

ATD Report 66-50

C B E FACTORS

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Monthly Survey No. 5

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ABSTRACT:

This monthly survey is based on Communist World open sources. It is the fifth in a series of monthly surveys covering the following areas: I. Chemical factors (pesticides, herbicides, fertilizers, psychotomimetics, other chemicals); II. Biological factors (pathogens); III. Environmental factors (aerosols, ecology, micrometeorology, soil science). Available translations of additional sources pertinent to the three subject areas are listed respectively in Appendixes 1-3. Titles of publications cited in Sections I-III are listed alphabetically in Appendix 4. There is no bibliography.

ATD Report 66-50

CBE FACTORS

Monthly Survey No. 5

ATD Work Assignment No. 50

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FOREWORD

This report is the fifth in a series of monthly surveys covering the following areas:

- I. CHEMICAL FACTORS
 - Pesticides
 - Herbicides
 - Fertilizers
 - Psychotomimetics
 - Other Chemicals
- II. BIOLOGICAL FACTORS
 - Pathogens
- III. ENVIRONMENTAL FACTORS
 - Aerosols
 - Ecology
 - Micrometeorology
 - Soil Science

Available translations of additional sources pertinent to these subject areas are listed in Appendixes 1--3. Titles of publications cited in Sections I--III are listed alphabetically in Appendix 4.

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I. CHEMICAL FACTORS

COPPER MICROFERTILIZER IN SOILS OF CHUYSKAYA VALLEY

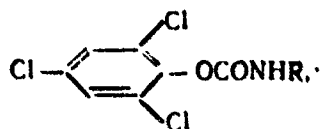
Akirov, K. Copper content in soils of Chuyskaya Valley and the effect of fertilizers. *Mikroelementy v zhivotnovodstve i rastenievodstve; sbornik, vyp 4* (Microelements in animal husbandry and plant growing; collection, no. 4.) Frunze, "Ilim," 1965. 80-87. (TAKEN FROM: *Referativnyy zhurnal*. 57. *Pochvovedeniye i agrokhiymiya*, no. 2, 1966, 38-39.)

Copper content was 9.8 mg/kg in the northern serozem soil and a maximum 8.3 mg/kg in meadow soils of the Kirgiz SSR. In 1962-63, application of CuSO_4 together with phosphorus fertilizer at the rate of 10 kg/hectare increased the crop of sugar beets. [JK]

SUPPRESSION OF PATHOGENIC FUNGI OF AGRICULTURAL PLANTS

Andreyeva, Ye. I., Yu. A. Baskakov, N. M. Golyshin, V. P. Kozuykov, R. T. Novikova, N. B. Pokrovskaya, and A. G. Yurkova. Class 45, No. 179550. *Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki*, no. 5, 1966, 97.

Carbamate esters of the general type



where R = C_1 - C_6 alkyls or cycloalkyls, have fungicidal effectiveness (full translation).

ASSOCIATION: *Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy* (All-Union Scientific Research Institute of Chemicals for Plant Protection) [VS]

PHOSPHORIC AND PHOSPHOROTHIOIC ESTERS CONTAINING HETEROCYCLIC RADICALS

Arbuzov, B. A., and V. M. Zoroastrova. *Phosphoric and phosphorothioic esters containing heterocyclic radicals. 7 Reactions of dialkyl phosphorochloridates and dialkyl phosphorothiochloridates with carbazole.* IN: *Akademiya nauk SSSR. Izvestiya. Seriya khimicheskaya*, no. 1, 1966, 194-197.

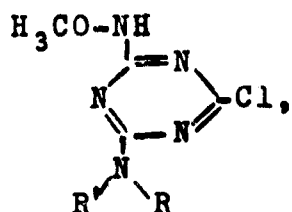
Two phosphoric amide esters: N-(diethylphosphono)carbazole(I) and N-(diisopropylphosphono)carbazole(II) were prepared by reacting the corresponding dialkyl phosphorochloridate with potassium carbazole in acetonitrile suspension at 70—80°C. Potassium carbazole was prepared by melting an equimolar mixture of carbazole and potassium hydroxide. The reaction products were crystalline with mp 76°C and 69—71°C for I and II, respectively. The I and II picrates were prepared by heating an equimolar mixture of I or II with picric acid in alcoholic solution. Both I and II picrates were crystalline products melting at 88—90°C and 121—122.5°C, respectively. The reaction of diethyl phosphorothiochloridate, $(C_2H_5O)_2P(S)Cl$ with potassium carbazole in acetonitrile or xylene solution did not yield the expected crystalline product.

ASSOCIATION: Nauchno-issledovatel'skiy khimicheskii institut im. A. N. Butlerova Kazanskogo gosudarstvennogo universiteta im. V. I. Ul'yanova-Lenina (Scientific Research Chemical Institute of Kazan' State University) [JK]

FUNGICIDES

Baskakov, Yu. A., N. N. Mel'nikov, I. A. Mel'nikova, Ye. P. Granin, Yu. N. Fadeyev, and K. O. Dmitriyeva. *Method of rust control on agricultural plants. Class 45, No. 178234. Izobreteniya, promyshlennyye obrastay, tovarnyye znaki*, no. 2, 1966, 138.

This Author Certificate introduces a method for rust control of agricultural plants by using fungicides of the type



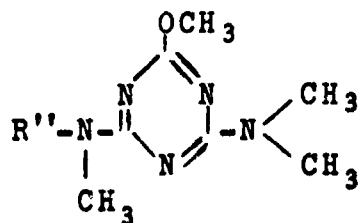
where $\text{R} = \text{R}' = \text{CH}_3, \text{C}_2\text{H}_5, \text{iso-C}_3\text{H}_7,$

$\text{CH}_2\text{CH} = \text{CH}_2, \text{n-C}_4\text{H}_9, \text{iso-C}_4\text{H}_9, \text{or } \text{C}_5\text{H}_{11};$

if $\text{R} = \text{H}, \text{R}' = \text{CH}_3, \text{C}_2\text{H}_5, \text{n-C}_4\text{H}_9,$

sec. $\text{C}_4\text{H}_9, \text{or iso-C}_3\text{H}_7,$

and of the type:



where $\text{R}'' = \text{H} \text{ or } \text{CH}_3.$

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection) [JK]

INHIBITORY EFFECT OF THE VAPORS OF ANTIFUNGAL COMPOUNDS ON *ASPERGILLUS NIGER*

Bomar, M. *Folia Microbiologica*, v. 11, no. 1, 1966, 51-55.

