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UDC 581.175.1:632.4:635.25

Induction of Pathogenesis-Related Proteins in Onion Tissues

18400421a Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 4, Apr 88 (manuscript received 20 Nov 87) pp 64-68

[Article by A. P. Dmitriyev, Yu. Yu. Malinovskiy and D. M. Grodzinskiy, corresponding member, UkSSR Academy of Sciences; Institute of Botany, UkSSR Academy of Sciences, Kiev]

[Abstract] Scales of the Skvirskiy variety of sharp onion Allium cepa were used to test the relative efficiencies of arachidonic and linoleic acids in inducing pathogenesis-related proteins under in vitro conditions. The scales were incubated with either inducer in 1 percent ethanol for 24 h at 19-22°C, followed by protein analysis via polyacrylamide gel + SDS disc electrophoresis. The resultant data showed that in addition to induction of cibulin 1d and 2d, arachidonic acid also induced the synthesis of a ca. 14 kD pathogenesis-related protein in trace concentrations. Optimum results were obtained when arachidonic acid was employed in a 10^{-4} M concentration. Linoleic acid, while inducing cibulin 1d and 2d when present at an optimum concentration of 10^{-2} M, failed to induce the synthesis of the 14 kD component. These observations substantiate the contention that while both biogenic inducers enhance plant resistance to infection, the mechanisms of action are not necessarily identical. Figures 2; tables 1; references 15: 5 Russian, 10 Western.

12172/9274

UDC 58.09.581.143.5:582.951.4

Plant Regeneration From Boxthorn (Lycium Barbarum) Protoplasts

18400421b Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 4, Apr 88 (manuscript received 28 Sep 87) pp 70-73

[Article by Ya. I. Ratushnyak and N. M. Piven, Institute of Botany, UkSSR Academy of Sciences, Kiev]

[Abstract] Conventional protoplast isolation and culture techniques were utilized in attempted plant regeneration of boxthorn (Lycium barbarum). For organogenesis, the protoplasts isolated from leaf mesophyll were maintained in either PRM or TM-4 media. On PRM the index of regeneration approached 80-90 percent, but was followed by a high morality rate after transfer to medium MS and inadequate root formation. On TM-4, after an initial phase of high mortality, extensive rooting favored a rate of regeneration that was some two-fold better than in the case of PRM (1-1.5 months for TM-4 vs. 2-3 months for PRM). An analysis of the karyotype of 17 plants obtained on TM-4 showed a diploid chromosome number (2n = 24). In the final analysis, the regenerative potential of L. barbarum mesophyll protoplasts suggests the use of this species in studies on cellular engineering of plants. Figures 1; references 4: 2 Russian, 2 Western.

12172/9274

UDC 577.149:547.435:581.1

Novel Cytokinin-Like Antistress Agent: Kartolin

18400422 Moscow AGROKHIMIYA in Russian No 4, Apr 88 pp 103-105

[Article by Yu. A. Baskakov, All-Union Scientific Research Institute of Chemical Plant Protection, Moscow]

[Abstract] A brief review is provided of kartolin [sic], a cytokinin-like agent used in protection of plants against stress, in view of the ease of its production, availability, low cost, and low toxicity for mammals. Kartolin was discovered as a preparation that could replace cytokinins in the stimulation of growth of a suspension of cultured tobacco cells, and concomitantly enhanced their tolerance of low temperatures (-60°C). Studies on mice and rats showed that the LD_{50} values exceeded 4 g/kg, pointing to the wide safety margin of this preparation. Field trials conducted over a 5 year period under various conditions of drought have shown that in the case of barley and wheat crops, application of 250-500 g/hectare kartolin enhanced harvests by 5-9 quintals/hectare. Similar results with rice, clover, and currant crops underscored the seemingly universal application of kartolin in agriculture. References 13 (Russian).

12172/12223

Role Played by Constitutive and Induced Fungitoxic Substances of Onion in Its Resistance to Necrotrophic Pathogens

18400367 Moscow PRIKLADNAYA BIOKHIMIYA I MIKROBIOLOGIYA in Russian Vol 24 No 2, Mar-Apr 88 pp 247-256

[Article by L. A. Tverskoy, A. P. Dmitriyev, A. V. Kovtun, Institute of Plant Physiology, UkSSR Academy of Sciences, Kiev]

[Abstract] The authors set out refine a fungitoxic substance extraction technique that could be used for further isolating and identifying such substances and to determine whether such compounds are contained in the intact tissue of the onion or whether they are synthesized de novo. The Allium cepa L. onion—one of the most widely cultivated crops, one of the richest sources of bactericide-fungicide-protozoacides, and a plant that is attacked by many phytopathogens both during growth and during storage—was exposed to Botrytis allii Munn.,

Botrytis cinerea Pers., and Fusarium solani App. et Wr. The onions were then incubated in a damp container at 19-23°C for 48 hours. Antibiotic substances were then extracted from the necroses that were produced and were assayed. The experiment's findings indicate that necrotrophs are variously capable of overcoming the mechanical barriers of the fleshy part of the onion. The longer the storage, the less resistant the onion became to B. cinerea and B. allii. Diethyl ether and ethyl acetate proved to be the most successful organic solvents for extracting nonvolatile fungitoxic substances from the onions. Figures 4; references 29: 20 Russian, 9 Western.

13227

UDC 577.352.335

Potential-Dependent Incorporation of Latrotoxin Into Bilayer Phospholipid Membranes

18400421c Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR, SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 4, Apr 88 (manuscript received 16 Oct 87) pp 79-82

[Article by A. N. Chanturiya, academician of UkSSR Academy of Sciences, and V. K. Lishko, Institute of Biochemistry, UkSSR Academy of Sciences, Kiev]

[Abstract] An evaluation was conducted on the insertion of the protein α-latrotoxin into bilayer lipid membranes (BLM) prepared from phosphatidylcholine and cholesterol (2:1). Conductivity measurements conducted in 10 mM tris-HCl buffer, pH 7.4, following positive and negative potential application, yielded the following data on the rates of channel formation: 19.7 min^{-1} at 100 mV, 8.8 min^{-1} at 80 mV, 4.7 min^{-1} at 60 mV, 0.5 min^{-1} at 40 mV, and -2.7 min^{-1} at -100 mV. Essentially similar data were obtained in KCl, $CaCl_2$, and systems containing EDTA. The kinetics for the inclusion of the latrotoxin into the BLM and the subsequent channel formation demonstrated a two-stage process, consisting of reversible binding and irreversible channel formation. The stimulating effect of a positive potential on latrotoxin insertion into the BLM was attributed to the putative presence of a positively charged group on the inserting terminus of the toxin. As a result, the effects of an electric field on this group would either promote or hinder transit of a portion of the latrotoxin molecule from the cis (outer) to the trans (inner) side of the BLM. Figures 2; references 11: 3 Russian, 8 Western.

12172/9274

UDC 547.663 + 547.99

Synthesis of Carbacyclin Analogs From d-1-(1,4,5-Trimethylhexene-2-yl-1) -8-methylhydrindan-4-one (I)

18400423a Minsk VESTSI AKADEMII NAVUK BSSR. SERYYA KHIMICHNYKH NAVUK in Russian No 2, Mar-Apr 88 (manuscript received 8 Apr 86) pp 79-84

[Article by O. D. Strizhakov, Institute of Bioorganic Chemistry, Belorussian SSR Academy of Sciences]

[Abstract] Interest in stable analogs of prostacyclin led to studies on the synthesis of analogs of carbacyclin from the ketone I. 6a-Nor-7a,7b-dihomo analogs of deoxycarba-prostacyclin were obtained from I via Wittig and Reformatskii reactions involving $Ph_3P{=}CH(CH_2)_nCO_2Et$ (n = 0 to 3) type of phosphoranes and ethyl bromoacetate. The results demonstrated that use of the Wittig and Reformatskii reactions facilitated the introduction of functional side chains into the six-membered ring of I. The resultant products are of interest as optically active congeners of carbacylin and prostaglandins. References 14: 5 Russian, 9 Western.

12172/12223

UDC 577.1

Theoretical Conformational Analysis of TRH Analogs

18400423b Minsk VESTSI AKADEMII NAVUK BSSR. SERYYA KHIMICHNYKH NAVUK in Russian No 2, Mar-Apr 88 (manuscript received 9 Oct 87) pp 85-90

[Article by A. A. Akhrem, V. P. Golubovich, V. P. Martinovich and L. K. Slobodchikova, Institute of Bioorganic Chemistry, Belorussian SSR Academy of Sciences]

[Abstract] An analysis was conducted on the structure-activity parameters of TRH (thyrotropin-releasing hormone) analogs, employing pair-additive approximations to assess three-dimensional structural alterations. The tabulated data were derived for 5 classes of analogs, represented by the following: 1) $pGlu^1$ substitutions: [Pro^1]-TRH and [Ala^1]-TRH; 2) His^2 substitutions: [Leu^2]-TRH, [Val^2]-TRH, [Thr^2]-TRH, [Phe^2]-TRH, [Gly^2]-TRH, [Ala^2]-TRH, [Pro^2]-TRH, [Ser^2]-TRH, and [Arg^2]-TRH; 3) Pro^3 substitution: [Ala^3]-TRH: 4) removal of C-terminal NH_2 group: [des-NH_2]-TRH; and 5) elongation: pGlu-His-Pro-Gly-NH_2 and pGlu-His-Pro-Ala-NH_2. The collated data on conformational parameters and minimum conformation energies may be used in the design of biologically active analogs of TRH. Tables 7; references 7: 3 Russian, 4 Western.

12172/12223

UDC 576

In Vitro and In Vivo Effects of Synthetic Antioxidants on Lipid Peroxidation and Erythrocyte Shape

18400424 Tbilisi SOOBSHCHENIYA AKADEMII NAUK GRUZINSKOY SSR in Russian Vol 129 No 3, Mar 88 (manuscript received 6 Feb 87) pp 621-624

[Article by M. I. Dzhalyabova and B. A. Lomsadze, Tbilisi State University]

[Abstract] In vitro and in vivo studies were conducted on the effects of the two synthetic antioxidants SD-6 and peginol on the rate of lipid peroxidation and shape of erythrocytes. The rate of peroxidation was monitored from the fluorescence intensity of Schiff bases formed as a result of the reaction of aminophospholipids with secondary products of lipid peroxidation. In vitro incubation of an erythrocyte suspension derived from outbred male rats with 3 x 10^{-4} M SD-6 for 60 min had no

effect on the rate of lipid peroxidation or the shape of the cells. However, incubation with 3 x 10^{-3} M SD-6 led to a 1.8-fold increase in fluorescence and formation of echinocytes. The change in shape of the erythrocytes was attributed to the loss of phosphatidylethanolamine and phosphatidylserine from the erthrocyte membranes. Essentially similar effects were obtained 24 h after intraperitoneal administration of peginol (360 mg/kg): enhanced fluorescence, echinocyte formation, and diminished membrane levels of phosphatidylcholine and phosphatidylserine. These findings suggest that changes in the shape of erythrocytes may signal enhanced lipid peroxidation. Figures 1; tables 2; references 14: 8 Russian, 6 Western.

12172/12223

Low Molecular Weight Peptides of Giant Hornet Vespa orientalis Venom. Structure and Function

18400390a Moscow BIOKHIMIYA in Russian
Vol 53 No 2, Feb 88 (manuscript received 4 Jan 87)
pp 219-226

[Article by M. U. Tuychibayev, N. U. Akhmedova, I. Kazakov, A. S. Korneyev and A. I. Gagelgans, Institute of Physiology, Uzbek SSR Academy of Sciences, Tashkent]

[Abstract] A study of the structure and function of three low molecular weight peptides (HR-1, HR-2 and HR-3), isolated from the giant hornet Vespa orientalis by reverse phase, high-performance liquid chromatography and capable of initiating histamine liberation, was described and discussed. Venom was obtained from worker insects. Automatic degradation by the Edman method revealed the complete amino acid sequence of peptides HR-1 and HR-2 and a partial structure of peptide HR-3. Relatively low concentrations of peptide HR-1 (2-20 μg/ml) selectively liberated histamine from rat mast cells while concentrations of 50-100 μg/ml produced nonselective cytotoxic action. This peptide also hemolyzed erythrocytes, inhibited Ca^{2+}-ATPase while uncoupling Ca^{2+} transport from ATP hydrolysis and induced lipid bilayer mebrane conductance, predominantly for monovalent cations via formation of single conductivity channels. Figures 8; references 24: 11 Russian; 13 Western.

02791

Purification and Properties of Protective Factor of Bacillus anthracis Toxin

18400390b Moscow BIOKHIMIYA in Russian
Vol 53 No 2, Feb 88 (manuscript received 9 Feb 87)
pp 283-288

[Article by V. A. Abalakin, L. V. Sergeyeva and T. D. Cherkasova, Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, Moscow]

[Abstract] A study of the nature of fragmentation of the protective factor of Bacillus anthracis toxin during purification under selected conditions of reduced proteolysis and a comparison of the protective factor and its low molecular weight fragments used male BALB/c and CAB mice (weight 18-20 g). Toxic cultural supernatant was produced by growing strain 34 F_2 B. anthracis for 24 hours on a liquid nutrient medium. The bacterial cells were precipitated by centrifugation and lethality of the toxic cultural supernatant and other purified preparations was assessed on inbred BALB/c mice during observation for 5 days after injection of 1.0 ml of the preparation into the caudal vein. Filtration of the sterile cultural supernatant, produced by 24 hour cultivation of the vaccinal strain, through a column packed with porous glass or silochrome showed that both edematic and lethal factors as well as protective factors of the toxin were adsorbed on the column. Elution of the adsorbed antigens permitted rapid concentration and purification of biologically active components of the toxin from large volumes of the sterile cultural supernatant under conditions of decreased proteolysis. The protective factor in 24 hour toxic cultural supernatant existed as large molecules (87 kD) as well as low molecular weight fragments with molecular mass on the order of 17-18 kD. Protective preparations with molecular mass below 68 kD have weak biological activity. Figures 4; references 13: 4 Russian; 9 Western.

