. Grosztian (Hungary), J. Bures (Czechoslovakia), K. Zelinski (Poland) and B. Jernicki (Poland); Academicians and Corresponding-Members of the USSR Academy of Sciences, USSR Academy of Medical Sciences, USSR Academy of Pedagogical Sciences, and republic academies-- E. A. Asratyan, O. G. Bablavadzhan, N. Yu. Belenkov, M. M. Khananashvili, A. V. Vald'man, G. G. Gasanov, M. M. Kol'tsova, V. V. Fanardzhan. The composition of the participants of the symposium assured a high scientific-theoretical level of discussion of the reports presented.

The basic problems of the symposium were questions on formation and inhibition of conditioned reflexes of various degree of complexity, including questions of higher nervous activity of man. It needs to be stressed that a number of reports contained results of jointly executed studies on the basis of the "Intermozg" program. In this number can be included the reports of K. Hecht (East Germany), M. G. Ayrapetyants (Soviet Union). J. Bures (Czechoslovakia), K. Davidova (East Germany), P. V. Simonov (Czechoslovakia), P. Molnar (Hungary), P. I. Kruglikova (Soviet Union) and others. In that way, the symposium made it possible, jointly, to analyze and to generalize the scientific results of multilateral cooperation over the course of the last three years after the Fifth Symposium "Brain and Behavior" which was convened in Liblice (Czechoslovakia).

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In conformance with the protocol of the Bratislava Session of "Intermozg", at the suggestion of the delegation of the Polish Academy of Sciences, the present, sixth, symposium was convened on the 75th birthday and 55th year of science activity of E. A. Akratyan. It was suggested that the materials of the symposium be published in the form of collected monographs.

The Sixth Symposium showed once again that the traditional symposiums on "Brain and Behavior", in progress since 1958, represent an effective form of joint discussion of urgent questions of research on higher nervous activity of man and animals. With each year the number of reports has been growing which are dedicated to results of jointly completed experiments, a fact which makes these symposiums more and more fruitful. Considering that, at the present time, "Intermozg" yearly convenes a number of conferences, symposiums and school-seminars on various elements of the multilateral cooperation, it is expedient to confer a more specialized and limited character on future symposiums on "Brain and Behavior", by having, as the symposium's core participants, the staff members of three institutes: the Nencki Institute of the Polish Academy of Sciences, the Institute of Physiology of the Czechoslovak Academy of Sciences and the Institute of Higher Nervous Activity and Neurophysiology of the USSR Academy of Sciences; among these participants will be the young scientists of these institutes; a further feature of this idea is that broader scientific conferences are to be related to sessions of "Intermozg". At the suggestion of the Polish Academy of Sciences delegation, the next, the Seventh International Symposium on "Brain and Behavior" is to take place in 1981 in Jablone (Poland). Participants of the symposium expressed warm thanks to the Academy of Sciences of the Armenian SSR, to the Institute of Physiology of the AS, ArmSSR, to the Institute for Advanced Training of Physicians, Yerevan, and to the administration of the House of Creative Power of Composers in Dillizhan for their hospitality and creation of good conditions for the work of the symposium on the days of celebration of the 150th anniversary of the entry of Armenia into the makeup of Russia, and for being able to get to know the cultural riches and achievements of Soviet Armenia.

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PUBLICATIONS

GUIDE TO VACCINES AND SERA

Moscow RUKOVODSTVO PO VAKTSINOMU I SYVOROTOCHNOMU DELU in Russian 1978  
signed to press 3 Jul 78 pp 2, 3-5, 437-439

[Annotation, preface, and table of contents from book edited by P.N.  
Burgasov, Meditsina, 15,000 copies, 439 pages]

[Text] The guide is written by vaccine and serum specialists working in various vaccine and serum institutes as well as in institutes of epidemiology and microbiology. It deals with the principal requirements for organizing the production of bacterial and viral preparations and describes features of the production of various vaccines, sera, bacteriophages, gamma-globulins, and bacteriotherapeutic preparations. Data on the history of the development of bacterial preparations in the USSR are presented and the principles of the specific prophylaxis of infectious diseases and its features under conditions of a decline in morbidity rate are described. Aspects of the organization of immunological clinics and hatcheries of microorganisms and laboratory animals are illuminated, as are aspects of the care and feeding of animals of various aquarium species and producer horses in immunological clinics.