The effect of the vapors of a number of antifungal compounds on *Aspergillus niger* spores was studied; attention was also given to spore reactivation. Organomercury compounds were found to have the greatest sporocidal effect, requiring only trace amounts for spore inactivation. The inhibiting effect of phenylmercuric borate and phenylmercuric acetate occurred after not more than 24 and 48 hours' exposure of the spores, respectively; phenylmercuric chloride and phenylmercuric bromide required four days to take effect. Spores exposed to phenylmercuric borate for 24 hours germinated again after 21 days in an environment free of toxic vapors, while after 48 hours' exposure, the sporocidal

effect of the compound persisted even after 60 days' re-exposure. Vapors of 8-hydroxyquinoline had a sporostatic effect after 24 hours' exposure; after exposure for 21 days to a non-toxic environment, spores recovered their ability to germinate. Formaldehyde vapors had a permanent sporocidal effect after 48 hours' exposure of the spores, since germination of the spores was not observed after 60 days' exposure in a non-toxic environment. Spores exposed to p-nitrophenol vapors for 48 hours germinated after 21 days' re-exposure in a non-toxic environment; a sporocidal effect was achieved after four days' exposure. After four days' exposure to p-chlorophenol vapors, a sporostatic effect was achieved which inhibited germination for another seven days. Phenol vapors had a sporostatic effect after eight days' exposure of the spores, but inhibition was only temporary since spores germinated after 21 days' exposure in a non-toxic environment. The sporostatic effect of 8-naphthol, after eight days' exposure, persisted for 44 days before the spores recovered their ability to germinate. Other test compounds inhibited germination only while the spores remained in the toxic vapors. These compounds were: p-phenylphenol, p-chloro-m-cresol, dinitro-o-cresol, biphenyl, resorcinol, p-dichlorobenzene, pentachlorophenol, nipagin, abegin, phenyl isothiocyanate, thymol, sorbic acid, bis-trichloromethyl trisulfide, mercaptobenzothiazole, chloranil, and captan. The following substances were found to be inactive: 2,4-dinitrophenol, methoxyphenoxyacetic acid, ditethone, zinc dimethyldithiocarbamate and tetramethylthiuram disulfide.

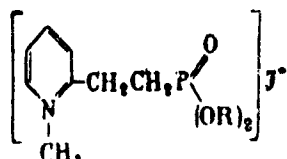
ASSOCIATION: Packaging Institute, Prague.

[BC]

PREPARATION OF QUATERNARY SALTS OF 2-(2-PYRIDYL) ETHYLPHOSPHONIC ESTERS

Dregval', G. F., and L. V. Cherkashina. Class 12, No. 179315. Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 5, 1966, 22.

To prepare physiologically active compounds of the general type



where R = C₂ — C₄ alkyls, 2-(2-pyridyl)ethylphosphonate esters were allowed to react with alkyl halides with cooling (full translation).

ASSOCIATION: Donetskii filial Vsesoyuznogo nauchno-issledovatel'skogo instituta khimicheskikh reaktivov i osobo chistykh khimicheskikh sredstv (Donets Branch of the All-Union Scientific Research Institute of Chemical Reagents and High Purity Chemicals) [VS]

MICROFERTILIZERS IN SOILS OF THE CHUYSKAYA VALLEY

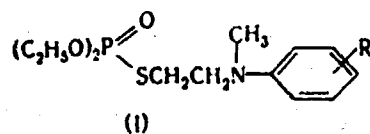
Dubovik, Ya. F. *Selective application of microfertilizers in soils of the Chuyskaya Valley. Mikroelementy v zhivotnovodstve i rastenievodstve; sbornik, vyp. 4 (Microelements in animal husbandry and plant growing; collection, no. 4.)* Frunze, "Ilim," 1965. 88-92. IN: *Referativnyy zhurnal*. 57. *Pochvovedeniye i agrokhimiya*, no. 2, 1966, 39 (2.57.280).

Data are given on Mn, Zn, Cu, Mo, Co, and B content in the topsoil of basic soil varieties of the Chuyskaya Valley on [Kirgiz SSR] and on extraction of Mn, Zn, Cu, Mo, and Co by certain crops. [JK]

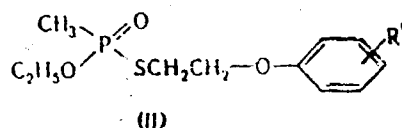
SYNTHESIS OF O-ETHYL S-2-ARYLOXYETHYL METHYLTHIOPHOSPHONATES

Godovikov, N. N., N. Ye. Teplov, and M. I. Kabachnik.
Akademiya nauk SSSR. Izvestiya. Seriya khimicheskaya,
no. 1, 1966, 164-166.

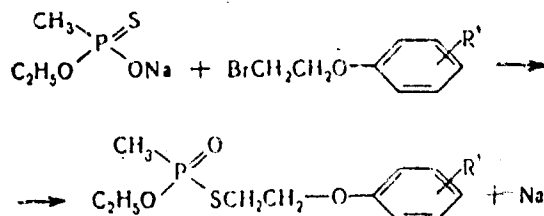
Previous studies of the anticholinesterase properties of
O,O-diethyl S-2-(arylmethylamino)ethyl thiophosphates (I)



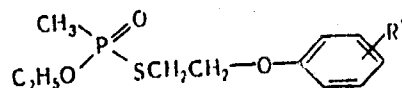
showed that the inhibition rate constants (k_2) of these compounds depend strongly on the nature and the position of substituent R in the phenyl group. A linear Hammet dependence was observed in $\log k_2 - \sigma$ coordinates. The question remained unanswered whether the anticholinesterase activity of these compounds was determined by their ability to form ammonium cations in aqueous media at pH 7-8, or whether reactions with cholinesterase could take place by some other mechanism, without formation of onium compounds. This question could be answered by investigating the anticholinesterase activity of O-ethyl S-2-aryloxyethyl methylphosphonates (II),



since these compounds cannot form onium compounds under the above conditions. Systematic changes in k_2 , with respect to changes in the Hammet constant for compounds I and II, would indicate that compounds I react with cholinesterase without first forming onium compounds. A number of compounds II were synthesized in the following manner:



R' = H, m-CH₃, p-CH₃, m-OCH₃, p-OCH₃, m-Cl, p-Cl, p-Br, p-C₂H₅



R'	Yield, %	bp, °C (mm)	mp, °C	n _D ²⁰	d ₄ ²⁰	Found, %			Formula	Calculated %		
						C	H	P		C	H	P
H	78	106 (10 ⁻²)	36.5–37.0	1.5400	—	50.8	6.6	12.1	C ₁₁ H ₁₁ O ₃ PS	50.8	6.6	11.9
m-CH ₃	66	132 (1)	—	1.5355	1.1478	50.6	6.6	12.0	C ₁₂ H ₁₁ O ₃ PS	52.5	7.0	11.3
p-CH ₃	69	119 (10 ⁻²)	22.5–23.0	1.5366	—	52.5	7.0	10.8	C ₁₁ H ₁₁ O ₃ PS	52.5	7.0	11.3
m-OCH ₃	67	125 (10 ⁻²)	—	1.5412	1.2041	52.2	7.0	11.0	C ₁₂ H ₁₁ O ₄ PS	49.6	6.6	10.7
p-OCH ₃	75	126 (10 ⁻²)	—	1.5410	1.2019	49.4	7.1	10.6	C ₁₂ H ₁₁ O ₄ PS	49.6	6.6	10.7
m-Cl	27	137 (10 ⁻²)	—	1.5470	1.2330	49.3	6.5	10.4	C ₁₁ H ₁₀ ClO ₃ PS	44.8	5.5	10.5
p-Cl	50	132 (10 ⁻²)	—	1.5465	1.2567	49.1	6.6	10.7	C ₁₁ H ₁₀ ClO ₃ PS	44.8	5.5	10.5
p-Br	12	140 (10 ⁻²)	46.0–46.5	1.5667	—	44.4	5.2	10.6	C ₁₁ H ₁₀ BrO ₃ PS	39.0	4.8	9.1
p-t-C ₄ H ₉	83	140 (10 ⁻²)	—	1.5216	1.1000	57.4	8.1	9.2	C ₁₅ H ₁₉ O ₃ PS	57.0	8.0	9.8

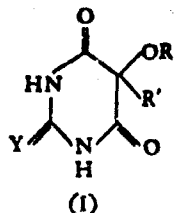
ASSOCIATION: Institut elementoorganicheskikh soyedineniy Akademii nauk SSSR (Institute of Heteroorganic Compounds, Academy of Sciences SSSR) [VS]

5-HYDROXYPYRIMIDINES. IV. SYNTHESIS OF 5-ALKOXY-5-ALKYL-2-THIOBARBITURIC ACID AND RELATED PYRIMIDINES.