02791

Trypsin and Chymotrypsin Inhibitors From Viper Venom

18400390c Moscow BIOKHIMIYA in Russian
Vol 53 No 2, Feb 88 (manuscript received 12 Feb 87)
pp 302-308

[Article by E. P. Siygur, M. Yu. Samel and Yu. R. Siygur, Institute of Chemical and Biological Physics, ESSR, Tallinn]

[Abstract] The purification and chemical and physicochemical properties of common viper venom serine proteinase inhibitors are described. Use of gel filtration and ion exchange chromatography isolated trypsin and α-chymotrypsin inhibitors with a molecular weight of approximately 7000 daltons and isoelectric points 10 and 9.9, respectively, from Vipera berus berus venom. Inhibitor I preferably inhibits α-chymotrypsin (K_i = 4.6 x 10^{-10} M) and forms a 1:1 enzyme-inhibitor complex. Inhibitor II is more effective in relation to trypsin (K_i = 6.7 x 10^{-11} M), forming an EI-complex at a molar ratio of 1:2, but it also inhibits α -chymotrypsin (K_i = 1.4 x 10^{-9} M) and porcine kallikrein (K_i = 1.6 x 10^{-8} M). Inhibitor II contains no valine or methionine. Figures 5; references 20 (Western).

02791

Analysis of Oligomeric Forms of Human Leukocyte Interferons Produced by Genetic Engineering

18400390d Moscow BIOKHIMIYA in Russian Vol 53 No 2, Feb 88 (manuscript received 7 May 87) pp 332-340

[Article by S. I. Borukhov, S. V. Kostrov, L. S. Izotova, M. N. Orlova and A. Ya. Strongin, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow]

[Abstract] An analysis of oligomeric forms of genetically engineered human leukocytic interferons α-INF-A, -N and -I_1 produced by corresponding recombinant strains of Pseudomonas sp. and an explanation of possible causes of formation were described and discussed. Use of sodium dodecylsulfate-polyacrylamide gel (Na-DS-PAAG) electrophoresis, gel-permeation high-performance liquid chromatography and immunoblotting showed that homogeneous preparations of α-INF-A, -N and I_1 produced from the biomass of the corresponding producer strains of Pseudomonas sp. contained some oligomeric forms produced via S-S-intermolecular cross-linkage, constituting 10-15 precent, 4-7 percent and 2-5 percent of the content of the monomeric form in the preparation. Immunological testing with the use of MAT NK-2 and [^{125}I]NK-2 established the fact that oligomeric forms of α-INF-A, -N and -I_1 are present in the preparations at all stages of isolation and purification and apparently are formed at early stages of synthesis in the microorganism cell. The effect of limited proteolysis and acid denaturation, alkaline denaturation and thermodenaturation on α-INF-A aggregation and polymerization was discussed. Na-DS-PAAG electrophoresis without a reducing agent showed that denaturation of 10 percent of trichloroacetic acid significantly increased the amount of oligomeric forms in the preparation of homogeneous and, especially, partially proteolyzed INF. Figures 4; references 20: 7 Russian; 13 Western.

02791

Mechanism of Activation of Escherichia coli Transformation Process by dsRNA

18400389a Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 41 No 2, Feb 88 (manuscript received 13 Oct 87) pp 99-103

[Article by R. A. Zakharyan, Yu. V. Tadevosyan, N. G. Azaryan and K. G. Karagezyan, Institute of Experimental Biology, ArSSR Academy of Sciences, Yerevan]

[Abstract] A study of incorporation of ^{14}C-labeled oleic acid into E. coli phospholipids under conditions of induction of the state of competence of cells by ds-RNA and the effect of ds-RNA on the lability of E. coli phospholipids previously incubated with ^{14}C-labeled oleic acid by the Weiss method showed that ds-RNA significantly increases E. coli transformation. The appearance of intermediate lysoforms of phospholipids and free unsaturated fatty acids having membranolytic properties is apparently a factor which increases cell membrane permeability and promotes DNA transport into the cell and transformation under the effect of ds-RNA. Figure 1; references 13: 1 Russian; 12 Western.

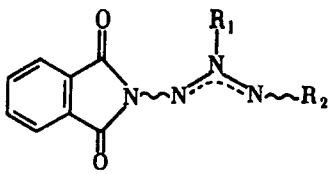
02791

1-Phthalimidoazimines—Electroneutral Reversible Cholinesterase Inhibitors Containing Polynitrogenous 1, 3-Dipolar Groups

18400372c Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 299 No 4, Apr 88 pp 1012-1015

[Article by I. V. Voznyy, N. N. Kovalev, M. A. Kuznetsov, S. N. Moralev, Ye. V. Rozengart, A. A. Suvorov, N. P. Stepanova, A. Ye. Khovanskikh, Institute of Evolutionary Physiology and Biochemistry imeni I. M. Sechenov, USSR Academy of Sciences, Leningrad]

[Abstract] The interaction of cholinesterase with a series of organic derivatives of polynitrogenous 1,3-dipoles—1-phthalimidoazimines (I-VIII)—was studied to determine whether electroneutral molecules of organic dipoles are capable of interacting with the active surface of cholinesterase. Azimines I-VIII were produced by oxidizing N-aminophthalimide (IX) with lead tetraacetate in the presence of the appropriate azocompounds. The researchers used purified preparations of acetylcholinesterase from human erythrocytes and butyrylcholinesterase from equine blood serum. The rate of anti-enzyme action did not depend on the length of incubation of effectors and enzymes, and for azimines IV and VII (IV, R_1 = $C(CH_3)_3$, R_2 = phenyl; VII, R_1, R_2 = $-C(CH_3)_2CH_2C(CH_3)_2-$) dilution of the reaction medium reduced the degree of inhibition. This suggests that the anticholinesterase activity is reversible. The efficiency of the azimines depends on structure. The difference between the weakest inhibitor and the strongest for acetylcholinesterase was 8-fold; for butyrylcholinesterase, 125-fold. The elongation of the alkyl radical R_1 from a methyl to a propyl group in the series I-III (I, R_1 = methyl; II, R_1 = ethyl; III, R_1 = propyl; R_2 = phenyl for I, II, III) was accompanied by a more than 4-fold increase in ability to inhibit only butyrylcholinesterase. The majority of the compounds were more specific inhibitors of butyrylcholinesterase. The difference between the enzymes exhibited itself in terms of inhibiting effect: almost all the compounds were competitive



inhibitors of acetylcholinesterase, whereas only VI and IX were competitive for butyrylcholinesterase (VI, R_1, R_2 = $-CH_2CH_2CH_2-$). The azimine group binding site appears to be the anion point region, the role of which is more pronounced for acetylcholinesterase than for butyrylcholinesterase. The presence of the dipole assured almost all the azimine derivatives binding in the active center of acetylcholinesterase; the rather high overall hydrophobicity of the azimine molecules resulted in considerable nonspecific binding by butyrylcholinesterase. Figures 3; references 8: 6 Russian, 2 Western.

13227

UDC 533.72;536.758

Molecular Electronics

18400427 Kiev VISNYK AKADEMIYI NAUK UKRAYINSKOYI RSR in Ukrainian
No 3, Mar 88 pp 29-33

[Article by Yu. B. Haydidey, doctor of physicomathematical sciences]

[Text] Further advancements in microelectronics obviously rest on additional miniaturization of essential computer components (ECC), such as transistors, switches, conductors, memory chips, and so forth. The rate of miniaturization is accelerating. In 1960, for example, the minimal size of components was on the order of 30 μ, a parameter that by now has been reduced to 1 μ, representing a value some 75-fold lower than the thickness of human hair. Experimental samples have been obtained that are 0.5 μ wide. The indications are that by the mid-nineties component widths will be reduced to 0.1 μ. Many view this level as the lower limit possible with present semiconductor technology.

One approach to further reductions in the size of ECC is based on the use of molecular groups as structural units[1], as well as individual large biomolecules. The concept of "molecular electronics" arose from such considerations.

Some 10 to 15 years ago the construction of molecular electronic instruments (MEI) remained within the realm of popular science and was a topic rarely approached by serious scientists (see, for example, Aviram and Ratner's work on molecular rectifiers in 1974); however, the last 6 years has seen considerable activity in this area. In the USA three conferences have been held on molecular electronics (1981, 1983, and 1986), while in Japan a meeting was held at the end of 1985 on "Bioelectronics and Molecular Electronic Instruments." The first two conferences dealt with the principles of MEI, sometimes approaching semifantastic proportions. The latter conferences demonstrated that the field has attained maturity and research on molecular electronics is proceeding on a solid foundation.

It would be tempting to use natural biological molecules or their fragments as ECC. However, there are many difficulties with such applications. As a result, researchers continue to rely on more conventional and traditional components to attain the desired molecular and architectural configurations. The most popular approach is based on the proposal advanced by Langmuir and Blodgett (LB) for construction of laminar molecular structures. Their method utilizes amphiphilic molecules, i.e., molecules in which one end is hydrophobic (usually an aliphatic chain of 18-22 carbon atoms) and the other—the active end—is hydrophilic. On water they form a layer of similarly oriented molecules with the hydrophilic end in the water and the hydrophobic end on the outside that can be transferred to a solid substrate.

When fatty acids or their salts are used as the amphiphilic molecules, high quality dielectric films several hundred angstroms thick can be obtained by layering such monolayers in a sequential manner on a solid substrate. The LB method can also yield more complex structures: a monolayer of amphiphilic dye molecules covered by several layers of fatty acids, followed in turn by yet another layer of dye molecules possessing a slightly different absorption spectrum.

Systems of this kind have been employed in studies on the transfer of electronic excitation energy, electron tunneling (certain dye molecules become electron donors when excited), and so forth. Barro, et al.[2] improved the LB methodology to obtain films consisting of N-docosyl pyrimidine, TCNQ and I.

Although considerable progress has been made in the construction of molecular assemblies with controlled properties, further advances shall depend on theoretical developments, since the use of these molecular systems in MEI depends on an understanding of the transport and memory characteristics of such ordered molecular systems.

The Institute of Theoretical Physics of the UkSSR Academy of Sciences has long been interested in processes occurring in molecular systems. The views of Davydov, et al.[3, 4] regarding soliton energy and charge transfer in quasiunidimensional molecular structures, and the papers of Davydov[5], Petrov, Ukrainskiy, and Kharkyanen[6, 7] dealing with protein-mediated electron tunneling have been well received and widely discussed in literature concentrating on molecular electronics.

Studies on these problems are continuing at the Institute of Theoretical Physics. Research results on energy and charge transfer in ordered molecular systems are of particular relevance from the theoretical and practical aspects.

Future MEI can be expected to rely on a variety of electronic processes, but resonance tunneling of electrons through a system of potential barriers appears to be the most promising for a number of reasons.

The "transparency" of a system consisting of two or more fairly high and broad potential barriers may be represented by a nonmonotonic energy function of falling particles with a clearly defined maximum. Transparency has a unit value at the maximum, the position of which is defined by the position of the quasiresonant level of an electron in the valley between the potential barriers. F. Carter[8], who was among the first to suggest the application of this phenomenon to MEI, was attracted by the ease with which this process can be controlled by, for example, varying the height of one barrier to either open or close the electron channel. Davydov and Yermakov[9], based on their detailed analysis of this process, assessed the transit time of an electron wave form through a system of barriers and

determined that under conditions of resonant tunneling the electrons remain in the valleys for a relatively long period of time: the duration increases exponentially with increases in height and breadth of the barriers. They suggested that electron fluxes encountering potential barriers will "sense" the presence of electrons occupying spaces between the barriers. In other words, resonance tunneling is indeed a nonlinear process. The transparency of a barrier system was shown to depend on the volume of the electron flux. Bistability prevails, in the sense that a single value of an incoming flux finds correspondence in two values for a flux that has transited. Generation of autooscillations has been demonstrated, as well as signal modulation, and so forth[10]. These observations confirmed the feasibility of using resonant tunneling in MEI, provided nonlinearity is taken into account.

The fundamental elements in many kinds of MEI may consist of lamellar molecular structures, represented by layers of amphiphilic donor and acceptor molecules separated by insulating molecular layers. In view of this, charge transfer in such systems remains an object of intensive research[1].

The movements of electrons in molecular crystals differ sharply from their movement patterns in ionic and covalent semiconductors[12]. The high polarity of the molecules and the strong interaction of electrons with polarized crystals in systems represented by bioorganic molecules hinders interaction of free electrons, requiring evaluation of carrier interaction with deformational degrees of freedom.

Charge tunneling in lamellar donor-acceptor systems represented by molecules has been studied by Haydidey and Yakimenko[11]. In the case under consideration excess electrons approach a layer of donor molecules and tunnel through a dielectric layer to reach a layer of acceptor molecules. The excess electrons deform their environment in relation to their concentration, concomitantly with a change in electron energy. Since the velocity of electron tunneling is highly dependent on electron distribution among the donors and acceptors, it becomes obvious that in systems with strong electron deforming interactions tunneling will be nonlinear. In such cases a bistable situation prevails: the system may be in the open state in which there are as many electrons on the acceptors as on the donors, or in the closed state in which electrons fail to reach the acceptors from the donor molecules[12]. Transition of the system from a monostable to bistable state is a nonequilibrium phase transition; the system may be controlled by varying the velocity with which the electrons hit the donor molecules or the potential difference between the donor and acceptor layers.