A large part of the guide is devoted to the description of aspects of the equipment of production laboratories and the mechanization and automation of the operations of production of various kinds of bacterial and viral preparations. The requirements of the safety and hygiene of labor in production premises are examined. The basic principles for the standardization and monitoring of the preparations at every stage during their production as well as in finished form are described.

The importance of the biological monitoring department and the State Scientific Research Institute for the Standardization and Monitoring of Medical Biological Preparations imeni L.A. Tarasevich to the organization of the production of these preparations in identifiable finished form is demonstrated.

In the discussion of every aspect of production the conditions for an efficient production process and the prospects for research based on modern scientific data are illuminated. Domestic and foreign literature references are given.

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The guide is designed for serum and vaccine experts, microbiologists, virologists, and immunologists.

The guide is illustrated with 25 figures and 14 tables.

Preface

Vaccination is one of the most effective measures for the prevention of infectious diseases. At the same time, its effectiveness depends largely on the quality of the bacterial and viral vaccines being manufactured. That quality in its turn depends on their composition and production techniques.

In the last 30 years the number of prophylactic preparations has markedly increased and the quality of many of them has greatly improved owing to the introduction of methods of purification, concentration, fractionation of antigens and other modern methods into production.

New bacterial and viral vaccines, blood preparations, new types of sera have appeared, new medical forms of these preparations and techniques of their production and administration have been introduced. Of special importance are the problems of the standardization and inspection of the produced preparations in accordance with international requirements. Given the steady decrease in the rate of morbidity due to a number of infectious diseases as well as the complete elimination of certain of these diseases in some regions (diphtheria, abdominal typhus, etc), it becomes necessary to assure a constant and undiminishing immunological protection of the population. Hence, the requirements for the quality of bacterial and viral preparations are incommensurately increasing and these preparations must be unconditionally harmless, areactogenic and highly immunological.

At the same time, despite the major advances in the production of bacterial and viral preparations, their production in different enterprises is not uniform and sometimes the use of the same technological process under different conditions of production results in variations in the quality of the preparations.

All this is largely due to the lack of a scientifically substantiated reference manual enabling the production worker, whatever his qualification, at any stage in the production of the preparations, to obtain exhaustive information from in a guide that should be a handy desk reference work. The editions of "Rukovodstvo po Vaktsinnomu i Syvorotochnumu Delu" published in 1934 and 1943 have in their time been of great help to the development of the production of vaccines and sera, but now they are obsolete and can no longer serve as a scientific handbook to production workers.

Present-day science and technology have made obsolete the earlier concepts of the organization of production divisions, premises and structure of enterprises, production equipment, techniques for the production of the preparations and evaluation of their quality indexes. A rational organization of

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of the production process has resulted in the introduction of assembly lines and the mechanization and automation of production stages as based on the control panel.

At present all the production enterprises are organized into autonomous structural units headed by the enterprise director who is subordinated to the director of the Scientific Research Institute of Vaccines and Sera or of Epidemiology and Microbiology. These enterprises operate on their own areas, with special-purpose buildings, and are equipped with modern apparatus and facilities.

The [current edition of] "Rukovodstvo po Vaktsinno-Syvorotochnomu Delu," prepared by a group of specialists, presents a detailed description of the organization of the production of bacterial and viral preparations and of the structure of the enterprises handling that production. It contains literature data on modern equipment and apparatus, on the importance of an efficient alignment of utility lines, and of special subdivisions assuring normal conditions for the fabrication and release of bacterial preparations.

The book examines problems of the organization of the operations of production subdivisions fabricating various specific preparations for different infectious diseases.