Huang, Hsiang-ling (7806/3276/5309), Chou, Cheng (0719/2398), T'ao, Ching-jung (7118/6975/5554). 5-hydroxypyrimidines. IV. Synthesis of 5-alkoxy-5-alkyl-2-thiobarbituric acid and related pyrimidines. Hua hsueh hsueh pao (Acta chimica sinica), v. 31, no. 6, 1965, 502–508.

This paper reports a study on the condensation of ethyl alkoxy-alkylmalonates with urea, thiourea, and guanidine.

Ethyl alkoxymalonates (II R = $n\text{-C}_3\text{H}_7$, $n\text{-C}_4\text{H}_9$, $i\text{-C}_5\text{H}_{11}$, and $\text{C}_6\text{H}_5\text{CH}_2$) were prepared from the corresponding ethyl alkoxycetates by ethoxalylolation with subsequent pyrolytic decarbonylation. Various II were then alkylated by

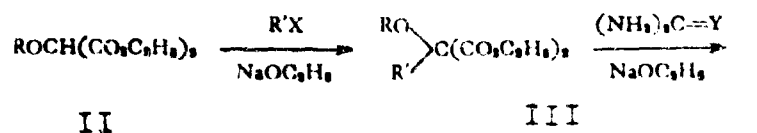


the standard method to give homologous ethyl alkoxy-alkylmalonates (III R' = CH_3 , C_2H_5 , $n\text{-C}_3\text{H}_7$, and $n\text{-C}_4\text{H}_9$). The ease with which ethyl alkoxy-alkylmalonates (III) condense with urea, thiourea, and guanidine under standard conditions promoted by sodium ethoxide varies considerably. All but one ethyl alkylmalonate

(III R = $\text{C}_6\text{H}_5\text{CH}_2$, R' = C_2H_5), which gave a low yield of 5-alkoxy-5-alkylbarbituric acid (I, Y = O), failed to react with urea.

Better results but with only limited success were obtained from the condensation between ethyl alkoxy-alkylmalonates and thiourea. The products that resulted from the reaction mixture were in most cases oils. The 5-alkoxy-5-alkyl-2-thiobarbituric acids (I, Y = S) solidified only with difficulty.

The condensation between two homologous ethyl alkoxy-alkylmalonates (III) with guanidine seemed to proceed most readily with the formation of highly crystalline 5-alkoxy-5-alkyl-2-iminobarbituric acids (I, Y = NH) in good yields. It should be noted that one homologous III with a propyloxy group failed completely in condensation with thiourea. Hydrogenolysis of 5-benzyloxy-5-alkyl-2-iminobarbituric acids gave the corresponding 5-hydroxy-5-alkyl-2-iminobarbituric acids (I, R = H and Y = NH).



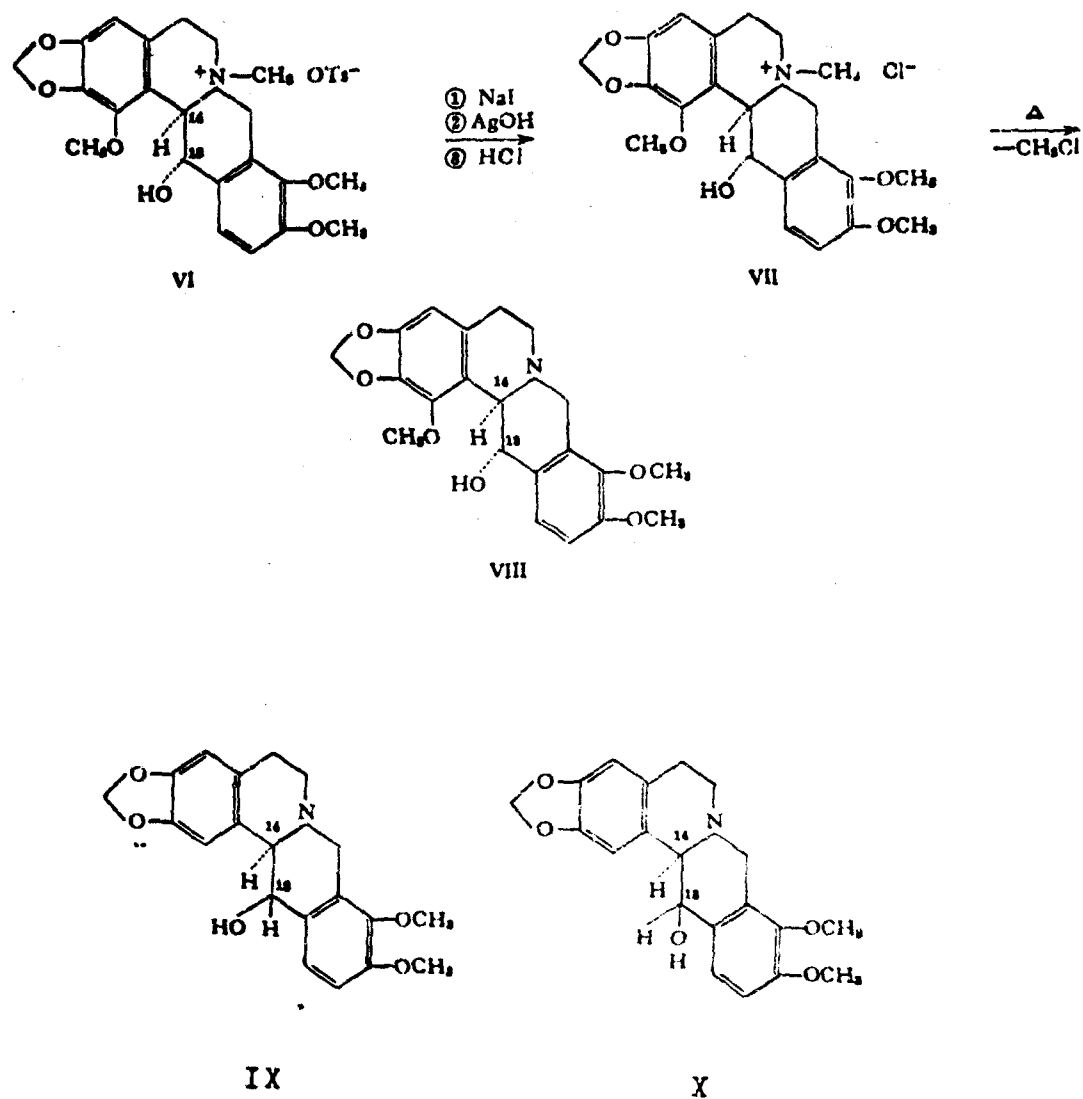
ASSOCIATION: Pei-ching ta hsueh Hua hsueh hsi (Chemistry Department, Peking University) [CR]

STEREOCHEMISTRY OF NARCOTINE AND RELATED ALKALOIDS

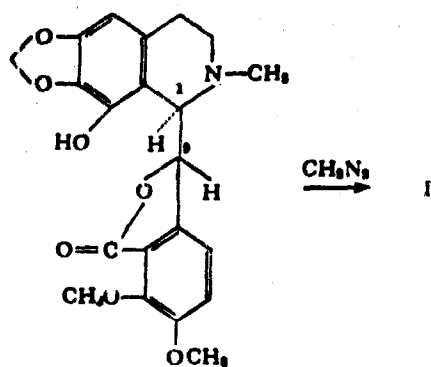
Huang, Wen-k'uei (7806/2429/7608), Chang, Chen-chieh (1728/2182/2638), and Lin, Ken-shou (2651/2704/1108). Stereochemistry of narcotine and related alkaloids. *Hua hsueh hsueh pao* (*Acta chimica sinica*), v. 31, no. 6, 1965, 470-475.