Charge extension along the layers is also of interest. In linear processes involving rigid molecular systems with low electron-deformational action forces, any fluctuation in the carrier concentration is dissipated according to the laws of diffusion. However, in nonlinear systems the concentration drop between the donor and acceptor layers can be described by wave rather than diffusion characteristics, with the shape of the trigger wave remaining unaltered as it spreads. A current impulse corresponds to the charge trigger wave, with the velocity of the impulse along the layers determined by boundary conditions and pumping mechanisms. It appears that this form of charge mobility in multilamellar systems may be applicable in MEI intended for recording and transferring information.

MEI require molecular quasiunidimensional conductors for charge and energy transfer for communication among the various components. In practice such quasiunidimensional systems contain defects (traps, barriers, etc.) which, in conjunction with the characteristics of unidimensional mobility, interact with carriers even in the presence of low defect concentration to impact on the efficiency of charge and energy transfer.

The importance of traps and barriers in charge and energy transfer hasreceived much attention at the Institute of Theoretical Physics. Onipko and Halchuk[13, 14] have developed a method of configurational averaging for limited quasiunidimensional systems with defects and demonstrated the important structural and behavioral information that such an approach can provide. They determined the trapping kinetics of quasiparticles by measuring exciton and dopant luminescence under various conditions of exciting illumination and so on. Their results demonstrated that electron and exciton transport may be regulated in an efficient manner by the introduction of certain dopants into the molecular conductors.

In summary, it can be stated that only the first few steps have been taken toward the construction of a computer based on molecular electronics. When this endeavour shall be completed remains problematical. The initial findings on the behavior of ordered molecular structures and assemblies, however, are encouraging.

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12172/09599

Dynamics of Recombination of Primary Ion-Radical Pairs in Photosynthetic Reaction Centers from Rhodobacter sphaeroides

18400372b Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 299 No 4, Apr 88 pp 1004-1007

[Article by S. L. Logunov, S. S. Vasilyev, B. N. Korvatovskiy, V. B. Tusov, N. P. Noks, N. I. Zakharova, N. P. Grishanova, V. Z. Pashchenko, A. A. Kononenko, Moscow State University imeni M. V. Lomonosov]

[Abstract] The authors' work advances the study of the kinetics of laser-induced oxidation-reduction transformations of bacteriochlorophyll and bacteriopheophytin into protein-pigment complexes of photosynthetic reaction centers consisting of wild Rhodobacter sphaeroides bacteria and a carotinoidless strain of R-26 by studying electron transport processes when Q_A transfer is blocked via reduction with dithionite (approx. 1 mg/ml) and sodium ascorbate (approximately 10^{-3} M). The recombination kinetics of the blocked R-26 reaction centers were similar to those observed by other experimenters. In the wild reaction centers, however, P^+I^- kinetics were more complex: an additional component with a time τ_2 equal to or approximately equal to 0.7 ns was observed. The application of an external 500-gauss magnetic field increased the characteristic time τ_1 of the slower recombination component in both blocked and unblocked reaction centers by 10-20 percent and did not affect the duration of the component τ_2. The principal difference between R-26 and the wild type is the absence in the R-26 reaction centers of spheroidene carotinoid, which is typical of the wild type. Evaluations of the energy gaps between P*I and $^1(P^+I^-)_{Initial}$ levels and $^1(P^+I^-)_{Initial}$ and $^1(P^+I^-)_{Relaxed}$ levels yields $\Delta G_1 = 0.12$ eV and $\Delta G_2 = 0.03$ eV for the wild reaction centers and $\Delta G_1 = 0.12$ eV and $\Delta G_2 = 0.06$ eV for the R-26 centers at room temperature. The data support the notion that the proton relaxation processes that stabilize the electron on the intermediate acceptor—bacteriopheophytin I—promote the direct transport of the photomobilized electron to the reaction centers of photosynthesized purple bacteria from bacteriochlorophyll P to the primary quinone Q_A. Figures 3; references 13: 5 Russian, 8 Western.

13227

Prospects of Biotechnology

18400429 Budapest CMEA: ECONOMIC COOPERATION in English No 1, 1988 pp 21-24

[Article by Leonid Repin, journalist, Soviet Union]

[Text] Biotechnology has lately been given priority by all those who favor progress.

Lothar Klaus, Assistant Director of the Institute for Biotechnology in Leipzig, of the Academy of Sciences of the GDR, told me:

"Biotechnology has become a working tool of the scientific and technical revolution."

Being directly related to practical needs of man, it has an enormous responsibility, indeed. Methods of biotechnology and those of genetic engineering have really fantastic possibilities. An industry has been developed which, using microorganisms, manufactures pharmaceuticals, including antibiotics, amino acids, enzymes, a variety of pesticides and fodder yeasts, as well as producing hydrogen, a clean fuel, and that is not all!

Responsibilities and Benefits of Science

Dimitri Mendeleev, a 19th century Russian scientist, was convinced of the possibility of getting nourishment from the elements of air, water and soil, in addition to the processing of commonly used plants. The first factories established for this purpose would make use of the simplest organisms which are similar to yeast as well as water, air, minerals and the heat of the sun. Many generations of scientists had to follow his footsteps until feasible solutions were found.

That was the issue I raised with Dr. Klaus.

"Well, take the problem of the manufacture of fodder protein from different sorts of raw materials. It was biotechnology that opened a new way."

In the institute where Dr. Klaus is working, that problem has been under consideration for six years. They succeeded in preparing fodder protein of high quality, first from a petroleum distillate and later on from other products not used earlier in the preparation of food.

In the GDr. they know well analogous activities of Soviet scientists. In the All-Union Scientific Research Institute of Protein Synthesis a new food product has been developed, a protein based on yeast. The envelope of the yeast cells is destroyed with the aid of enzyme preparations, the protein extracted from the cell is purified, concentrated and dried. One can obtain 250 kg of protein from one ton of yeast in that way. This colorless, odorless powder contains about 80 percent protein, 5 percent hydrocarbons and about 2 percent nucleic acids. It can be used as an additive to a large variety of products of low protein content. Calculations show that, by processing 1 million tons of yeast a year, one can obtain an additional quantity of protein equivalent to 1 million tons of high quality beef. Of course, nobody proposes to make steaks out of yeast cells, the point is to produce protein to be used as an additive.

Dr. Klaus introduces me to Peter Kuschka, who deals with problems of environmental protection using the methods of biotechnology.

"It is common to use aerobic bacteria to clean sewage", says Peter Kuschka. "In the settling tank air is transmitted through the sewage to enable the bacteria to utilize the oxygen for the processing of organic materials. We decided to purify some particular kinds of sewage using anaerobic bacteria which are capable of obtaining energy without using oxygen."

That method promises significant advantages. The most important of them is that it is not necessary to blow air through the settling tank. Energy can be saved and a number of mechanisms and appliances become superfluous. In addition, about 40 per cent of the carbon originating from the life functions of the microorganisms can be utilized in the form of a gaseous fuel either in the enterprise or for the heating of buildings.

"What are the concrete responsibilities of your group, within the general objectives," I asked Dr. Kuschka.

"We produce biochemical reactions. We want to get, through their parameters, a clear picture of the processes. Before recommending any method for use, we must be absolutely convinced of its feasibility," he said. Hearing this I could not help glancing at Dr. Klaus who had explained the same idea: that of the responsibility of research workers to science, to society and also to themselves.

Dr. Klaus added that one of the recent developments at the institute concerning the conservation of the environment was the extraction of mercury from sewage using bacteria.

In the institute there is no department or laboratory which does not deal with questions of practical importance. One fourth of the staff is engaged in long-term problems and basic research. Science cannot be limited to applied research related to the most timely problems, it must exceed the pace of change of the environment, and illuminate by a powerful projector the way of its own further development. Otherwise it can easily get into the situation of a train running with full speed into a dead-end.

Dr. Klaus spoke about contacts with Soviet colleagues. It often happens that young men are sent to the biology center at Pushchino near Moscow. Dr. Joachim Engels, after his return from the Soviet Union, was entrusted with the management of a new department for genetics.

The workforce of the institute maintains extensive cooperative with organizations of the CMEA member countries. Symposia are organized on biotechnology, genetics and other fields where joint research is done. The GDR is the coordinating country, within the framework of the CMEA, of the cleavage of cellulose which has many concrete applications. The institute in Leipzig carries out joint work with the Institute for Microbiology in Riga and the Institute for Microbiology of the Academy of Sciences of the Soviet Union. The Institute in Pushchino helps German colleagues in research aimed at the elimination of sulphur from brown coal. That problem is of major importance for the GDR. Recently permanent business contacts were established with the Scientific Research Institute of Bratislava concerning the study of the genetic modifications of the culture of a fungus which can be used for the cleaveage of cellulose.

Technical Appliances

One can find few scientists who would not wish to play a prominent role in their own sector. Stoyan Tsonkov, Doctor of Technology, Director of the Central Laboratory for Biological Devices and Automation in Sofia, talked of biology as the science of the next century.

Forecasts affirm that biology will make progress. The development of biology will lead to global discoveries by the next century. One can only agree.

What were the achievements of biology in the past? The accumulation of knowledge, to start with. Scientists studied the variety of the forms of life, they were astonished at its possibilities and made the first attempts to penetrate into the essence of its processes. Biology today is engaged in essentially different concerns. It sets merely practical targets, learns to control vital processes, making sure that they proceed in conformity with scientific decisions and extracting maximum benefits for humanity. This refers primarily to molecular biology, genetics, biophysics, microbiology and last but not least to biotechnology.

What is Stoyan Tsonkov about today? The development of appliances necessary for biotechnological experiments of course.

"It is impossible to start the intensification of biotechnology in the economy," he says, "before a certain level of technology and of manufacturing processes is reached in biotechnology."

"What do you mean in particular?"

"I mean modern recording and control devices, automated lines of biotechnology and advanced engineering. It is, of course, equally important to develop adequate apparatuses in which biotechnological processes proceed. We, in our laboratory, are dealing with the design of some equipment for the primary processing of raw material, bioreactors or fermentors, regulators, appliances for the separation of the bioproducts obtained, for their concentration and clearing, as well as various means of computer technology for the control and optimization of the processes."

Difficulties were mentioned which arise in course of the design of new appliances. The main difficulty is the fact that we are faced with microorganisms. Those living creatures complicate the manufacturing process by making it nonstationary. It is thus necessary to maintain the temperature at a given value with a tolerance of 0.1-0.2°C. It is equally important to assure the stability of the concentration of the input solution, etc.

The use of cybernetics in biology and bioengineering helped to define a scientific approach to biosynthesis. In recent years we succeeded in establishing mathematical models of various bioprocesses and in optimizing the latter both in static and dynamic modes of operation.

Dr. Tsonkov reports that bioreactors with microprocessor control were developed in their laboratory, in cooperation with specialists from Czechoslovakia and the Soviet Union. Those reactors are now in mass production in Bulgaria and exported to other socialist countries. Joint work is done with specialists from the biological center in Pushchino near Moscow where a number of devices from Bulgaria operate perfectly.

Recently an automated bioreactor, having, as Tsonkov says, a more intelligent computer, was developed here. The history of the experiment is stored in its memory. That memory enables the researcher to follow the behaviour of the individual parameters as a function of time. The bioreactor is among the best in the world in the accuracy of the maintenance of test conditions. Tanya Vladimirova and George Vylevsky are amongst those who contributed.

Vylevsky specialises in the design of reliable, high-sensitivity transducers. His recent construction is a transducer for flow meters for the measurement of the consumption of gas and liquids. The device he designed together with his colleagues is called: quasimetric consumption meter for gases. Such devices do not exist in Bulgaria. Knowing Georgi Vylevsky, I say with conviction that such a device will soon exist in Bulgaria.

"Such transducers," says Vylevsky, "are rather expensive so it is not advantageous to import them. Their development is not a simple job. The first problem is that the device should operate at high temperature of up to 150°C. Similar devices have been constructed in the past to function at a maximum of 50°C."

With the Aid of Genetic Engineering

"Can we imagine the danger inherent in the incidental, artificial development of living creatures which did not exist earlier?" asks Dr. Frantisek Kapralek, who is in charge of the laboratory of genetic engineering of the Institute for Molecular Genetics of the Czechoslovak Academy of Sciences.

The picture of a monster emerged in my imagination. It was, who knows why, extremely similar to an ant but of the size of a dog. Such a creature, if all capabilities of an ant were multiplied in it proportionally to the growth of the size, would be capable of moving at a speed equal to that of a well run-in Lada motor car, and it would be many times stronger than an elephant. It could bit wit one single move of its powerful jaws, through ancient trees. Oh no, we do not want them.

Dr. Kapralek agreed with me and reassured me:

"When genetic engineering first started, some said that this was an extremely dangerous business because the appearance of microorganisms which did not exist in nature might lead to irremediable consequences. Today, with the accumulated experience of genetic engineering, it can be said that those worries were unfounded. We learned to work in a way which can assure full reliability and safety."

We crossed the rooms of a unique laboratory, the only one of this kind in Czechoslovakia, and Dr. Kapralek explained that one of the most important experiments carried out here is a high-accuracy project aimed at the extraction of enzymes from the virus causing malignant tumors in poultry. That enzyme is used as a raw material in further research for new ways of defeating malignant diseases of poultry. If scientists had no such high-accuracy instruments as genetic engineering provides, enabling them to carry out precise operations on microorganisms, success could be hardly expected.

Jir Zadina, candidate in biology, flings open the massive door, which is similar to that of a bank safe, then another one, and so we can enter the main part of the laboratory in which he experiments on microorganisms. Now I realize why Dr. Kapralek spoke with such a conviction of the assurance, for the environment, of reliability and safety of the experiments.

The first safety measure is a careful sterilization of all instruments in autoclaves. The second is the lower pressure of the atmosphere in the room, to prevent microorganisms from penetrating neighbouring rooms where the pressure is higher. The third is a sophisticated net of special filters.