Considerable space is devoted to features of the mechanization and automation of production processes, development of assembly lines, methods for cultivating microbial suspensions, and installation of electronic control panels. Original methods for standardizing bacterial and viral preparations, antitoxic sera, anatoxins, and bacteriophages are described. Data on the production of standard preparations (reference vaccines), their storage, and the verification of their activity through comparison with international standards, are presented.

A special chapter in the book is devoted to techniques of producing prophylactic and therapeutic vaccines against intestinal infections (abdominal typhus, varieties of paratyphoid fever, dysentery), bacteriophages for various purposes (salmonellosis, dysentery, coliprotein, staphylococcal), preparations for bacteriotherapy (coli- and lactobacterins, bificol). Material on aspects of the production of various anatoxins, associated pertussis-diphtheria-tetanus vaccines, and viral preparations is presented.

Techniques for the production of blood preparations such as gamma-globulin (measles, smallpox, influenzal, pertussis, staphylococcal), and gamma-vinin (albumin, fibrinolysin, aminocrouin, histoglobulin) are described. Features of the immunization of horses--producers of antitoxic sera, and significance of antigens and of methods for the hyperimmunization of producers, techniques for processing medicinal sera, purification and concentration, and inspection methods are pointed out.

The book describes the organization of vivaria, the care of laboratory animals, conditions of quarantining, feeding modes, and the determination of indexes of suitability of animals for experiments (state of microbial status, etc.).

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The material presented in this Guide on the basis of achievements of modern science and technology will help to augment knowledge of the theory of the problems of specific prophylaxis and promote a scientific approach to the organization and equipping of production laboratories and evaluate the quality of the preparations manufactured, as well as to broaden the understanding by production workers of the importance of specific prophylaxis in the complex whole of preventive measures. This material will also contribute to the knowledge of vaccine prophylaxis and serum therapy among general practitioners, pediatricists, specialists in infectious diseases, epidemiologists, and immunologists.

This Guide on vaccines and sera is both a valuable methodological handbook and a compilation of modern knowledge on the manufacturing technology of preventive, therapeutic, and diagnostic preparations.

We hope that the anthology represented by the Guide will meet with broad response among researchers dealing with the production of bacterial and viral preparations and represent an extremely valuable handbook in the organization of the production of sera and vaccines and the manufacturing technology of various bacterial and viral preparations.

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PUBLICATIONS

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NEW BOOK ON SELECTIVE TOXICITY OF ORGANOPHOSPHORUS INSECTICIDES

Leningrad ZHURNAL EVOLYUTSIONNOY BIOKHMII I FIZIOLOGII in Russian No 3, 1979  
pp 313-314

[Review by I Shcherbak of the book "Izbiratel'naya toksichnost' fosfororganicheskikh insektitsidov (sravnitel'no-biokhimicheskiye aspekty)," by V. I. Rozengart and O. Ye. Sherstobitov, Leningrad, Nauka, 1978, 174 pages]

[Text] The monograph by V. I. Rozengart and O. Ye. Sherstobitov fills a long-standing gap in Soviet literature, which had persisted in spite of the obvious scientific, as well as applied, importance of the problem of selective toxicity of chemicals used for the protection of plants and domestic animals.

The authors of this monograph are working hard and fruitfully in the field of investigation of structure and catalytic properties of cholinesterases, anticholinesterase properties of organophosphorus compounds (OPC) and metabolism thereof. For this reason, it is not surprising that their entire presentation reflects their own experience and that virtually in all chapters use is made not only of data from the literature, but the original findings of the authors.