Both natural *L*- α -narcotine (I) and artificial *L*-8-narcotine (II) were reduced by LiAlH_4 to the α -diol (III), m.p. 132° , $[\alpha]_D^{15} + 51.2^\circ$ (CHCl_3), Al_2O_3 thin layer chromatography R_f 0.63 (ether), and the β -diol (IV), m. p. $60 \sim 61^\circ$, $[\alpha]_D^{15} - 59.5^\circ$ (CHCl_3), Al_2O_3 thin layer chromatography R_f 0.45, (ether), respectively. The latter was contaminated with a small amount of α -diol (III), the yield of which was increased to 32% as the reaction time was prolonged to four hours. A copper complex could be prepared from the β -diol (IV), but not from the α -diol (III). From these facts, the relative configurations of both *L*- α -narcotine (I) and *L*-8-narcotine (II) should be referred to as belonging to the erythro- and threo-series, respectively.

α -Diol (III) was carried through a sequence of reactions to yield 1-methoxy-13-epi-ophiocarpine (VIII), m. p. 165° , $[\alpha]_D^{22} - 236^\circ$ (CHCl_3), which has the same sign of specific rotation as that of opiocarpine (IX) $[[\alpha]_D^{24} - 283^\circ$ (CHCl_3), 14R:13R] and of epi-opiocarpine (X) $[[\alpha]_D - 282^\circ$ (CHCl_3), 14:13S]. It follows that this product (VIII) has the same configuration, i.e., R at position 14. From the result of relative configuration of the α -diol (III) discussed above, the erythro, one may be assigned the complete absolute configuration of 1-methoxy-13-epi-opiocarpine (VIII) as 14R:13S. These results also lead to the complete absolute configurations for *L*- α -narcotine (I), i.e., 1R:9S, and for *L*-8-narcotine (II), 1R:9R.



From the known relationships among narcotoline (XI), gnoscopines, *l*- α -narcotine (I), and *l*- β -narcotine (II), the stereochemistry of these alkaloids may be assigned as follows: narcotoline (XI), 1R:9S; α -gnoscopine, erythro-; β -gnoscopine, threo.



XI

ASSOCIATION: Lan-chou ta hsueh Hua Hsueh hsi (Chemistry Department, Lanchow University) [CR]

PREPARATION OF POLYFLUOROALKENYLSULFURIC ESTERS

Knunyants, I. L., G. A. Sokol'skiy, and M. A. Belaventsev. Class 7, No. 177880. Izobreteniya. Promyshlennyye obraztsy. Tovarnyye znaki, no. 2, 1966, 26.

This Author Certificate introduces a method of preparing polyfluoroalkenylsulfuric esters by reacting fluorinated β -sultones with dialkylsulfates. The end product is separated by distillation.

ASSOCIATION: Voennoy akademiya khimicheskoy zashchity (Chemical Defense Military Academy) [JK]

INSECT REPELLENT, PLANT GROWTH STIMULATING, AND POTENTIAL
PESTICIDE CYANOETHYLATION PRODUCTS

Kost, A. N., Ye. V. Vinogradova, and K. K. Bragina.
*Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimi-
cheskaya tekhnologiya*, v. 8, no. 6, 1965, 963-968.

A series of β -alkoxypropionitriles, $\text{ROCH}_2\text{CH}_2\text{CN}$, have been synthesized from the corresponding alcohols² and acrylonitrile, and were subsequently transformed into β -alkoxypropionic acids, $\text{ROCH}_2\text{CH}_2\text{COOH}$, β -alkoxypropionyl chlorides, $\text{ROCH}_2\text{CH}_2\text{COCl}$, and β -alkoxypropionamides, $\text{ROCH}_2\text{CH}_2\text{CONR}'\text{R}''$. Similarly, β -phenyloxypropionitrile and the corresponding acid, chloride, and diethyl amide were prepared. Properties of the synthesized β -alkoxypropionic acids, their chlorides, and amides were tabulated (see Table 1). A series of nitriles of substituted pimelic and glutaric acids, and of β -phenylaminopropionic acid and dimethylaminopropionitrile methylates were prepared by cyanoethylation of ketones, amines or nitriles.

The nitriles studied exhibited a weak fungicide property against rust of the wheat. However, 4-cyano-4-phenylpimelonitrile, 2,3-diphenylglutaronitrile, and (I) were especially effective against certain spores, when sprayed on plants. The earlier reported plant growth stimulating effect of β -alkoxypropionic acids was studied on wheat and gladiolus. The most active were the potassium β -methoxypropionate (KB-1) which increased growth of wheat by 40%, and potassium β -ethoxypropionate (KB-2) on gladiolus.

The amides (Table 1) displayed an insect repellent effect on rat fleas. The most effective were the amides VIII (hexamethylenimine base) and XI, which both extended 93—95% protection for 30—35 days compared with 12—15 days for dimethylphthalate.

ASSOCIATION: Moskvoskiy gosudarstvennyy universitet im N. V. Lomonosova (Moscow State University); Moskovskiy botanicheskiy sad (Moscow Botanical Gardens)

Table 1. Properties of *p*-alkoxypropionamides

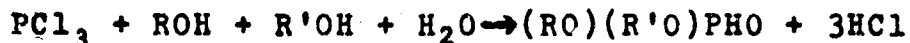
Compound no.	R	NR ^{II}	Empirical formula	Yield %	B.P. °C (mm)	n_D^{20}	d_4^{20}	MRD		%N	
								Found	Calculated	Found	Calculated
I	CH ₃	N(C ₂ H ₅) ₂	C ₉ H ₁₇ O ₂ N	53.8	100(8)	1.4510	0.9743	44.0	44.7	8.66 8.84	8.79
II	.	N(C ₂ H ₅)C ₆ H ₅	C ₁₂ H ₁₇ O ₂ N	64.4	127(2)	1.5183	1.0547	59.55	59.55	6.67 6.71	6.75
III	.	N(CH ₃) ₂	C ₉ H ₁₇ O ₂ N	47.2	161—164(7)	1.4662	0.9899	47.90	47.16	8.04 8.11	8.17
IV	C ₂ H ₅	N(C ₂ H ₅) ₂	C ₉ H ₁₉ O ₂ N	56.1	75—77(2)	1.4465	0.9459	48.89	49.35	8.24 8.26	8.08
V	.	N(C ₂ H ₅)C ₆ H ₅	C ₁₃ H ₁₉ O ₂ N	60.5	117—119(1)	1.5095	1.0304	64.24	64.22	6.36 6.41	6.33
VI	<i>n</i> -C ₄ H ₉	N(C ₂ H ₅) ₂	C ₁₁ H ₂₃ O ₂ N	76.6	100—103(3)	1.4477	0.9250	58.22	58.59	5.95 7.12	6.95
VII	.	NHC ₆ H ₅	C ₁₂ H ₁₉ O ₂ N	70	161—166(3)	(m.p. 26—28°)				6.28 6.34	6.33
VIII	.	N(CH ₃) ₂	C ₁₂ H ₂₃ O ₂ N	73.4	146—147(3)	1.4786	0.9854	65.27	65.62	5.99 6.01	6.13
IX	<i>n</i> -C ₃ H ₇	N(C ₂ H ₅) ₂	C ₁₂ H ₂₃ O ₂ N	77.5	107—109(2)	1.4492	0.9135	63.12	63.21	6.46 6.48	6.55
X	.	N(C ₂ H ₅)C ₆ H ₅	C ₁₆ H ₂₃ O ₂ N	64.0	171—175(2)	(thick mass)				5.39 5.40	5.31
XI	C ₆ H ₅	N(C ₂ H ₅) ₂	C ₁₁ H ₁₉ O ₂ N	76.7	159—161(4)	1.5203	1.0472	64.26	64.23	6.20 6.28	6.33