In the Institute for Microbiology of the Academy of Sciences of Czechoslovakia, Deputy Director Zdenek Hostalek speaks of experiments of equally high accuracy aimed at the artificial production of microorganisms necessary for man. This is one of the recent objectives of science, an area which had not existed earlier, though many generations of scientists and alchemists of the Middle Ages worked hard, with firm faith in success and yet in vain, to develop new materials with preset properties. The development of government enabled biologists to do things that could not be done before.

In 1982, the government of Czechoslovakia decided on the development of biotechnology. This is a sector in which possibilities of fundamental science are in accordance with practical interests which may well promote production. A number of the scientific research institutes of the country participate in that work and so does the Institute for Microbiology.

New technologies are under development in the department for molecular biology and genetics, that is what Dr. Hostalek says. Here research is going on to obtain new microorganisms which can be used in the economy. Some of the genetic material is transferred from one microorganism to another, so new creatures are obtained which do not exist in nature. It goes without saying that all activities take place under the same sterile conditions as those demonstrated by Dr. Kapralek.

Well-known microorganisms extract nitrogen from the air but multiply slowly. On the other hand, there are microorganisms that reproduce themselves rapidly. The business is theoretically simple but it cannot be solved easily in practice. The particular gene must be selected from rapidly multiplying microorganisms which is responsible for their multiplication and transferred to the bacteria which extract nitrogen. The goal to be reached in the institute is the development, through government, of new, more active cultures to be applied in industry.

Dr. Hostalek stressed that, in the institute, a number of other experiments are also undertaken in accordance with the concrete wishes of manufacturers. Citric acid, which is necessary for the production of many foodstuffs and detergents, had earlier been obtained from molds cultivated on sugar. This was very expensive. A new technology has been developed in the institute. Citric acid is obtained with the use of bacteria cultivated on enzymes. The process has already been implemented in industry.

Another problem is the development of wasteless technologies and the utilization of materials that had earlier polluted the atmosphere or water and found their way to rivers and lakes. Could those materials not become useful as a nutrient for some industrial microorganisms?

Materials which poison water are certain alkalis. In the Institute for Microbiology, a method has been developed, according to which those alkalis can be utilized, with the aid of bacteria, for the production of fodder protein. Those bacteria multiply actively on those alkalis and form a sort of yeast which can be added to the fodder mix of cattle.

"The first factory which will apply our technology is already under construction," says Dr. Hostalek, "and our next goal is to obtain clean food protein. That is our present work, to be done jointly with our Soviet colleagues."

I often head such tales during my visit in the institute. Actually all major research is being done in common with Soviet specialists. The majority is joint work with the participation of the Institute for Biochemistry and Physiology of Microorganisms of the Academy of Sciences of the Soviet Union.

The prospects of cooperation in biotechnology are wide.

/06662

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Induction of Crown Gall in Cotton Plants

18400418 Dushanbe DOKLADY AKADEMII NAUK TADZHISKOY SSR in Russian Vol 30 No 10, Oct 87 (manuscript received 5 Jun 87) pp 670-672

[Article by K. A. Aliyev, O. S. Lifanova and M. K. Karimov, Institute of Plant Physiology and Biochemistry, Tajik SSR Academy of Sciences]

[Abstract] Studies were conducted on the use of Agrobacterium tumefaciens B6 for the induction of crown gall in cotton plants (Gossypium hirsutum), as a model system for assessing plasmid Ti transformation and expression of T-DNA. Plants cultivated under sterile conditions were scarred and infected with A. tumefaciens when 10 days old. Gall formation on the stems was favored by a temperature in the 25-27°C range and plant juice pH 5.5. The formation of galls became noticeable after 20-25 days, reaching a diameter of 0.5-0.6 mm. The gall-bearing plants had much more extensive leaf development, which was attributed to hormonal imbalance due to the presence of the Ti plasmid of genes for auxin and cytokinin. These studies demonstrated the feasibility of using A. tumefaciens in inducing grown galls in cotton plants and as an approach to targeted plant modification. Figures 2, tables 1; references 3 (Russian).

12172/9274

Greenhouses of the Future

18400465 Moscow ADVANCES OF SCIENCE AND TECHNOLOGY in English No 11, 15 Apr 88 pp 1-3

[Article by Marina Kuryachaya, Novosti correspondent]

[Text] Supplying us with fresh vegetables and greens on the year-round basis, hothouses and greenhouses do great damage to the environment. The explanation lies in the hothouse technology.

To prepare one hectare of quality soil mixtures sometimes up to 10 hectares of ploughland have to be destroyed. Meanwhile, natural rehabilitation of the soil cover takes abo it a century. In hothouses the soil has to be replaced practically annually for vegetables and even more often for flowers.

Of course, the used soil mixture can be reused, but only after it is disinfected thermally, or chemically, which is not always 100% safe. In the meantime, hothouses consume hectares upon hectares of fertile land.

To resolve this problem an entirely new technology is required for hothouses. Hydroponics appeared to offer the solution. But, its introduction has given rise to a range of other complex problems. Specialists around the world are seeking a way out. A commercial plant for unconventional growing of hothouse produce is in operation at the Mytishchi ornamental gardening state farm near Moscow. Its manager Nikolai Zagorulko is the author of the new invention, registered at the State Committee for Inventions and Discoveries of the USSR.

From his study we go down to the ground floor and enter a long gallery overgrown with ivy and encased in glass. The glass-covered doors on both sides of it lead to the hothouses. We open one of them and find ourselves amidst a sea of carnations on unusually long and strong stems. They grow from a network of plastic pipes with short vertical "shoots" in which the carnations are fixed. No soil whatsoever is seen in the greenhouse.

"The most remarkable thing is that our technology does not require soil," Zagorulko explains. "The plants get everything necessary from the nutritive substance, which rules out such an arduous operation as fertilizer application. We prepare the solution and pump it in the pipes. The liquid fills them for some time and then oxygen takes its place. This alternating process is round-the-clock. We call it the water-air method."

With a light movement of his hand he pulls out a carnation with wet and clean roots. In his other had he holds the cap which covered the pipe end. The cap keeps the roots at the fixed depth.

"Look, there aren't any and cannot be any weeds here, which makes labor-consuming weed control unnecessary. We only have to do planting, removing of suckers and harvesting."

Nikolai Zagorulko cuts off the carnation and holds it horizontally by the end of the stem more than half a meter in length. The stem does not bend, which proves the flower's top quality.

"We only planted them 45 days ago and they are ripe for harvesting," he continues. "In the adjacent greenhouse where carnations were sown in the soil mixture one month ago they have not even formed buds yet." Next to carnations I see sweet pea, blossoming roses, red strawberries, green cucumbers, and ripening tomatoes. Practically any greenhouse plant can be grown by the water-air method. In a matter of two weeks the strawberry plants set fruit and blossom twice as fast as those growing in soil. Tomatoes whiten 40 days after sowing.

What distinguishes the Mytishchi technology from conventional hydroponics? The later has many variations. In Japan, for example, oxygen is fed to the root system through a complex system of thin pipes.

Another method, aeroponics, is when the roots, found in the air, are regularly sprayed with a nutritive substance. All these methods require sophisticated electronic control and automation, and often have to be computerized. The slightest error kills the plants.

The best known are hydroponic methods with the use of a solid-state substrate—gravel, moss, sand, peat, sawdust, and, recently, ion-exchange resins and mineral wool. In them the plant roots become fixed and the nutritive substance is fed. But this entails even more problems. Firstly, any substrate is costly today and can be reused only after heat or chemical treatment, if at all. As a result mountains of waste grow. The Mytishchi technology is wasteless.

Secondly, algae develop on practically any substrate, taking up the lion's share of the nutrients and suppressing the plants. Actually, they are weeds. The Mytishchi method also avoids this problem.

Lastly, the problem of the equipment is common for all hydroponic methods. Such equipment is costly and too sophisticated, including special pumps, filters and electric valves.

The water-air installation is made up of standard and, what's important, low-cost equipment—conventional pipes, pumps, level relays. It is easy-to-handle and reliable.

The largest Soviet greenhouse farms in Vilnius, Kiev and Minsk have begun to introduce the Mytishchi method. The water-air technology of the future is winning recognition.

/12223

Production of Transgenic Rabbits That Have and Express Human Somatotropin Genes

18400373a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 299 No 5, Apr 88 pp 1246-1249

[Article by G. N. Yenikolopov, V. I. Zakharchenko, M. A. Grashchuk, N. M. Surayeva, Academician G. P. Grigoriyev, Ye. A. Tinyayeva, P. M. Rubtsov, K. G. Skryabin, Academician A. A. Bayev, Member of the All-Union Academy of Agricultural Sciences imeni Lenin L. K. Ernst, Institute of Molecular Biology, USSR Academy of Sciences; All-union Scientific Research Institute of Agricultural Biotechnology, All-Union Scientific Research Institute of Experimental Veterinary, Scientific Research Institute of the Husbandry of Rabbits and Other Fur-Bearing Animals, All-Union Academy of Agricultural Sciences imeni Lenin]

[Abstract] Transgenic rabbits were produced that have and express human somatotropin. The immense technological and economic potential of such work lies in the fact that active expression of the somatotropin gene can lead to accelerated growth and increased body weight in farm animals and to increase milk production. Domestic and New Zealand chinchillas were used in the experiments. Zygotes were removed from the oviducts of the rabbits 16-20 hours after mating and injection of chorionic gonadotropin. The human growth hormone gene was injected into the male pronucleus using a KM-2 micromanipulator. After a 24 hour cultivation at 38°C in culture medium under a gaseous atmosphere consisting of 5 percent CO_2, 5 percent O_2, and 90 percent N_2, 4-8 cell embryos were transplanted into the oviducts of synchronized female rabbit recipients that were in estrus 19-20 hours before the operation and were treated with chorionic hormone. DNA was isolated from various kinds of tissue in rabbits 1.5-2 weeks of age and RNA was isolated from certain organs of the animal. A recombinant structure was produced that contained, in addition to cloned complementary DNA from a human somatotropin gene, a promoter region of the MT_1 mouse metallothionein gene, donor and acceptor splicing segments from an early region of the SV40 virus, and a polyadenylation segment from that same region. After the recombinant DNA molecules were injected into the impregnated egg cell of the rabbits, the offspring included transgenic rabbits, i.e., rabbits that had various numbers of copies of the recombinant DNA. In all, 467 embryos were transplanted; 46 transplanted embryos developed and/or came to term normally. The experiments showed the transplanted genes to be intact, with good transcription, correct use of the region for initiation of transcription, and correct tissue specificity for the transcription. Figures 3; references 15: 4 Russian, 11 Western.

13227

Isolation and Comparative Characteristics of Two Unrelated Temperate Phages for Pseudomonas putida PpG1

18400373b Moscow GENETIKA in Russian Vol 24 No 2, Feb 88 pp 239-249

[Article by V. N. Krylov, A. B. Dzhusupova, I. Zh. Zhazykov, Yu. I. Kopylova, A. F. Alnikin, V. Z. Akhverdyan, Ye. A. Khrenova, All-Union Scientific Research Institute of Genetics and Selection of Industrial Microorganisms, Moscow; Institute of Microbiology and Virology, KaSSR Academy of Sciences, Alma-Ata]

[Abstract] Pseudomonas putida PpG1 is shown for the first time ever to be a natural host of two temperate phages, PP56 and PP71. P. putida holds promise as a bacterium that can be employed in the creation of industrial producers and strains used for cleaning the environment and purifying industrial wastes. Until very recently, bacteriophages specific for strains belonging to P. putida were generally thought to be extremely rare; temperate phages had not been found. New phages, especially temperate phages, are germane to the development of techniques for the genetic analysis of P. putida, the production of phage-resistant strains, and the cloning of genes. The two phages clearly belong to different species. PP56 (Bradley classification C) is shown to form turbid negative colonies up to 2 mm in diameter on the sensitive PpG1 bacteria, with a distinct zone of lysogen growth in the center. PP71 (Bradley classification B) forms extremely small, turbid negative colonies that are barely distinguishable. PP56 has a short tail appendage, and the diameter of its head is 60 nm. PP71 has a flexible, extended appendage 195 nm long; the diameter of its head is 65 nm. Complementation tests of selected clear-plaque mutants suggest that PP56 has no less than three genes participating in lysogenization; PP71, no less than two. Both phages are highly capable of transducing chromosomal and plasmid markers. PP56 grew normally in the presence of all the study plasmids. The growth of PP71, however, was completely inhibited by plasmids of the IncP2 group—PMG53, RMS165, and RMS139—and partially inhibited by RPL11. The genetic material of the phages is in the form of double-stranded DNA; endonuclease-sensitive sites, however, differ. Figures 4; references 18: 4 Russian, 14 Western.

13227

Cloning Some BgIII Fragments of Bacteriophage T4 DNA in the Vector Plasmid pSCC31

18400355a Moscow GENETIKA in Russian Vol 24 No 1, Jan 88 pp 34-41

[Article by R. G. Nivinskas, Institute of Biochemistry, LiSSR Academy of Sciences, Vilnius]

[Abstract] The engineering of the plasmid pSCC31, which contains single BgIII and HindIII sites in the gene for EcoRI endonuclease and a P_L promoter for the lambda phage, made it possible not only to clone BgIII fragments of the phage's DNA with positive selection of plasmid transformants, but also to bring about heat-induced synthesis of proteins of the cloned genes. The author attempts to clone BgIII fragments of T4 DNA with lengths of 3.3-8.1 kb in the vector plasmid pSCC31. A multiple mutant from genes 56 (amE51), denA (nd28), and denB (deletion rIIH23), and alc (alc8) was used, as were T4 amber mutants. E. coli strains consisted of JC4588/λ^+(pSCC31-B12), M5248, K803, B834 galU56, B40, B^E. Three BgIII fragments of T4 DNA were cloned: No 7.1, with genes 25-29; No 8.1 and No 9 with genes

17-21 and part of gene 22. The author was unable to clone BglII fragments No 7.2, 8.2, and 6, which envelop the same area between BglII sites 119.40 and 137.20 on the physical map of the phage. Several genes nonessential for the growth of the phage, as well as genes with various regulatory functions, are located in the genome region next to the phage coat genes (genes 54, 31), DNA ligase genes (30), and the RNA ligase gene (63). This genome region also houses at least three genes whose products have a destructive effect on the bacterial cell. Figures 2; references 17: 2 Russian, 15 Western.