The monograph consists of two very evident unequal parts, although there is no formal division. The first, smaller part is a sort of introduction to the problem; it deals primarily with the structure and properties of cholinesterases (third chapter), structure and mechanisms of anticholinesterase action of OPC (second and fourth chapters), as well as mechanisms of toxic effects of OPC on animals (fifth chapter). Although there are some recently published summary works on these questions in the Soviet literature, the presence of such an introductory section in the monograph under review is quite justified. In the first place, it makes the book understandable and, mainly, useful to those who are not specialists in biochemistry (or enzymology), but who are concerned in learning about the mechanisms of selective toxicity: hygienists, toxicologists, synthetic chemists, etc. In the second place, these chapters make use of the latest data on the subjects discussed. The most important factor that distinguishes this book from other works is that it deals with structure and properties of cholinesterases and mechanisms of their interaction with OPS in the comparative biochemical aspect, to which little attention is still being given in

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the literature, but which is of decisive importance to proper understanding and interpretation of a number of manifestations of selective toxicity of pesticides. The authors lay emphasis on the importance of consideration of differences between cholinesterases of different origin. And they do not limit themselves to the differences between cholinesterases of mammals and arthropoda, but stress the interspecific differences in cholinesterase properties, including the sensitivity of these enzymes to the inhibitory effect of OPC.

The second part of the monograph deals with the actual mechanisms of selective toxicity. General considerations concerning the selectivity of OPC action and a listing of the various possible mechanisms of selective toxicity are discussed in a small special chapter (Chapter 6). This is followed by a more comprehensive description of the main such mechanisms. Selectivity based on species-related differences in OPC metabolism is discussed in the greatest detail (the longest chapter of the entire monograph, Chapter 9, deals with this). This is indeed the best studied mechanism (or group of mechanisms) and, perhaps, the most appreciable. According to current conceptions, the selectivity of OPC action is related, in most cases, to the distinctions of their metabolism or, more precisely, to the quantitative differences between animal species with respect to rate and direction of different routes of metabolic conversions of each OPC. Practical use of these differences is one of the most realistic means of purposeful synthesis of new pesticides with selective action. Continued in-depth investigation of metabolic differences through comparative biochemical studies offers the scientific basis for the use of this route. For this reason, the chapter dealing with OPC metabolism is of great interest to specialists in different fields who are concerned with pesticides. We should like to comment on the very logical and clear presentation of the rather complex and diverse material that makes up Chapter 9. This is largely aided by the original classification, proposed by the authors, of metabolic conversions of OPC. This classification is based on different types of enzymatic (and in some cases nonenzymatic) reactions, in which OPC may become involved in animals, and it covers virtually all possible chemical conversions of OPC in the course of metabolism.

The difference in sensitivity of cholinesterases of different animal species to OPC may be another rather important mechanism at the basis of the selectivity of action of these compounds. Data about this mechanism of selectivity are submitted rather comprehensively in the tenth chapter. The importance of this chapter lies in the fact that it calls the attention of researchers to the need to take into consideration and further develop a relatively little-studied aspect of selective toxicity, which has both independent theoretical significance and immediate applied importance.

Chapter 8, which deals with selectivity based on differences in distribution of OPC in the body, occupies a very important place in the monograph. For the first time, such a thorough and serious analysis of this mechanism has been made in the literature. In general, such analysis is very difficult,

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since the numerous experimental data described in the literature are extremely disparate and difficult to compare. All the more obvious the merit of the authors, who were able to describe in concise form the main patterns of distribution of OPC, of greatest significance to manifestation of selective toxicity. Moreover, on the basis of their own original data, the authors convincingly demonstrated the significant role of sorption of unaltered OPC on different membranes (endothelium of capillaries, erythrocytes) in deposition and distribution of these toxic compounds in the body. Hence there are some interesting possibilities of obtaining selective effects that had not drawn the attention of researchers previously. In spite of the traditional conceptions, it was established for the first time (and reasons given) that the increase in lipidophilia of a substance does not necessarily cause it to penetrate into nerve tissue. The importance of this fact goes beyond the framework of the problem in question: control of the effects of drugs by taking advantage of their capacity to be sorbed on membranes should, unquestionably, draw the attention of pharmacologists and physicians.

We cannot fail to comment on the literary qualities of the monograph. The entire book is written in a good style, it is very readable and interesting. The tables, that are not overly loaded, well-executed charts and graphs, which accompany the text, aid in comprehension and assimilation of the material.