[JK]

NEW METHOD OF PREPARATION OF COMPLEX DIALKYL PHOSPHITES

Mandel'baum, Ya. A., P. G. Zaks, and N. N. Mel'nikov.
Zhurnal obshchey khimii, v. 36, no. 1, 1966, 44-46.

A newly developed one-step process for the preparation of dialkyl phosphites with different organic radicals consisted in reacting phosphorus trichloride with an equimolar mixture of two different alcohols and water below 0°C:



The earlier processes were two-step and required 3—4 moles of alcohol for each mole of dialkyl phosphite. All complex dialkyl phosphites prepared by the new method and their constants are listed in Table 1. A series of efficient insecticides was prepared from dialkyl phosphites with different radicals.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection)

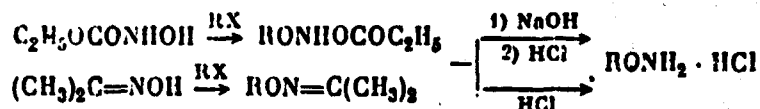
Table 1.

Compound	Per- cent Yield	BP (mm)	n _D ²⁰	d ₄ ²⁰	MR _D		Percent P found	Formula	Per- cent P calcu- lated
					Experi- mental	Calcu- lated			
(C ₂ H ₅ O)(CH ₃ O)PhO	40.5	70—73° (15)	1.4070	1.1288	27.12	26.92	24.30, 24.60	C ₃ H ₉ O ₃ P	25.00
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	60.5	98—102 (20)	1.4145	1.0389	36.59	36.16	20.43, 20.15	C ₅ H ₁₃ O ₃ P	20.40
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	52.5	73—75 (8)	1.4100	1.0301	36.56	36.16	20.00, 20.40	C ₅ H ₁₃ O ₃ P	20.40
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	75.0	112—116 (28)	1.4160	1.0180	40.93	40.78	18.30, 18.50	C ₆ H ₁₅ O ₃ P	18.67
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	31.0	116—120 (28)	1.4100	1.0218	40.25	40.78	19.08, 19.01	C ₆ H ₁₅ O ₃ P	18.67
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	52.0	100—103 (9)	1.4220	0.9979	45.83	45.40	16.90, 17.23	C ₇ H ₁₇ O ₃ P	17.22
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	35.0	121—125 (12—13)	1.4243	0.9901	50.62	50.02	15.61, 15.83	C ₈ H ₁₉ O ₃ P	15.97
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	41.0	125—128 (10)	1.4270	0.9738	54.85	54.64	14.85, 15.20	C ₉ H ₂₁ O ₃ P	14.90
(C ₂ H ₅ O)(CH ₃ O)PhO	46.0	64—66 (8)	1.4112	1.0987	31.86	31.54	22.12, 22.29	C ₄ H ₁₁ O ₃ P	22.46
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	71.0	98—100 (9)	1.4200	0.9989	45.68	45.40	17.28, 17.29	C ₇ H ₁₇ O ₃ P	17.22
(C ₂ H ₅ O)(C ₂ H ₅ O)PhO	53.5	110—113 (10)	1.4222	0.9906	49.78	50.02	15.81, 16.21	C ₈ H ₁₉ O ₃ P	15.97

HYDROXYLAMINE DERIVATIVES

Markova, Yu. V., N. G. Ostroumova, L. N. Zenkova, and M. N. Shchukina. *Zhurnal organicheskoy khimii*, v. 2, no. 2, 1966, 239-242.

O-substituted hydroxylamine derivatives are of considerable interest as potential biologically active compounds, since they can react with the active functions of biologically important substances. Some of these have antimicrobial activity, others are enzyme inhibitors, while others have pharmacological activity. In searching for new biologically active compounds, the present work deals with the synthesis of some previously unknown O- and N-derivatives of hydroxylamines. Two methods were used for the preparation of O-derivatives of hydroxylamines:



Taking into account the biological activity of thiourea derivatives, some N-alkoxy-N'-arylthioureas of the general type $\text{RONHCSNHC}_6\text{H}_4\text{R}'$ were prepared by condensation of the appropriate O-substituted hydroxylamines with isothiocyanates. The compounds prepared are given in the tables below.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy khimikofarmatsevticheskiy institut imeni S. Ordzhonikidze (All-Union Chemical and Pharmaceutical Scientific Research Institute)

Table 1. $\text{RONHCOOC}_2\text{H}_5$

R	Yield (in %)	bp (mm) or mp	Found %			Formula	Calculated %		
			C	H	N		C	H	N
$\text{CH}_3\text{OC}_6\text{H}_4\text{CH}_2$ $\text{C}_2\text{H}_5\text{OC}_6\text{H}_4\text{CH}_2$	49 54	155–160° (0.6) 165–175 (0.2)	58.37 60.04	6.75 7.21	6.60 5.78	$\text{C}_{11}\text{H}_{15}\text{NO}_4$ $\text{C}_{12}\text{H}_{17}\text{NO}_4$	53.66 60.24	6.71 7.16	6.22 5.85
	16	136–138 (0.8)	55.84	9.24	13.11	$\text{C}_{10}\text{H}_{20}\text{N}_2\text{O}_3$	55.53	9.32	12.95
	28	143–145 (0.2)	49.16	8.50	12.66	$\text{C}_9\text{H}_{18}\text{N}_2\text{O}_4$	49.53	8.31	12.84
	80	91–94	38.56	3.72	19.69	$\text{C}_7\text{H}_8\text{ClN}_2\text{O}_3$	38.63	3.70	19.31