13227

Crossing Triticale and Secalotricum with Rye. I. Seed Setting and Germination Ability of Hybrid Grains

18400355b Moscow GENETIKA in Russian
Vol 24 No 1, Jan 88 pp 80-88

[Article by U. K. Kurkiyev, A. K. Abdulayeva, I. M. Surikov, All-Union Scientific Research Institute of Plant Growing imeni N. I. Vavilov, Leningrad]

[Abstract] Hybrids of triticale and rye make it possible to produce new forms of wheat-rye recombinants, lines with intergenome chromosome substitutions, secondary 4x-triticale, and alloplasmic forms of rye. The authors crossed tricale and rye of different levels of ploidy and different origin in 1976-85 in the city of Derbent, Dagestan ASSR. A total of 22 forms of hexaploid triticale were used—two primary hexaploids and 20 secondary hexaploids. In addition, six octaploid triticales and two specimens of secalotricum were used, as were five specimens of 4x-triticale and one 4x-secalotricum. The authors' data bear out the literature in terms of the role ploidy plays in the outcome of hybridization between tricale and rye: crosses with 4x-rye produce more seed settings in octoploid and hexaploid triticales and secalotricums. Unlike the tetraploid amphidiploids, hexaploid and octoploid triticales surpass secalotricums of the same ploidy in terms of seed setting. However, seed setting in octoploid triticales pollinated with diploid rye was 9.1 percent, as opposed to 27.5 percent in hexaploid triticales. Parallel behavior is observed in hexaploid and octoploid triticales and secalotricums in terms of germination ability. Overall, triticales and secalotricums of the same ploidy demonstrate similar abilities to cross with rye and similar germination ability. References 12: 6 Russian, 6 Western.

13227

Problems of Human Factor and Its Activation

18400354a Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian Vol 9 No 2, Mar-Apr 88 pp 3-19

[Article by Ye. V. Filippova, candidate of psychological sciences; a summary of a roundtable discussion that appears in source under the rubric "Restructuring the Psychological Sciences"]

[Abstract] A roundtable discussion of the problems associated with the human factor was held by the Scientific Council for the Complex Study of Human Problems in February 1987, at the Institute of Psychology of the USSR Academy of Sciences. A wide range of specialists—such as philosophers, psychologists, sociologists, economists, lawyers, educators, physiologists, military personnel, and medical professionals—attempted to define the term "human factor" and to place it in a social context and, specifically, in the context of restructuring. In his concluding remarks, the chairman of the council—USSR Academy of Sciences Corresponding Member B. F. Lomov—summarized the discussion by emphasizing that the human factor is more than simply man; rather it is "man's relationship to other things." The driving force behind the social process, the human factor operates at a global level, within large groups (classes, nations, and generations, for example), within small groups (such as labor collectives), and in the individual. References 6: 6 Russian.

13227

UDC 577.112.3+577.19.612.017

Experimental Evaluation of Synthetic Oligopeptides and Other Immunomodulators

18400425 Riga IZVESTIYA AKADEMII NAUK LATVIYSKOY SSR in Russian No 4, Apr 88 (manuscript received 25 Sep 86) pp 54-61

[Article by A. F. Blyuger, Kh. M. Veksler, Zh. P. Graudinya, L. Ye. Poluektova, O. Yu. Sondore, N. F. Gromova, P. E. Kagan and B. A. Shif, Riga Medical Institute]

[Abstract] A series of experimental studies were conducted to assess the immune effects of tuftsin, rigin, inosiplex, and double-stranded (ds)-RNA synthesized at the Institute of Organic Synthesis and the Institute of Microbiology of the Latvian SSR Academy of Sciences. The animals studies employed C57B1/6 and BALB/c mice, as well as immunodeficient C57B1/6 following gamma irradiation (450 rads). In addition, in vitro studies were conducted with cells derived from healthy humans and those afflicted with viral hepatitis and breast cancer. The constellation of studies demonstrated and confirmed the beneficial effects of the agents in question in terms of improving the immune status of experimental animals and in clinical trials. The mechanism of action was believed to involve membrane phenomena of the monocyte/macrophage system, as well as of the B cells. Thus, tuftsin enhanced the adhesive properties of monocytes from the oncologic patients, enhanced antibody production by B cells and, possibly, interleukin-1 production in patients with chronic hepatitis. Rigin exerted similar effects to tuftsin but appeared to be a more potent agent. In addition, rigin also possessed adjuvant activity and affected the receptor mechanisms of poorly differentiated B cells. Inosiplex was found to be effective in cases of hepatitis due to stimulation of antibodies against viral antigens. Finally, both inosiplex and ds-RNA the activity of natural killer cells in patients with hepatitis. Tables 4; references 10: 4 Russian, 6 Western.

12172/12223

Effect of Reaferon on Functional Activity of Peripheral Blood Lymphocytes and Neutrophils of Volunteers

18400393b Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 88 (manuscript received 26 Feb 87) pp 61-65

[Article by D. I. Gabrilovich, L. V. Serebrovskaya, R. T. Murzabayeva, M. I. Semashko, A. V. Zmyzgova and N. B. Shalygina, Central Scientific Research Institute of Epidemiology, USSR Ministry of Health, Moscow]

[Abstract] A study of the effect of reaferon, a genetically engineered analog of human α_2-interferon, on cellular factors of immunity of healthy persons was carried out in order to determine its possible toxic effect, to establish optimal safe doses for future clinical use and to determine the immunomodulating effect of reaferon after use for 3 days. Healthy volunteers (25) (23 men and 2 women, ranging in age from 18-35 years) were hospitalized and separated into 5 groups. Members of 3 groups received interferon intramuscularly twice a day for 3 days (course dose was 6 million conventional units for the first group, 18 million units for the second group and 27 million conventional units for the third group). The fourth group received 2 million conventional units in 150 ml of physiological solution intravenously over a period of 1.5 hours daily for 3 days, and the fifth group received reaferon intravenously twice a day in 200 ml of physiological solution over the course of 2 hours for 3 days (course dose 18 million conventional units). The functional state of the lymphocytes and neutrophils was assessed by the rosette formation test. Small doses of reaferon (6 million conventional units) did not impair the rosette formation capacity of immunocompetent cells. Other doses inhibited this capacity in both the T- and B-lymphocytes and also affected the neutrophils. The effect was dose-dependent. The suppressive effect of large doses of reaferon lasted for a week (the length of the experiment). References 15: 5 Russian, 10 Western.

02791

UDC 632.95:614.89

Convenient Means of Protecting Respiration and Vision Organs

18400408 Moscow KHIMIZATSIYA SELSKOGO KHOZYAYSTVA in Russian No 3, Mar 88 pp 36-38

[Article by B. M. Tyurikov, A. N. Koroteyeva and V. I. Gavrishchuk, candidate of technical sciences, All-Union Scientific Research Institute of Labor Safety of the USSR State Committee on Agriculture]

[Text] In agriculture, it is not always possible to eliminate all dangerous and harmful factors of the environment affecting human beings. Normal working conditions are ensured by using the means of individual protection.

Studies on working conditions on jobs using agricultural chemicals were conducted in the hothouses of the sovkhoz "Yubileynyy," in the granaries of the OPKh [Experimental Model Farm] "Krasnaya Zvezda" of the VNIIOT [All-Union Scientific Research Institute of Labor Safety] of the USSR Gosagroprom and at the base of the Orlovskiy Rayon Association "Selkhozkhimiya" of the Orel Oblast.

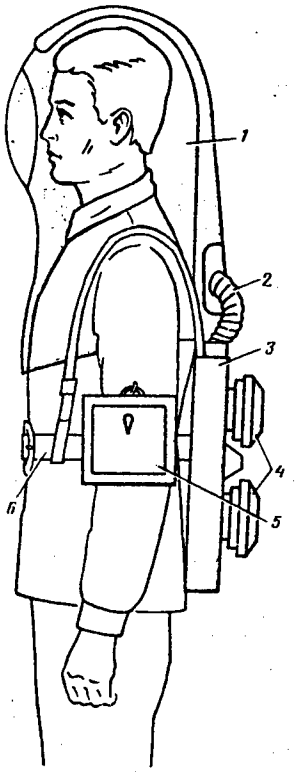
The basic operations (preparation of pesticide solutions at the solutions center, plant spraying and treatment of the tents of the hothouses with pesticide solutions with the aid of a hand boom sprayer) were preformed by plant protection teams.

Presowing treatment of grain at the OPKh "Krasnaya Zvezda" Granary with granozan was done with grain treater PS-10.

Studies at the "Selkhozkhimiya" base were done on jobs connected with equipment servicing at the station for pumping liquid ammonia from railroad tank cars into stationary reservoirs and its distribution to consumers. Working conditions were studied according to the following indexes: temperature, speed and contamination of the working zones by agricultural chemicals and relative humidity.

Meteorological conditions were observed with the aid of generally known instruments. Air sampling for analysis was done by a model 822 aspirator and a VB2-02 individual sampler on special absorbers. The samples were analyzed in a chemical laboratory according to the existing methods.

The obtained results showed that the concentration of harmful substances in the air of the working zones at the above locations exceeded in some cases the maximum permissible levels by 100 times. Consequently, it is necessary to use means of individual protection.



General View of the Respiratory System with Forced Air Filtering.

Key:
1. "One-size-fits-all" helmet
2. Connecting hose
3. Air blower
4. Antigas boxes
5. Power source
6. Fastening straps

At the present time, respiratory organs and the eyes are protected against pesticides by using RPG-67 protective gas respirators and RU-60M universal respirators in combination with protective airtight glasses PO-2, as well as gas masks with large and small boxes. These respirators and gas masks have high protective qualities. However, working with them on causes undue fatigability and lowers labor productivity, because the filter and valves create resistance to respiration, the temperature of the air is elevated and it contains much carbon dioxide, and the half-mask or mask exert pressure on the face and head. PO-2 goggles also have drawbacks: fogging of the glasses, pressure on the soft tissues of the face, and insecure fixation on the head of the worker.

In order to improve the working conditions of those working with pesticides, we developed and produced samples of respiratory systems with forced air filtering DAsPFV (figure), as well as special protective goggles. DAsPFV provides reliable protection of the respiratory

organs, the eyes and the skin of the head when the air of the working zone contains not less than 18 percent of free oxygen, harmful aerosols of up to 250 PDK (maximum permissible concentration), steam or gas of harmful substances of up to 100 PDK. The system consists of a face part in the form of a "one-size-fits-all" helmet with a transparent screen and a cape, a connective air hose, an air blower with antigas boxes, a power source with an air blowing rate regulator and fastening straps.

The system operates on the following principle. When the motor is turned on, the rotor of the centrifugal air blower rotates. Contaminated air enters the antigas boxes which purify it from harmful substances. Then, the purified air with over-pressure enters the helmet through the connecting hose, after which it enters the respiratory organs of the worker. The excess air, as well as the spent air, escapes into the atmosphere through the leaky areas between the cape of the helmet and body of the worker. The required amount of air supplied to the face part is ensured by the air blowing rate regulator by changing the voltage on the motor and is set by the subjective sensation of the worker proceeding from the condition of creating the necessary overpressure in the space under the mask preventing the entry of harmful substances in the respiration zone and the airflow for respiration necessary for performing active jobs.

For jobs at lower concentrations of harmful substances of the order of 10...15 PDK when respirators can be used, special protective glasses have been developed consisting of a rubber body, double sight glasses, a head piece, a plastic casing, filtering-absorbing elements, and plastic ear caps.

To ascertain the possibility of using DAsKFV and the protective glasses for jobs with pesticides, they were tested under industrial conditions at the above-mentioned agricultural sites.

The protective effectiveness of DAsPFV was evaluated by the coefficient of harmful substance penetration in the space under the mask which was determined as a ratio of the concentration of the harmful substance in the air of the space under the mask in the respiration zone to the concentration of harmful substances in the air of the work zone.

The protective effectiveness of the glasses was determined by sampling the preparation outside and inside of the space under the glasses. Samples from under the glasses were taken by washing off the penetrated pesticide from the eyelids and from the inner surface of the glasses.

Evaluation of the operation properties of the product was done by their visual examination and questioning the testers.

The concentration of harmful substances in the air of the work zone exceeded the PDK in some instances by 95...100 times (table). The respiratory system exhibited sufficiently high protective effectiveness. For example, the protection coefficient for granozan and ammonia was within the limits of 100 (with respect to mercury).

On jobs performed in protective glasses, the granozan concentration in the air of the work zone reached 0.06 mg/m^3, which exceeds the PDK by 12 times. In the samples washed off the external surface of the glasses, from 0.05 to 0.25 μg Hg was detected. No mercury was detected in samples washed off the eyelids and the internal surface of the glasses.

RU-60M and RPG-67 respirators with G-mark cartridges provide reliable protection against granozan at the concentration in the air of work zones from 0.05 to 0.75 mg/m^3.

Individual questioning of persons participating in the test revealed their unanimous opinion regarding the possibility of using DAsPFV and the special protective glasses for jobs connected with the use of agricultural chemicals.