At the end of the book there is a reference table listing the names and chemical structure of virtually all OPC mentioned, as well as data on their toxicity and anticholinesterase effectiveness in mammals and arthropods.

Among the flaws of the monograph we can mention that some important aspects of the problem of insecticides and acaricides were not adequately covered. There was virtually no discussion of the effects of OPC on enzymes other than cholinesterases. The book does not deal with development of resistance to OPC, including the role of carboxyesterases in resistance to these agents. Although these aspects are extensive and important enough to deserve special consideration, it would be very desirable to add a brief discussion thereof in the next edition of the monograph.

One of the chief flaws of the book, for which the publishing house and not the authors is to blame, is that very few copies have been printed. Only 1000 copies were printed of a publication that is intended not only for scientists in different specialties (chemists, biochemists, toxicologists, entomologists, hygienists), but a broad spectrum of practical agricultural workers. For this reason, it is not surprising that it became a bibliographic rarity already 2-3 weeks after it was published.

In conclusion, it can be stated that this monograph is definitely needed and timely. Not only does it summarize a vast literature, but it contains the

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original contribution of the authors to work on this problem. This monograph will be of interest to specialists in different fields, and each will find many useful facts in it.

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PUBLICATIONS

CENTRAL AND REFLEX MOTOR COORDINATION MECHANISMS

Moscow TSENTRAL'NYYE I REFLEKTORNYYE MEKHANIZMY UPRAVLENIYA DVIZHENIYAMI in Russian 1979 signed to press 2 Jan 79 pp 2, 3-5, 182-184

[Annotation, introduction, and table of contents from book by A. G. Fel'dman, Nauka, 1000 copies, 184 pages]

[Text] Biomechanical and neurophysiological principles of the design of movements in man and higher animals are considered. The mechanical properties of muscles and the organization of the motor neuron pool are described. The role of the stretch reflex in motor coordination is investigated. The mechanisms of arbitrary variation in the articular angle, muscular moment, and muscle rigidity in man are examined. An analysis of posture stability is provided. The hypothesis of the shift in the equilibrium point as a method of posture control as well as of the strength and rigidity of muscles is substantiated. Examples of experimental analysis in the simulation of various movements are presented. The problem of assuring equilibrium during locomotion, and the functional significance of reciprocal and simultaneous work of antagonistic muscles are discussed. The book is designed for biophysicists, physiologists, mathematicians, physicians, and occupational and sports physiologists. Figures 79; references 225.

Introduction

N. A. Bernshteyn (1935, 1947) used to stress that the number of active motor neurons cannot serve as an unambiguous yardstick of the central motor commands: depending on instantaneous flows of afferent pulses, the same central flow toward the motor neurons may result in recruiting a varying number of these neurons. What then can be an unequivocal yardstick of central motor commands, or, in other words, what is being programmed by the central structures to implement motion? This question is explored on experimental and theoretical basis in the book presented here to the

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reader's attention. It is answered as follows: the central program for motion is a program for varying the parameters of reflexes in time.

The reader will probably be surprised by this statement since motions also are possible in the absence of reflexes, under conditions of muscle deafferentiation (Taub, 1976). But there is no logical contradiction here: when reflexes exist, the central structures orient them with the object of implementing motion, and when they do not exist, the action of central structures reduces to changing the number of active motor neurons. A similar but less categorically expressed viewpoint is taken by Lundberg (195; see also Ioffe, 1975), on observing that the effect of many efferent systems on motor neurons is mediated by the reflex-arc interneurons and consequently, in one way or another, these systems affect the reflexes. But the alpha-motor neurons themselves are intermediate links in various reflexes. Hence the direct central commands to alpha-motor neurons also are not neutral with respect to reflexes.

The hypothesis formulated above appears similar to the motor coordination hypothesis offered by Sherrington (1906, 1969): "...It is the combination of reflexes in ordered interaction and sequence that represents coordination."

Most of the exposition in the book deals with experimental and theoretical analysis of motor coordination.

Chapter 1 presents information on the activity of the muscular contractile apparatus and on the hierarchic organization of the motor neuron pool assuring the ordered triggering of motor units.