Table 2. $\text{RONH}_2 \cdot \text{HCl}$

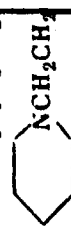
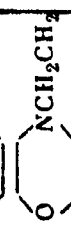
R	Yield (in %) Method	mp (decomp)	Found %				Formula	Calculated %			
			C	H	Cl	N		C	H	Cl	N
$\text{CH}_3\text{OC}_6\text{H}_4\text{CH}_2$ $\text{C}_2\text{H}_5\text{OC}_6\text{H}_4\text{CH}_2$ $\text{C}_4\text{H}_9\text{OC}_6\text{H}_4\text{CH}_2$ $n\text{-NO}_2\text{C}_6\text{H}_4\text{CH}_2$	69 64 — —	203° 179 193 213	51.06 53.30 57.00 41.16	6.48 6.75 7.64 4.40	18.75 17.66 15.30 17.14	7.59 6.96 6.08 14.07	$\text{C}_7\text{H}_{11}\text{NO}_2 \cdot \text{HCl}$ $\text{C}_8\text{H}_{13}\text{NO}_2 \cdot \text{HCl}$ $\text{C}_{11}\text{H}_{17}\text{NO}_2 \cdot \text{HCl}$ $\text{C}_7\text{H}_8\text{N}_2\text{O}_3 \cdot \text{HCl}$	50.67 53.97 57.02 41.09	6.38 6.93 7.83 4.43	18.70 17.41 15.30 17.33	7.37 6.88 6.04 13.69
	23	173	38.39	8.33	32.22	12.89	$\text{C}_7\text{H}_{16}\text{N}_2\text{O} \cdot 2\text{HCl}$	38.72	8.35	32.66	12.90
	40	184	33.02	7.67	32.72	12.41	$\text{C}_6\text{H}_{14}\text{N}_2\text{O}_2 \cdot 2\text{HCl}$	32.89	7.36	32.36	12.78

Table 3. RON = C(CH₃)₂

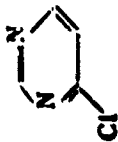
R	Yield (in %)	mp or bp (mm)	Found %			Formula	Calculated %		
			C	H	N		C	H	N
α -NO ₂ C ₆ H ₄ CH ₂	12	51.5—53°	57.36	6.13	13.73	C ₁₀ H ₁₂ N ₂ O ₃	57.68	5.81	13.45
	46	108—111 (20)	64.85	11.04	15.38	C ₁₀ H ₂₀ N ₂ O	65.18	10.94	15.20
	33	110—114 (30)	57.79	9.66	14.92	C ₉ H ₁₈ N ₂ O ₂	58.04	9.74	15.04
CH ₃ OC ₆ H ₄ CH ₂	42	143—145 (12)	68.64	7.90	7.22	C ₁₁ H ₁₃ NO ₂	68.37	7.82	7.25
	21	94—95 (16)	45.53	4.33	—	C ₇ H ₃ ClN ₃ O	45.29	4.34	—

Table 4.
 $\text{RONHCNHC}_6\text{H}_4\text{R}'$
 $\parallel$
 S

R	R'	Yield (in %)	mp	Found %				Formula	Calculated %			
				C	H	N	S		C	H	N	S
$\text{C}_6\text{H}_5\text{CH}_2$	OC_2H_5	39	102-104°	63.51	5.76	9.25	10.60	$\text{C}_{10}\text{H}_{18}\text{N}_2\text{O}_2\text{S}$	63.55	6.00	9.26	10.50
$\text{CH}_3\text{OC}_6\text{H}_4\text{CH}_2$	H	48	107-109	62.55	5.54	9.80	11.01	$\text{C}_{15}\text{H}_{16}\text{N}_2\text{O}_2\text{S}$	62.48	5.59	9.71	11.12
$\text{C}_6\text{H}_5\text{OC}_6\text{H}_4\text{CH}_2$	H	63	89-91	63.57	6.28	9.51	10.60	$\text{C}_{16}\text{H}_{18}\text{N}_2\text{O}_2\text{S}$	63.55	6.00	9.27	10.60
$\text{C}_6\text{H}_5\text{OC}_6\text{H}_4\text{CH}_2$	H	57	78-80	65.24	6.50	8.30	9.50	$\text{C}_{18}\text{H}_{22}\text{N}_2\text{O}_2\text{S}$	65.42	6.71	8.48	9.70
$\text{CH}_3\text{OC}_6\text{H}_4\text{CH}_2$	OC_2H_5	67	105-107	61.42	5.84	8.70	9.71	$\text{C}_{17}\text{H}_{20}\text{N}_2\text{O}_3\text{S}$	61.42	6.06	8.43	9.64
$\text{CH}_3\text{OC}_6\text{H}_4\text{CH}_2$	OC_4H_9	—	66-67	63.20	6.38	7.64	9.01	$\text{C}_{19}\text{H}_{24}\text{N}_2\text{O}_3\text{S}$	63.31	6.71	7.77	8.89
$\text{C}_6\text{H}_5\text{OC}_6\text{H}_4\text{CH}_2$	OC_2H_5	50	71-74	62.24	6.43	8.01	9.35	$\text{C}_{18}\text{H}_{22}\text{N}_2\text{O}_3\text{S}$	62.40	6.40	8.08	9.25
$\text{C}_6\text{H}_5\text{OC}_6\text{H}_4\text{CH}_2$	OC_4H_9	63	69-72	64.34	6.90	7.73	9.98	$\text{C}_{20}\text{H}_{26}\text{N}_2\text{O}_3\text{S}$	64.14	6.98	7.48	8.56
$\text{C}_6\text{H}_5\text{OC}_6\text{H}_4\text{CH}_2$	OC_2H_5	58	76-78	63.98	7.18	7.21	9.00	$\text{C}_{20}\text{H}_{26}\text{N}_2\text{O}_3\text{S}$	64.14	6.98	7.48	8.56
$\text{C}_6\text{H}_5\text{OC}_6\text{H}_4\text{CH}_2$	OC_4H_9	55	88-91	65.60	7.11	6.86	8.19	$\text{C}_{22}\text{H}_{30}\text{N}_2\text{O}_3\text{S}$	65.64	7.50	6.96	7.95
	H	47	105-106	55.17	6.65	14.80	11.41	$\text{C}_{13}\text{H}_{19}\text{N}_3\text{O}_2\text{S}$	55.50	6.80	14.93	11.39
	OC_2H_5	50	113-115	55.43	6.94	12.62	9.42	$\text{C}_{15}\text{H}_{23}\text{N}_3\text{O}_3\text{S}$	55.36	7.12	12.91	9.85

Table 5.
 $\text{R}-\text{C}_6\text{H}_4-\text{CH}_2\text{ON}=\text{CHR}'$

R	R'	Yield (in %)	mp	Found %				Formula	Calculated %			
				C	H	N	S		C	H	N	S
OCH_2	$\text{C}_6\text{H}_4\text{CH}(\text{CH}_3)_2$	60	65-67°	75.94	7.08	5.03	—	$\text{C}_{18}\text{H}_{21}\text{NO}_2$	76.29	7.47	—	4.94
OCH_3		52	47-50	69.16	5.81	11.30	—	$\text{C}_{14}\text{H}_{14}\text{N}_2\text{O}_2$	69.40	5.82	—	11.56

Table 5. (Cont.)