The advantage of DAsPFV in comparison with the respirators and gas masks used now on the above-mentioned jobs is the overall protection of the respiratory organs, the eyes and skin of the head, improved visibility and absence of resistance to respiration and pressure on the skin of the head.

The special protective glasses have reliable fixation on the head, insignificant pressure on the skin of the face, and fit tightly along the obturation line; moreover, they satisfactorily combine with respirators having a PR-7 rubber half-mask.

At the present time, the problem of series production of the respiratory systems is being decided. The needs of the agricultural industry complex of the country amount to 50,000 items. The preliminary cost of the respiratory system is about 100 rubles, the economic effect in comparison with the PSh-2 hose gas mask amounts to about 70 rubles per one respiratory system a year.

Working Conditions at Agricultural Sites and Protective Effectiveness of DAsPFV Against Agricultural Chemicals

(1) Виды работ	(2) Вредное вещество	(3) ПДК, мг/м³	(4) Метеоусловия на рабочих местах			(5) Концентрация вредных веществ в воздухе рабочей зоны, мг/м³	(6) Концентрация вредных веществ в воздухе подмасочного пространства, мг/м³	(7) Коэффициент проникания, %
			t, °C	φ, %	(12) P, КПа			
		(8) *Теплицы совхоза «Юбилейный»*						
(13) Опрыскивание растений пестицидами	(9) Карбофос, 50 % к. э.	0,5	18,9	62,7	98,4	10,0	(16) Не обнаружено	(18) Близок к нулю
(14) Приготовление растворов пестицидов на растворном узле	(9) Карбофос, 50 % к. э.	0,5	18,9	62,7	98,4	13,0	» »	То же (19)
(15) Шатровая обработка теплиц смесью пестицидов	(10) Рогор, 40 % к. э., (11) куprозан 80 % с. т.	0,5	22,2	47,0	98,4	48,0	(17) Следы	(18) Близок к нулю
	(9) Карбофос, 50 % к. э.	0,5	22,2	47,0	98,4	12,0	(16) Не обнаружено	То же (19)
		(20) *ОПХ «Красная Звезда»*						
(21) Протравливание зерна с помощью машины - протравителя ПО-10	(23) Гранозан	(24) 0,005 (по ртути)	4,0	—	100,5	0,5	(19) То же	(19) То же
		(25) *База «Сельхозхимия»*						
(22) Обслуживание технологического оборудования на станции перекачки жидкого аммиака	(26) Аммиак	20	18,0	60,0	98,8	170	1,7	1,00

Key:—1.Types of jobs—2.Harmful substance—3.Maximum permissible concentration, mg/m^3—4.Meteorological conditions at work sites—5.Concentration of harmful substances in the air of the work zone, mg/m^3—6.Concentration of harmful substances in the air under the mask, mg/m^3—7.Penetration coefficient (percent)—8."Yubileynyy" Sovkhoz Hothouses—9.Karbofos (dicarboethoxy ethyl dithiophosphate)—10.Rogor—11.Kuprozan—12.P, KPa—13.Plant spraying with pesticides—14.Preparation of pesticide solutions at the solution center—15.Tent treatment of hothouses with pesticide mixture—16.Not detected—17.Traces—18.Close to zero—19.Same—20.OPKh "Krasnaya Zvezda"—21.Grain treatment with PO-10 grain treating machine—22.Servicing technological equipment at the liquid ammonia pumping station—23.Granozan—24.0.005 (mercury)—25."Selkhozkhimiya" Base—26.Ammonia

/12232

Selection of Laser Therapy Regime for Burn Wounds

18400388c Kiev KLINICHESKAYA KHIRURGIYA in Russian No 3, Mar 88 (manuscript received 10 Dec 86) pp 53-55

[Article by D. Ye. Pekarskiy, Yu. V. Tkach and A. A. Balenko, Kharkov Scientific Research Institute of General and Emergency Surgery, Ministry of Health, UkSSR]

[Abstract] A study of the state of vascularization of the skin made it possible to establish the regime of irradiation of burn wounds by a helium-neon laser, since the radiation penetrates to a depth of 1-1.5 mm. The state of the capillary blood flow was judged by indicators of its volumetric rate, registered with the use of a doppler gauge. Healthy persons (8 men and 7 women, average age of 36.2 + or - 0.54 years) had a volumetric rate of 6.4 + or - 1.2 ml/(min x 100 g of tissue). This figure was assumed to be normal and was compared with figures reported by other authors who used other methods of study. A therapeutic laser, consisting of four LG-75-A helium-neon lasers and an optical-mechanical system for combining the laser beams was used. The emission power of each source at the outlet was 25 mW. The optimal regime of laser therapy proved to be a radiating power of 100 mW, a power density of 7.9-31.6 mW/cm^2, a single exposure of at least 40 s and a course of treatment of 8-12 (at least 4-5) irradiation sessions every other day. Figure 1; references 7: 5 Russian; 2 Western.

02791

Use of Intracorporeal Laser Irradiation of Blood in Treatment of Patients With Purulent Inflammatory Diseases

18400388d Kiev KLINICHESKAYA KHIRURGIYA in Russian No 3, Mar 88 (manuscript received 12 Jan 87) pp 59-60

[Article by D. N. Kavkalo, Ye. P. Konovalov, V. V. Skiba, M. V. Zemskova and V. N. Terletskiy, Kiev Scientific Research Institute of Clinical and Experimental Surgery, UkSSR Ministry of Health; Department of General Surgery (headed by Professor V. S. Zemskov), Kiev Medical Institute imeni Academician A. A. Bogomolets]

[Abstract] A study of the effect of intravenous irradiation of the blood by an LG-75-1 therapeutic laser on the course of the pathological process in 88 patients with purulent-septic processes showed the effectiveness of this method when the blood was irradiated 5-6 times a day for 30 minutes. All patients displayed the following: some increase or decrease of body temperature with the latter being a favorable prognostic sign; decrease of heart rate even with a body temperature increase; arterial pressure change as a function of the initial indicators; a decrease of the inflammatory process and intoxication and an increase of indicators of immunological reactivity and rapid elimination of microorganisms from the blood. Subjective sensations of the patients during treatment included a feeling of heat throughout the body or in the extremities, spine and neck, weakness, drowsiness and disappearance of pain.

02791

Mechanism for the Photoreactivation of Superoxide Dismutase With Helium-Neon Laser Light

18400372a Moscow DOKLADY AKADEMII NAUK SSSR in Russian Vol 299 No 4, Apr 88 pp 995-1000

[Article by Ye. A. Gorbatenkova, O. A. Azizova, N. V. Paramonov, Yu. A. Vladimirov, Scientific Research Institute of Physicochemical Medicine, Moscow]

[Abstract] A low-energy helium-neon laser is capable of activating a copper-zinc-containing superoxide dismutase that is inhibited by an acidic pH. Inhibition in an acidic medium is due to the fact that a change in the ligand sphere of copper cannot take place, which is due to histidine-61 protonation on the zinc side. At this point, the metal's valence cannot change during the dismutation reaction. When the pH changes to neutral or weakly basic values, deprotonation occurs and the bond between the Zn^{2+} and the Cu^{+} is restored, as indicated by optical and paramagnetic properties typical of an intact enzyme. The authors mixed superoxide dismutase from bovine erythrocytes in 10 mM tris buffers with pH values of 5.9, 7.4, and 8.2. The solutions were kept for no longer than two hours. Copper complexes with histidine were prepared by mixing 1 mM $CuCl_2$ and 4 mM histidine in the 10 mM tris buffer. The samples were brought up to the pH values given above and were left at room temperature for 4-6 hours. After two hours of incubation at pH 5.9, enzyme activity was 5-7 percent of the control. Laser irradiation of the superoxide dismutase brought about reactivation: after 60 seconds, the enzyme activity was 107.5 percent of that in the buffer with a pH of 7.4. The absorption spectra of the irradiated superoxide dismutase after 60 seconds of exposure was analogous to that of a solution with a pH of 8.2. The spectra returned to normal 40 minutes after the irradiation was stopped. Paramagnetic studies yielded similar results. The ability of the red helium-neon laser to reactivate the superoxide dismutase in an acidic medium stems from photoinduced histidine-61 deprotonation and subsequent restoration of the structural integrity of the active center. This suggests that the laser light can model a pH change toward basic values. In pathological conditions in which changes are reversible, elevating the concentration of hydrogen ions can give rise to protonated enzymes that have variable catalytic activity. This would appear to explain why a low-energy laser has no effect on normally functioning cells and tissue, but has a marked stimulating effect on targets in extreme or pathological states. Figures 6; references 12: 4 Russian, 8 Western.

13227

Laser Radiation in the Complex Treatment of Acute Otitis Media

18400371b Kiev ZHURNAL USHNYKH, NOSOVYKH I GORLOVYKH BOLEZNEY in Russian
No 2, Mar-Apr 88 pp 40-43

[Article by V. Ya. Dikhtyaruk, A. I. Rozkladka, Children's Department, Kiev Scientific Research Institute of Otolaryngorhinology imeni A. I. Kolomiychenko]

[Abstract] One hundred fifty-five individuals between the ages of 10 and 72 were treated for acute otitis media at the Kiev Scientific Research Institute of Otolaryngology. In 112 patients, the standard treatment complex was combined with irradiation at $\lambda = 0.63$ μm from an LG-75 (AFL-1) helium-neon laser with an output power of up to 20 mW. After one or two laser therapy sessions, the patients reported reduced pain in the ear and in the mastoid process. Body temperature dropped from 39-39.5 to 37-37.4°C. Three or four sessions generally eliminated the pain entirely, reduced the hyperemia of the tympanic membrane considerably, and eliminated most, if not all, discharge from the ear. Complete recovery was recorded 6-10 days after treatment began. In the remaining 43 patients (those who did not undergo laser therapy), the condition followed a more severe course and lasted, on average, three days longer. Clinical, audiometric, laboratory, and thermographic indices indicate that complex therapy that includes laser treatments is effective and advisable for acute influenzal otitis media and acute otitis suppurativa. References 9 (Russian).

13227

Immobilized Insulin for Oral Administration

18400410 Moscow KHIMIYA I ZHIZN in Russian No 6, Jun 88 p 69

[Unattributed article: "Insulin in Powders"]

[Text] The majority of diabetics require regular insulin injections. Injections are not only uncomfortable for the patient but also can result in various complications. Therefore, naturally the best insulin preparations are in the form of powders or tablets.

Recently the Soviet biochemists F. B. Levin (candidate of biological sciences, Moscow Stomatological Institute imeni N. A. Semashko) and S. A. Morenkova (doctor of biological sciences, Institute of Surgery imeni A. V. Vishnevskiy) developed this type of preparation—a dry powder which can be taken orally. The insulin is not broken down by gastic juices because it is immobilized—attached to a nonsoluble support. The technology is very economical and allows no less than 80 percent of the original crystalline insulin to be utilized.

Testing of the preparation in laboratory animals showed that it begins to act, on the average, 3 hours after its administration and lasts for approximately 24 hours. These parameters are similar to those for prolonged action insulin for injection, which is currently produced by domestic and foreign pharmaceutical industries. The new preparation has another important advantage—it has a good shelf life. Even after a four year storage at the temperature of an ordinary refrigerator (+4°C), it maintains full activity.

It is necessary to quickly establish the production of sufficient amounts of the preparation and to conduct comprehensive studies and clinical testing. The authors of the new preparation work in institutes which do not have a direct role in searching for agents to treat diabetes. So now the fate of the preparation depends on whether the corresponding institutes of the USSR Ministry of Health show any interest in it.

Effect of Antioxidants on Intracellular Regeneration of Cerebral Cortex Neurons in Burn Disease

18400388a Kiev KLINICHESKAYA KHIRURGIYA in Russian No 3, Mar 88 (manuscript received 10 Dec 86) pp 40-42

[Article by K. S. Volkov and S. A. Smorshchok, Department of Histology (headed by Professor S. A. Smorshchok), Ternopol Medical Institute]

[Abstract] An experimental study of the effect of membrane stabilizers α-tocopherol and sodium selenite on the degree of changes of submicroscopic organization of cerebral cortex neurons after thermal burns involved experiments on 90 guinea pigs which received a 6 percent solution of nembutal intraperitoneally 5-10 minutes before infliction of a 60 second water vapor burn on the unshaved back. The burns covered 15-20 percent of the body surface and included IIIA and IIIB degree burns. The animals were placed in one of three groups. Group 1 animals were not burned. Group 2 animals were burned (control) and group 3 animals, after being burned, were given 30 mg of α-tocopherol per kg of body weight parenterally and sodium selenite (20 μg/kg of body weight) daily for the first 10 days of the experiment and then once every 3 days until the end of the experiment. Animals were decapitated on the 1st, 7th, 14th, 21st and 28th day of the experiment and cerebral cortex nuerons of the somatosensory zone were studied under an electron microscope. Destructive changes of neurons increased with the increase of time from burn infliction. Even in the early period after burns, chromatolysis was less pronounced in burned animals given the antioxidants and it assumed a peripheral or segmentary nature. Significant activation of the nuclear apparatus occurred on the 7th and 14th day. The moderate increase in the number of lysosomes and the small number of autophagosomes in the experimental group in comparison with those in the control group indicated lesser injury of the neuronal membrane components and decrease of catabolic reaction intensity typical of burns. Thus, use of the antioxidants in burn disease created conditions necessary for implementation of intracellular regenerative processes and promoted relative normalization of the structure of many cerebral cortex membranes by the end of the experiment.