Chapter 2 analyzes experimentally and in theory the dependence of the tonic activity of the motor neuron pool on length and force of muscles in a decerebrated cat (the tonic stretch reflex). Various modifications of the tonic stretch reflex due to electrical irritation of efferent systems, stretching of antagonistic muscle, or gamma-fiber anesthesia, are examined. It is concluded that any central modification of a stretch reflex is a consequence of the regulation of its threshold. This chapter also defines the concept of the domain of activation of the motor neuron pool. On this basis a preliminary description of elementary mechanisms of the gradation of the force, rigidity, and length of muscles is presented.

Chapter 3 analyzes the mechanisms of variation in the articular angle and muscular moment in man. This is the book's central chapter as regards the importance of the concepts defined (control parameters, invariant characteristics of muscle and joint, equilibrium points, etc.) and also as regards the experimental findings presented. In particular, it is shown that the rapid ballistic variation of the articular angle in man is a consequence of variation in the threshold of the tonic stretch reflex. Considerable attention is devoted to analysis of the problem of recovery of posture under a varying load, and analysis of rhythmic movements in the discrete joint. Instances of certain movements of monkeys also are given.

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Chapter 4 deals with analysis of posture stability with allowance of the work of the antagonists. The necessary conditions for posture stability are formulated. An example illustrating how the requirement of posture stability necessitates the coactivation of agonistic and antagonistic muscles is presented. Dynamic coordination of the system with allowance for data on the work of the contractile apparatus (Chapter 2) and on the autonomously controlled parameters of activity of the motor neuron pool (Chapters 2 and 3) is described. The domain of stability of the position of the articular link is determined. It is concluded that the increase in dynamic sensitivity of the stretch reflex reduces the stability margin. Outside the stability region, however, the instability of the system appears to be moderate.

Chapter 5 describes the dynamics of the transition process during active variation in the articular angle. It is shown that the principal kinematic, dynamic, and electromyographic characteristics of the process can be derived from the premise that motion occurs owing to a shift in the equilibrium point of a joint. The need for reciprocal central influences on the motor neurons of the agonist and the antagonist even in cases in which motion culminates in the coactivation of both these muscles is stressed. The role of the central coactivation of alpha- and gamma-motor neurons during coordination of the force and length of muscle is discussed. The dependence of the threshold of the tonic stretch reflex on the activity parameters of muscle spindles and on the central influences on the alpha- and gamma-motor neurons is explored.

Chapter 6, the last, contains experimental material on the activity of Ia interneurons of reciprocal inhibition and Renshaw cells during rhythmic movements (walking, combing). Basically, however, this chapter represents a theoretical study of the organization of complex movements. A study of this kind is not an end in itself in this book but rather an attempt to elucidate experimental findings and come closer to the understanding of the organization of complex movements, which apparently is impossible without a theory. This chapter describes in schematic form an algorithm for assurance of stability during walking and provides a scheme for the organization of nonindividualized control of muscles of the extremities on preserving the possibility of separate control of each joint. The idea of nonindividualized muscle control has been voiced in a number of studies (Gel'fand et al., 1966; Gurfinkel' et al., 1966; Tsetlin, 1969). The fundamental role of two central programs--the agonist and antagonist coactivation program and the program for their reciprocal activation--is postulated. The possible operating modes of the reciprocal motor neuron inhibition system are explored and various versions of the coupling of central and reflex mechanisms during the generation of rhythmic movements are described.

In describing the various hypotheses of the organization of motor coordination we specified whenever possible the ways of their experimental verification or, conversely, refutation.

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The author is deeply indebted to all of his colleagues, for it was by associating with them that he was led to settle upon this direction of research. In particular, the author is indebted to M. B. Berkinblit, I. M. Gel'fand, V. S. Gurfinkel', I. A. Keder-Stepanova, Ya. M. Kots, G. N. Orlovskiy, V. V. Smolyaninov, M. L. Tssetlin, L. M. Chaylakhyan, M. L. Shik.

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