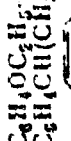
R	R'	Yield (in %)	mp	Found %			Formula	Calculated %		
				C	H	N		C	H	N
OCH ₃		54	42-44°	69.20	5.72	11.30	C ₁₁ H ₁₄ N ₂ O ₂	69.10	5.82	11.56
OC ₂ H ₅		46	77-80	71.97	7.10	4.68	C ₁₈ H ₂₁ NO ₃	72.22	7.07	4.69
OC ₂ H ₅		30	43-45	77.11	7.77	4.75	C ₁₉ H ₂₃ NO ₃	76.73	7.79	4.71
OC ₂ H ₅		11	42-44	70.03	6.58	10.78	C ₁₅ H ₁₆ N ₂ O ₂	70.29	6.29	10.93
OC ₄ H ₉		30	35-37	77.35	8.41	4.29	C ₂₁ H ₂₇ NO ₃	77.50	8.36	4.30
OC ₄ H ₉		28	70-72	72.65	7.89	4.33	C ₂₀ H ₂₅ NO ₃	73.37	7.69	4.27
H		25	42-43	73.90	5.75	13.56	C ₁₃ H ₁₂ N ₂ O	73.56	5.70	13.20

Table 6. RON=CHR'·HCl

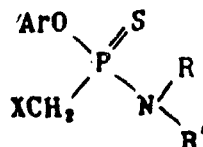
R	R'	Yield (in %)	mp	Found %			Formula	Calculated %		
				C	H	N		C	H	N
CH ₃ OC ₆ H ₄ CH ₂		9	185-187°	—	—	—	C ₁₄ H ₁₄ N ₂ O ₂ ·HCl	—	—	—
CH ₃ OC ₆ H ₄ CH ₂		95	166-169	—	—	—	C ₁₄ H ₁₄ N ₂ O ₂ ·HCl	—	—	—
C ₆ H ₅ OC ₆ H ₄ CH ₂		98	179-180	—	—	—	C ₁₅ H ₁₆ N ₂ O ₂ ·HCl	—	—	—
C ₆ H ₅ OC ₆ H ₄ CH ₂		48	151-155	63.93	6.93	8.78	C ₁₇ H ₂₀ N ₂ O ₂ ·HCl	63.64	6.60	8.73
	C ₆ H ₄ CH(CH ₃) ₂ -n	50	207-208	61.56	7.87	9.00	C ₁₆ H ₂₁ N ₂ O ₂ ·HCl	61.43	8.06	8.95

[VS]

PREPARATION OF AMIDES OF O-ARYL METHYLPHOSPHONIC ACID
AND O-ARYL CHLOROMETHYLPHOSPHONIC ACID

Mel'nikov, N. N., A. F. Grapov, and N. V. Lebedeva.
Class 12, No. 179317. *Izobreteniya, promyshlennyye*
obraztsy, tovarnyye znaki, no. 5, 1966, 23.

Compounds of the general type



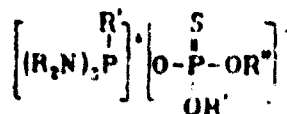
where Ar = phenyl, halophenyl, alkylphenyl, carbalkoxy-phenyl, alkoxyphenyl, alkylthiophenyl, nitrophenyl; R and R' = H or lower alkyls, identical or different; X = H or Cl, are prepared by treating 1 mole of O-aryl methylchloro-thiophosphonate or chloromethylchlorothiophosphonate with 2 moles of amine in an inert solvent (full translation).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy
institut khimicheskikh sredstv zashchity rasteniy
(All-Union Scientific Research Institute of Chemicals for
Plant Protection) [VS]

PREPARATION OF HEXAALKYLTRIAMIDOALKYLPHOSPHONIUM THIO-
PHOSPHATES

Mel'nikov, N. N., and B. A. Khaskin. Class 12, No. 179313.
Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki,
no. 5, 1966, 22.

Compounds of the general type



where R = alkyl, R' = lower alkyl, R'' = alkyl, aryl, or ester function, are prepared by allowing thiophosphate esters to react with hexaalkyltriamidophosphines (full translation).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection) [VS]

PREPARATION OF 2-HYDROXYMETHYL-4-CHLOROPHENOXYACETIC ACID

Mel'nikov, N. N., K. A. Nuridzhanyan, N. P. Bulanova, and G. V. Kuznetsova. Class 12, No. 179329. Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 5, 1966, 26.

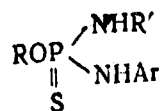
In this simplified process, 2-chloromethyl-4-chloromethyl-phenoxyacetic acid is treated with sodium acetate and water to form 2-hydroxymethyl-4-chlorophenoxyacetic acid (full translation).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection) [VS]

SUPPRESSION OF PATHOGENIC PLANT FUNGI

Mel'nikov, N. N., I. L. Vladimirova, N. M. Golyshin, V. I. Abelentsev, T. P. Krylova, and A. V. Unterberger. Class 45, No. 179551. Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 5, 1966, 97.

Diamido esters of thiophosphoric acid of the following type



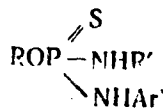
where R and R' = alkyl, and Ar = aryl, can be used as fungicides (full translation).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection) [VS]

PREPARATION OF MIXED DIAMIDOTHIOPHOSPHATE ESTERS

Mel'nikov, N. N., I. L. Vladimirova, A. F. Prokof'yeva, and T. P. Krylova. Class 12, No. 179312. Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 5, 1966, 22.

Mixed diamidothiophosphate esters of the general type



where R and R' are alkyls, and Ar is aryl, are prepared in this method by the reaction of O-alkyl-N-alkylamidothiophosphoric acid chlorides with aromatic amines in organic solvents in the presence of hydrogen chloride acceptors (full translation).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals of Plant Protection) [VS]

ETHYLALKYLPHOSPHINIC ESTERS

Nikonorov, K. V., and E. A. Gurylev. IN: *Akademiya nauk SSSR. Izvestiya. Seriya khimicheskaya*, no. 12, 1965, 2136-2140.

Esters of ethyl-(α -acetoxy- β,β,β -trichloroethyl)phosphinic I and ethyl-(α -hydroxy- β,β,β -trichloroethyl)phosphinic II acids were prepared by the reaction of esters of II with acetic acid anhydride in the presence of concentrated H_2SO_4 and an acid ester of ethylphosphonous acid with chloral, respectively. The preparations were undertaken because of the earlier report on the insecticidal property of dialkyl esters of (α -acetoxy- β,β,β -trichloroethyl)phosphonic acid, which were prepared by a reaction analogous to that which was used for preparation of (I) esters. The latter reaction required a large excess of acetic anhydride to produce higher yields. Data on the (I) esters are given in Table 1.

The (II) esters with $R = n-C_3H_7$, $i-C_3H_7$, $n-C_4H_9$, and $i-C_4H_9$ were not pure. Toxicity of the (II) esters is higher than that of the dialkyl esters of (α -hydroxy- β,β,β -trichloroethyl)phosphonic acid.