02791

Use of Immobilized Proteases in Preparation of Burn Wounds for Plastic Closure

18400388b Kiev KLINICHESKAYA KHIRURGIYA in Russian No 3, Mar 88 (manuscript received 5 May 87) pp 46-48

[Article by Yu. P. Potapskiy, T. I. Davidenko, A. V. Chuyenko, A. A. Fomichev and V. F. Shatalov, Odessa Medical Institute imeni N. I. Pirogov, Physicochemical Institute imeni A. V. Bogatskiy, UkSSR Academy of Sciences]

[Abstract] Chinchillas (100, weight 2800-3000 g) experienced IIIB degree burns by infrared irradiation using the Gubler method on the shaved skin of the back (nearly 10 percent of the body surface), under hexenal narcosis. The effectiveness of using an immobilized form of bacterial protease (elastomesenterin) was assessed after use of various procedures on 7 groups of rabbits. Elastomesenterin produced a pronounced necrolytic effect. Single application of a 27 PU dose completely lysed the scab and completely cleansed the burn wound within 3.2 + or - 0.2 days after beginning of treatment. Reference 1 (Russian).

02791

The Possibility of Using Artificial Intelligence To Solve Problems Associated with Clinical Labyrinthology

18400371a Kiev ZHURNAL USHNYKH, NOSOVYKH I GORLOVYKH BOLEZNEY in Russian
No 2, Mar-Apr 88 pp 15-21

[Article by V. I. Pivrikas, Department of Otolaryngorhinology, Clinic at the Scientific Research Institute of the Physiology and Pathology of the Cardiovascular System, LiSSR Ministry of Health]

[Abstract] The author touches upon concepts and features of medical expert systems—artificial intelligence systems that use deductive reasoning and are said to be capable of replacing the physician in a given diagnostic field—presenting an overview that includes Western systems such as INTERNIST-I, MYCIN, GLAUCOMA, MOLGEN, ONCOCIN, RX, GALEN, ATTENDING, AI/RHEUM, and CODEX and the Soviet system MODIS. A prototype system used for at least five years at the Klaypeda Clinic for evaluating the functional state of the vestibular analyzer operates with an SM-1800 computer linked to an SM-1600. The first computer constitutes the lower level of a two-level hierarchy,; the second computer, the higher level, for control and interpretation. The system has two operating system packages, requiring 320 K of memory. Figures 2; references 45: 19 Russian, 26 Western.

13227

Characteristics of Klebsiella pneumoniae Plasmid Carrying Drug Resistance and Antilysozymal Activity

18400393a Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 3, Mar 88 (manuscript received 12 Jan 87) pp 28-32

[Article by V. M. Bondarenko, A. L. Yablochkov, Yu. M. Romanova and V. G. Petrovskaya, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya]

[Abstract] An explanation of genetic control of antilysozymal activity of septicemic strains of klebsiella, isolated in a hospital during klebsiella infection, involved electrophoretic study of K. pneumoniae 22-110, 17 previously described strains possessing antilysozymal capacity and 4 strains not possessing it. Study of the profile of plasmid DNA of klebsiella strains which inactivate lysozyme showed that the presence of antilysozymal activity in the bacteria is associated with the function of plasmids with a molecular weight of 55-60 MD. Plasmid pAlz 60, isolated from blood of a septicemia patient, includes markers of resistance to several drugs in the replicon, is a conjugative plasmid and is expressed in a wide range of hosts. PAlz 60, an fi$^-$ type conjugative plasmid has one restriction site for endonucleases EcoRI and XhoI and 16-20 sites for restrictases KpNI, BglII and HindIII. The plasmid is transferred to recipient strains of enterobacteria of different taxonomic groups with a frequency of 1 x 10^{-5} to 1 x 10^{-7}. References 13: 7 Russian, 6 Western.

02791

Formation of Pathogenic Properties in Escherichia coli and Klebsiella pneumoniae in Vitro

18400389b Yerevan BIOLOGICHESKIY ZHURNAL ARMENII in Russian Vol 41 No 2, Feb 88 (manuscript received 21 Jan 87) pp 150-151

[Article by S. T. Mnatsakanov and N. M. Arutyunyan, Armenian Scientific Research Institute of Epidemiology, Virology and Medical Parasitology imeni A. B. Aleksanyan, Yerevan]

[Abstract] In view of the uncertainty existing in problems concerning formation of pathogenic variants in different representatives of enterobacteria, especially transmission of plasmids which determine synthesis of biologically active substances possessing pathogenic properties, this problem was studied with emphasis on transmissibility of the capacity to synthesize enterotoxin with the use of 11 enterotoxigenic strains of Escherichia coli isolated from children with acute intestinal diseases. In E. coli, transmission of resistance to ampicillin occurred with a frequency of 1 x 10^{-2}-1 x 10^{-4} in 8 donor strains and was absent in 3. Production of enterotoxin was observed in 12 of 32 transconjugants having the capacity to synthesize enterotoxin. Transmission of resistance to ampicillin from E. coli to K. pneumoniae occurred with a frequency of 1 x 10^{-2}-1 x 10^{-5}. The studies confirmed the possibility of in vitro transmission of enterotoxigenicity and adhesion factors by nonenterotoxigenic and nonadhesive strains of Escherichia and Klebsiella which may reveal pathogenic properties of E. coli and K. pneumoniae. References 7: 3 Russian; 4 Western.

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Use of Ultra-High Frequency Field To Accelerate Epithelization of Donor Wounds in Burn Patients

18400388e KLINICHESKAYA KHIRURGIYA in Russian No 3, Mar 88 (manuscript received 4 Feb 87) pp 75-76

[Article by B. V. Grechko, D. A. Telyushchenko, Yu. G. Kadyshev, P. G. Litvinov and S. B. Marilova, Department of Surgical Diseases No. 2 (acting director—docent B. V. Grechko), Odessa Medical Institute imeni N.I. Pirogov, 5th Municipal Clinical Hospital, Odessa]

[Abstract] A study of the effect of an ultra-high frequency field on donor wounds of patients after autodermoplasty in order to establish optimal conditions for wound epithelization and healing involved 40 patients ranging in age from 20-55 years, with severe burns covering from 1-10 percent of the body surface. Control group patients were treated by generally accepted methods while experimental group patients received the same treatment plus exposure to an ultra-high frequency field for 10-15 minutes daily until complete epithelization of the donor wounds, which occurred on the 6th-9th day after the beginning of treatment. There were no complications. The newly formed skin was rosy, without any signs of defects, which made it possible to use the skin at a later stage of autodermoplasty.

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Possible Structural-Functional Relationship Between Pyracetam and Vasopressin

18400392a Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No 3, Mar 88 (manuscript received 18 Mar 87) pp 271-275

[Article by T. A. Gudasheva, R. U. Ostrovskaya, F. V. Maksimova, S. S. Trofimov, M. Yu. Kosoy, G. M. Molodavkin and A. P. Skoldinov, Institute of Pharmacology, USSR Academy of Sciences, Moscow Oblast]

[Abstract] A study of the effect of pyroglutamylpeptides examined nootropic activity in passive avoidance conditioned reflex and transcallosal response tests in male mongrel rats (weight 180-200 g) after intra-abdominal injection of 0.2 ml/100 g of weight of the substance 15 minutes before testing, either immediately after training or 15 minutes before examination. Control animals received a 0.9 percent solution of sodium chloride. Pyracetam proved to be a synthetic analog of the N-terminal section of the basic metabolite of vasopressin. It affected memory and learning by interacting with specific nootropic receptors, playing a key role in the control of memory processes, the endogenous ligands of which are vasopressin metabolites. Comparison of physiological properties of pyracetam and pGlu-Asn-NH_2 [I] showed that I has a specificity of effect, like pyracetam and vasopressin metabolites. Its specific action only at certain stages of training confirmed that different stages of memory differ chemically. The study indicated that nootropic receptor populations are heterogeneous. Figure 1; references 11: 3 Russian; 8 Western.

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Antiviral Activity of Organosilicon Compounds With Adamantyl Fragment

18400392b Moscow KHIMIKO-FARMATSEVTICHESKIY ZHURNAL in Russian Vol 22 No 3, Mar 88 (manuscript received 29 Jan 87) pp 315-316

[Article by Ye. V. Grishina, N. S. Fedotov, V. D. Sheludyakov, N. I. Mitin, M. M. Zubairov, A. B. Kapustin and A. V. Litvinov, Scientific Research Institute of Chemistry and Technology of Heteroorganic Compounds, Moscow]

[Abstract] A study of antiviral properties of organosilicon compounds with an adamantyl substituent included tests of RNA-containing avian influenza virus on 10-day old chick embryos and DNA-containing Aeski disease virus on a chick fibroblast cell culture. Virostatic effect was assessed by the quantity (percent) of surviving chick embryos after 100 percent kill in the control and virucidal effect was determined by the difference of virus titers in the experimental and control groups. Compounds containing hydroxyallyl and oxime groups at the silicon atom and a methyl bridge between the silicon atom and the adamantane nucleus produced the greatest virucidal effect. Compounds with an oxygen or carbonyl bridge and hydroxyallyl and oxime groups at the silicon atom produced a virostatic effect on RNA-containing avian influenza virus. All compounds tested inhibited DNA-containing Aeski disease virus. References 10: 9 Russian; 1 Western.

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UDC 57.017.3:576.314

Binding of ^{3}H-Dihydroalprenolol (I) by Cardiocytes of Hibernating Mammals

18400420b Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 88 (manuscript received 26 Jun 87) pp 72-74

[Article by N. F. Gubina, L. V. Berkalo, G. F. Zhegunov and A. M. Utevskiy, corresponding member, UkSSR Academy of Sciences, Institute of Cryobiological and Cryomedical Problems, UkSSR Academy of Sciences, Kharkov]

[Abstract] A study was conducted on the concentration and binding affinities of β-adrenergic receptors of cardiocytes of gophers (Citellus undulatus) in relation to hibernation, arousal from hibernation, and wakeful status. The purpose was to correlate possible changes in the receptors with the level of heart activity: 5-10 beats/min at 2-5°C (hibernation), 400-450 beats/min at 2-5 to 30-37°C (arousal), and 300-350 beats/min at 35-37°C (wakeful state). The binding studies conducted with membrane suspensions and I were used to construct Scatchard plots which demonstrated that, with incubations at 37°C, B_{max} increased from 10.87 pmoles/mg in the hibernating state to 14.36 pmoles/mg during arousal, followed by a reduction to 8.00 pmoles/mg in the wakeful state. Concomitantly, the binding affinities in these three physiological phases showed a respective decrease, with the dissociation constants changing from 4.81 during hibernation to 8.00 during arousal and to 8.54 in wakefulness. These findings demonstrated that the level of heart activity in the gopher in the hibernation-wakefulness cycle is at least to some extent predicated on the status of β-adrenergic receptors of the heart. Tables 1; references 8: 3 Russian, 5 Western.

12172/9274

The Effect of Liposomes on the Air-Blood Barrier of the Lungs in Acute Hypoxic Hypoxia

18400359 Leningrad ARKHIV ANATOMII, GISTOLOGII I EMBRIOLOGII in Russian Vol 94 No 2, Feb 88 pp 63-67

[Article by M. M. Serdenko, Ye. V. Rozova, A. V. Stefanov, S. A. Bryginskiy, A. V. Zubarenko, Department for the Study of Hypoxic States, Institute of Physiology imeni A. A. Bogomolets, UkSSR Academy of Sciences; Department of Neurochemistry, Institute of Biochemistry imeni A. V. Palladin, UkSSR Academy of Sciences, Kiev]

[Abstract] The morphometric and ultrastructural changes produced in the air-blood barrier of the lungs when liposomes were introduced into the body during a highly hypoxic state were studied. A group of male white laboratory rats were made to breathe a hypoxic gas—7 percent O_2 in nitrogen—for 90 minutes. Another group was injected with an isotonic solution of liposomes 30 minutes after they begin breathing the same gas and 60 minutes before they stopped. A third group was injected with the liposomes just before they began breathing the gas mixture. After the rats were decapitated, pieces of the same sections of the lower parts of both lungs were studied under an electron microscope. The first group showed a great many micropinocytic bubbles in capillary endotheliocytes, sectors of local subendothelial edema, and vacuole-like, transparent formations in the cells of the alveolar epithelium; the air-blood barrier was rarely found intact. Ultrastructural changes in the second group were negligible. There was evidence of slight micropinocytosis, primarily in the endotheliocytes of the pulmonary capillaries. The surfactant system of the lungs did not appear to suffer from the severe hypoxia to which the lungs of first group were exposed. Overall, the lungs of the animals in the third group were unchanged, although some sections of the air-blood barrier did show increased micropinocytosis in the endotheliocytes of the pulmonary capillaries. The results would seem to indicate that the destruction of the permeability of cytoplasmic membranes that leads to emphysema is associated primarily with the lipid structures of the membranes. The phospholipid introduced beforehand into the body seems to block the disturbance of the structural and functional integrity of the cytoplasmic membranes of the cells that make up the air-blood barrier. Figures 3; references 16: 11 Russian, 5 Western.

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Sad State of Georgian Medicine, Health Services Deplored

[Editorial Report] Tbilisi KOMMUNISTI in Georgian on 27 April 1988 carries on page 2 under the title "If You Are a True Healer!" an unsigned 2,100-word article deploring the current sad state of Georgian medicine and health services. The first third of the article sketches the proud traditions of Georgian medicine from early times, the profound love and respect which the people have accorded their healers both in centuries past and since the advent of scientific, professional medicine in the 19th century.

The article states that these traditions are now in danger, the quality of Georgian medicine is declining on all fronts, too many doctors and other health personnel care only about money-grubbing, rural districts are poorly served, medicine is in short supply, and so many people have lost faith that nearly 10,000 Georgians yearly rush to Moscow or elsewhere outside Georgia to seek the help they need. A sociological survey revealed public attitudes of "fear and loathing," with 38 percent of the respondents concerned about corruption, extortion, and the like. The article parenthetically asks whether all those eager applicants to medical school every year are motivated by dedication or by greed. Brief reference is made to USSR Health Minister Chazov's comments at the aktiv in Georgia last summer to emphasize the ills plaguing Georgian medicine today. Among other things, the rate of doctor certification is low (figures from Adjaria are cited), the strength of various medical branches is declining, fewer higher degrees in medicine are being awarded, and the overall "reserve" is aging. Some 40 percent of Georgia's doctors live in Tbilisi, which includes only 20 percent of the republic's population; rural inhabitants are poorly served. Part of the problem is that rural leaders cannot be bothered to provide proper housing and amenities to doctors assigned there. Another problem is that a great many more women than men are entering the profession, often propelled by fond parents who think of it as an "easy" profession. In 1987, 75 percent of the medical graduates were women, and 33 percent of them got married at "job allocation" time and could not go to their assignments. In Abkhazia, 80 percent of all doctors are women, most are mothers with young children, and hence cannot attend refresher courses.

For this overall decline, also the fact that not enough is being done to prevent the alarming spread of narcotics (for example), the authors of the article blame the apathy of the Georgian Health Ministry, the institutions under its jurisdiction, and the relevant primary party organizations.

/12223

Study of Prevalence of Ischemic Heart Disease and Arterial Hypertension at Industrial Enterprise

18400397a Kiev VRACHEBNOYE DELO in Russian No 3, Mar 88 (manuscript received 2 Jan 86) pp 51-53

[Article by R. I. Mikunis, V. K. Serkova, T. A. Shirkova, Yu. I. Monastyrskiy, N. T. Bogach and A. A. Klipatskiy, Vinnitsa Medical Institute]

[Abstract] The absence of studies of the prevalence of ischemic heart disease and arterial hypertension among workers at enterprises with a high level of automated production prompted summarization of results of a 5-year observation of workers and engineering and technical personnel of a plant at which young workers (average age 29.4 + or - 4.3 years) predominated. The work requires strict attention and high concentration, rapidity and automatism of hand movements under conditions of hypodynamia. Specialized screening at the first stage of the study revealed prevalence of ischemic heart disease, hypertension and risk factors. Later stages presented measures which affect the basic risk factors of these diseases, described a treatment for cardiovascular diseases and its effectiveness. The study included 3,652 persons ranging in age from 20-60 years (2,228 males and 1,424 females) with 78.2 percent of them being under 50 years of age. Ischemic heart disease appeared in 427 persons, including more males than females. The difference in numbers between males and females leveled out with increase of age of the subjects. Arterial hypertension was diagnosed in 602 persons and borderline hypertension was diagnosed in 713. Basic risk factors included hypercholesterolemia, smoking and obesity. Therapeutic and prophylactive measures suggested included general hygienic care, mechanotherapy and hydrotherapy combined with drug therapy and suggestion. References 5 (Russian).

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Centralized Sterilization of Medical Instruments in Prophylaxis of Hepatitis B

18400397b Kiev VRACHEBNOYE DELO in Russian No 3, Mar 88 (manuscript received 16 Mar 87) pp 118-121

[Article by A. F. Frolov, M. Ya. Orgel, T. Yu. Melnichenko, L. T. Martsinkovskiy, L. F. Shevchenko, V. A. Ananyev, L. M. Stratiyenko, G. V. Matoshko, I. B. Solodar, A. P. Kolyadenko, V. A. Gelevera, V. N. Zherdetskiy, V. T. Slotyuk, G. I. Solovyeva and N. V. Tychinskiy, Kiev Scientific Research Institute of Epidemiology and Infectious Diseases imeni L. V. Gromashevskiy, Vinnitsa Regional Department of Public Health]

[Abstract] Observations performed over a 5-year period (1981-1985) at hospitals and prophylactic institutions in Vinnitsa Oblast and observation of patients for 6 months (maximum period of incubation of hepatitis B) showed that centralized sterilization of medical instruments reduced viral hepatitis morbidity and decreased the number of carriers and is an effective means of preventing viral hepatitis during out-patient care. Centralized sterilization decreased only the instrumental factor of viral hepatitis transmission. Figures 2; references 4 (Russian).

02791

Problems Associated With Restructuring Applied Psychology

18400354b Moscow PSIKHOLOGICHESKIY ZHURNAL in Russian
Vol 9 No 2, Mar-Apr 88 pp 20-26

[Article by Ya. A. Ponomarev and Ch. M. Gadzhiyev, Institute of Psychology, USSR Academy of Sciences, Moscow; Azerbaijan Social Institute of Inventor Creativity, Baku]

[Abstract] Soviet sources cite figures that suggest that Great Britain and Italy have twice as many applied psychologists as does the USSR and that the United States has 30 times as many. Such figures can hardly be turned around in a short period of time. The authors, however, propose that numbers are not the problem, since the roles of socialist psychologists, their aims, and their research methods are not the same as those in capitalist countries. The real problem, they say, is in the "level of organization" of applied psychology in the USSR, which, they say, calls for coordination between academic centers and government agencies and for the creation of a headquarters that will target and attack the specific problems facing the country in terms of applied psychology. The headquarters would address tasks such as condensing the time required for training specialists and altering the system of psychological research centers. References 17 (Russian).

13227

UDC 577.391:611.73

Calcium Transport System of Sarcoplasmic Reticulum in Early States of Acute Irradiation

18400420a Kiev DOKLADY AKADEMII NAUK UKRAINSKOY SSR. SERIYA B: GEOLOGICHESKIYE, KHIMICHESKIYE I BIOLOGICHESKIYE NAUKI in Russian No 3, Mar 88 (manuscript received 3 Aug 87) pp 63-65

[Article by V. M. Voytsitskiy, S. V. Khizhnyak and N. Ye. Kucherenko, Kiev State University]

[Abstract] The effects of x-ray irradiation on the calcium transport system of the skeletal musculature was assessed in outbred rabbits of both sexes, following irradiation of a posterior extremity in a dose of 0.21 coulombs/kg. Determinations of Ca^{2+}-ATPase activities of the sarcoplasmic reticulum showed a statistically significant (p less than 0.5) depression within 1 and 24 h of irradiation, accompanied by depression of active Ca^{2+} uptake (830 nmoles/mg protein control value, 780 nmoles/mg at 1 h, and 738 nmoles/mg at 24 h). Concomitantly, the concentration of SH groups in the membranes also showed statistically meaningful reduction from 10.0 plus or minus 0.5 moles/10^5 g protein in control preparations to ca. 8.5 moles/10^5 g protein after 1 h. These observations demonstrated that in the acute phase of radiation sickness compromised Ca^{2+}-ATPase activity led to diminished active Ca^{2+} uptake, with inactivation of the enzyme attributed to destruction of the SH groups in the sarcoplasmic reticulum. These changes, however, were also accompanied by an increase in passive Ca^{2+} uptake due to radiation-induced increased permeability in the membranes. These studies demonstrated the high sensitivity of the sarcoplasmic reticulum to radiation damage and the impact on calcium balance. Tables 1; references 14: 7 Russian, 7 Western.

12172/9274

Experimental Models of Viral Infections in Primates

18400409 Moscow VOPROSY VIRUSOLOGII in Russian Vol 33 No 1, Jan-Feb 88 p 128

[Abstract of report No 5185-B by N. P. Chizhov deposited at VINITI on 17 July 87]

[Text] Literature data on experimental models of viral infections in monkeys is summarized. The development and use of experimental models have fundamental scientific and practical importance. The information obtained in using "model" viral infections in primates is more adequate in extrapolating the data obtained to humans than information obtained using phylogenetically less related species of animals (mice, hamsters, rabbits, etc.). In this context, this review is the first attempt to systematically present features of modeling viral infections in primates. The presentation of the material is based on current viral nomenclature.

The majority of "models" of viral infections in monkeys are adequate for the corresponding human diseases. Poliomyelitis viruses of types I-III cause the development of infectious disease when various species of monkeys (rhesus macaques, Cercopithecus, etc.) are infected by parenteral or intranasal routes. The clinical picture of the disease is equivalent to that of human poliomyelitis. There are data on the modeling of rhinoviral infections in gibbons. A number of alpha viruses (Venezuelan equine encephalomyelitis virus) and flaviviruses (yellow fever, Japanese encephalitis and tickborne encephalitis viruses) cause various forms of generalized infection with lethal outcome in lower monkeys. Among the Bunyaviruses, the Rift Valley fever virus causes disease typical for man in the rhesus macaque, cynomolgus monkey, and African green monkey. As a result of a search for an adequate model, it was observed that Hantaan virus (hemorrhagic fever with renal syndrome) causes disease in squirrel monkeys. The major clinical manifestations of infection are transient uremia, interstitial nephritis, and damage of the renal tubules. As a rule, the disease ends in recovery of the infected animals. The most adequate according to pathogenesis is modeling by influenza infection in squirrel monkeys, in which intranasal (aerosol) infection by influenza A virus (H1N1, H3N2, etc.) causes febrile disease with transient viremia. The development of pneumonia has an abortive character. Under natural conditions, respiratory-syncytial viruses which are pathogenic for humans affect only humans, but the SSA strain isolated from an outbreak of acute respiratory disease in a nursery turned out to be identical to the Long strain isolated from children with acute respiratory disease. Arenaviruses (lymphocytic choriomeningitis, Lassa, Machupo, Junin viruses, etc.) are highly pathogenic for various species of monkeys. Among the pox viruses, monkeys are most susceptible to the monkey pox virus, which when administered parenterally or by aerosol causes an infectious disease in many species of lower primates which can progress from a mild to a lethal form. Fever, eruptions on the skin of the extremities, head, torso, and viremia and observation of the virus in rinse material are considered informative signs of disease. Alpha herpes viruses (herpes simplex is a typical representative) causes encephalitis on intracerebral infection of Cercopithecus and other species. The disease is characterized by a relatively short incubation period (3-4 days), fever, and distinctive neurological symptoms and results in the death of the animals 10-14 days after infection. Human herpes virus type 2 is the foremost etiological agent of genital herpes. The most representative model for humans is experimental genital herpes in Cebus monkeys. The models described may be used for studying the pathogenesis of viral infectious diseases, the efficacy of prophylactic and therapeutic preparations, and other problems of experimental virology. Tables 1; references 38.

Symposium on Degradation of Pesticides with Intensified Crop Growing Technologies (21-25 April 1987, Riga)

18400370a Kiev FIZIOLOGIYA I BIOKHIMIYA KULTURNYKH RASTENIY in Russian
Vol 20 No 2, Mar-Apr 88 pp 201-203

[Article by I. Sh. Kofman]

[Abstract] Large-scale agricultural activity necessitates that pesticides be used efficiently and safely. Of great importance in the pesticide-crop-environment relationship are the biochemistry and physiology of the effects that pesticides have on plants and the establishment of health norms regarding the use of toxic chemicals. The symposium, organized by the All-Union Scientific Research Institute for the Protection of Plants at its Baltic branch in Riga, had two working sections: "The Degradation of Pesticides" and "Group Methods of Pesticide Analysis." Among the reports in the first section was that of D. B. Girenko and M. A. Klisenko, of the All-Union Scientific Research Institute of the Hygiene and Toxicology of Pesticides, Polymers, and Plastics, in Kiev, on the processes associated with the transformation that various classes of pesticides undergo as a result of pH effects and exposure to UV irradiation. Girenko and Klisenko showed that hydrolytic and photochemical processes can lead to the formation of products that are more toxic than the pesticide used initially. Other reports in the section addressed degradation rate as affected by the application of mineral fertilizers; transformation patterns of Treflan; and the work done in Latvia in monitoring pesticide application in agriculture. Reports in the second section touched on topics such as the development of methods that use thin-layer chromatography to analyze pesticides in agricultural crops and the role of GLC, TLC, and chromato-enzymatic technology in the analysis of organophosphorus pesticides that are present with some derivatives of benzimidazole and carbamic acid.

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Prospects of Using Growth Regulators in Agriculture

18400370b Kiev FIZIOLOGIYA I BIOKHIMIYA KULTURNYKH RASTENIY in Russian
Vol 20 No 2, Mar-Apr 88 pp 203-207

[Article by V. A. Negretskiy and L. I. Musatenko summarizing the reports presented at the meeting "Scientific Basis of the Use of Plant Growth Regulators in Intensified Technologies," held 6-7 May 1987 in Yalta]

[Abstract] In summarizing the meeting titled "Scientific Basis of the Use of Plant Growth Regulators in Intensified Technologies"—which was held 6-7 May 1987 at the State Nikita Botanical Garden and which was organized by the All-Union Academy of Agricultural Sciences imeni V. I. Lenin and the All-Union Scientific Research Institute of Agricultural Biotechnology—the authors analyze the principal trends in the study of phytohormones, synthetic growth regulators, their mechanisms of action, and practical applications. The meeting itself addressed issues such as mechanisms of hormonal regulation of the growth and development of plants; new endogenic and synthetic plant-growth regulators; new antistress preparations; the synthesis of and principles for uncovering new growth regulators; government testing; the role of growth regulators in controlling harvest and its quality; and the scientific and practical bases for using growth regulators in intensified technologies. Among those whose papers were presented at the meeting, E. V. Morozova, of the All-Union Institute of Fertilizers and Agricultural Soil Science, reported success in protecting plants against drought via increased mineral fertilization and the use of cytokinins. The paper of O. N. Kulayeva, of the Institute of Plant Physiology imeni K. A. Timiryazev, showed that the use of cytokinins increases phosphorylation of RNA polymerase, which is associated with intensified protein synthesis, and, ultimately, that plants can be protected from stress chemically and that plants can be screened for drought resistance. A number of other reports described screening of growth regulators as well as the use of growth retardants.

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