ASSOCIATION: Institut organicheskoy khimii Akademii nauk SSSR, Kazan (Institute of Organic Chemistry, Academy of Sciences SSSR) [JK]

Table 1. Ethyl-(α -acetoxy- β , β , β -trichloroethyl)phosphinic acid esters

Compounds	BP °C (mm)	n_D^{20}	d_4^{20}	Analysis					Calculated					Yield %
				C, %	H, %	P, %	Cl, %	MR	C, %	H, %	P, %	Cl, %	MR	
$\text{CH}_3\text{O}-\text{P}(\text{C}_2\text{H}_5)_2-\text{CH}-\text{O}-\text{COCH}_3$ $\text{C}_6\text{H}_{13}\text{O}_3\text{P}$	91-92 ($6 \cdot 10^{-2}$)	1,4870	1,408	—	—	9,68; 9,80	35,70; 35,80	60,77	28,23	4,03	10,42	35,80	60,53	43
$\text{C}_2\text{H}_5\text{O}-\text{P}(\text{C}_2\text{H}_5)_2-\text{CH}-\text{O}-\text{COCH}_3$ $\text{C}_8\text{H}_{17}\text{O}_3\text{P}$	93-94 (10^{-2})	1,4833	1,355	30,74; 30,82	4,69; 4,95	10,00; 9,60	33,90; 34,00	65,66	30,82	4,49	9,95	34,19	65,15	36
$n\text{-C}_4\text{H}_9\text{O}-\text{P}(\text{C}_2\text{H}_5)_2-\text{CH}-\text{O}-\text{COCH}_3$ $\text{C}_8\text{H}_{19}\text{O}_3\text{P}$	106-112 (10^{-2})	1,4790	1,317	33,37; 33,42	5,28; 5,21	9,36; 9,17	32,00; 32,12	70,09	32,18	4,91	9,52	32,72	69,76	38
$i\text{-C}_4\text{H}_9\text{O}-\text{P}(\text{C}_2\text{H}_5)_2-\text{CH}-\text{O}-\text{COCH}_3$ $\text{C}_8\text{H}_{19}\text{O}_3\text{P}$	103-104 (10^{-2})	1,4752	1,309	33,34; 33,34	5,30; 5,13	9,04; 9,40	31,80; 31,88	70,06	33,18	4,91	9,52	32,72	69,76	20
$n\text{-C}_6\text{H}_{13}\text{O}-\text{P}(\text{C}_2\text{H}_5)_2-\text{CH}-\text{O}-\text{COCH}_3$ $\text{C}_{10}\text{H}_{23}\text{O}_3\text{P}$	121-123 (10^{-2})	1,4778	1,286	35,67; 35,38	5,75; 5,61	8,99; 8,87	31,05; 31,50	74,67	35,35	5,30	9,13	31,37	74,38	22
$i\text{-C}_6\text{H}_{13}\text{O}-\text{P}(\text{C}_2\text{H}_5)_2-\text{CH}-\text{O}-\text{COCH}_3$ $\text{C}_{10}\text{H}_{23}\text{O}_3\text{P}$	121-123 (10^{-2})	1,4760	1,281	35,58; 35,34	5,58; 5,45	9,17; 9,06	31,05; 31,50	74,74	35,35	5,30	9,13	31,37	74,38	20

PREPARATION OF ARYLOXYACYLCARBAMATE ESTERS

Nuridzhanyan, K. A., N. P. Bulanova, and G. Ya. Yermolenko. Class 12, No. 179300. Izobreteniya, promyshlennyye obrastsey, tovarnyye znaki, no. 5, 1966, 19.

Aryloxyacylcarbamate esters of the general type $RCONHCOOR'$, where R = aryloxyacyl, and R' = alkyl or aryl, are prepared in this method by allowing aliphatic alcohols or phenols to react with aryloxyacyl isocyanates (complete translation).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection) [VS]

PREPARATION OF THIOCYANOMETHYLARYLOXYCARBOXYLIC ACIDS

Nuridzhanyan, K. A., N. N. Mel'nikov, N. P. Bulanova, G. V. Kuznetsova, and L. P. Guseva. Izobreteniya, promyshlennyye obrastsey, tovarnyye znaki, no. 3, 1966, 27. Class 12, No. 178389.

This Author Certificate introduces a method of preparing thiocyanomethylaryloxy-carboxylic acids by the reaction of chloromethylaryloxy-carboxylic acids with ammonium or metal thiocyanate in absolute alcohol or dimethylformamide.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection) [JK]

WEED KILLERS

Nuridzhanyan, K. A., L. D. Stonov, L. A. Bakumenko, and N. P. Bulanova. Method of weed control. Class 45, No. 178237. Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 2, 1966, 139.

This Author Certificate introduces a method of weed control using S-butyl [(2,4-dichlorophenoxy)acetyl]thiocarbamate and S-propyl [(2,4-dichlorophenoxy)acetyl]thiocarbamate herbicides.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection) [JK]

ENRICHMENT OF PLANTS WITH BIOACTIVE TRACE ELEMENTS

Nurmagambetov, K. O. IN: Akademiya nauk KazSSR. Vestnik, no. 1, 1966, 87-88.

The application of iodine, copper, cobalt, and manganese microfertilizers is recommended on soils of meadows and pastures in Kazakhstan because of the deficiency of these trace elements in soils, water, and plants of certain oblasts' (I, Co, Cu, and Mn contents in plants are given for Alma-Ata Oblast'). High iodine deficiency in 14 oblasts' of Kazakhstan caused the spread of endemic goiter disease among men and domestic animals. A potassium iodide application rate of 16-20 g/hectare of fodder culture is required. [JK]

CONFERENCE ON TRACE ELEMENTS AND NATURAL RADIOACTIVITY OF SOILS

Tonkonozhenko, Ye. V. V sel'skom khozyaystve, v. 4, no. 2, 1966, 79-80.

At the Fourth All-Union Intervuz Scientific Conference held from 17 to 20 November 1965 in Petrozavodsk, V. V. Akimtsev, professor of Rostov State University, treated the role of soils as an ecological factor in the development and geographic expansion of epidemic diseases.

Data were given on the content of trace elements in various soils and on the availability of various trace elements in soils of a number of administrative subdivisions [unnamed]. The effect of microfertilizers was discussed on the crop and quality of plants, and on the assimilation of nitrogen and phosphorus by the plants.

Data were presented on natural radioactivity of soils and plants in each republic and administrative subdivision (kray and oblast'). [JK]

CARBAMIDE-POLYPHOSPHORIC ACIDS SYSTEM

Vol'fkovich, S. I., and A. I. Chekhovskikh. Physico-chemical investigation of the carbamide-polyphosphoric acids system. Zhurnal prikladnoy khimii, v. 39, no. 2, 1966, 249-257.

Products containing 16.9—17.1% nitrogen and 51.6—52.0% P_2O_5 were prepared by melting carbamide (urea) with polyphosphoric acids in a 1:1 mol ratio. The products which contain a chemical compound may be used as high-analysis mixed fertilizers for various soils and cultures. In addition, the noncrystallizable liquid melts of 0—25 mol % carbamide in polyphosphoric acid with 76.1 wt.% total P_2O_5 may be used as liquid fertilizers.

Hygroscopicity (relative moisture content) of the solid reaction products of carbamide and orthophosphoric or polyphosphoric acids which contained 71.6, 74.5, or 76.1 wt.% total P_2O_5 fluctuated within the limits acceptable for solid fertilizers. The product prepared from the 74.5% polyphosphoric acid was the best. Hygroscopicity of the carbamide polyphosphates increased with an increase in relative contents of the ortho- or pyroform.

[JK]

ORGANIC INSECTICIDE-FUNGICIDES

Voronkova, V. V., V. I. Lomakina, Ya. A. Mandel'baum, and N. N. Mel'nikov. *Organic insecticide-fungicides*. 88. Reaction of trialkyl phosphites with alkylthiol chloroacetates. *Zhurnal obshchey khimii*, v. 35, no. 12, 1965, 2209-2216.

Chromatographic and infrared spectral study has been made of the reaction products of trialkyl phosphites, $(RO)_3P$, where $R = CH_3, C_2H_5$, or C_4H_9 , with alkylthiol chloroacetates, $ClCH_2COSR'$, where $R' = CH_3$ OR C_4H_9 . As shown in a previous study by the authors [*ZhOKh*, 35, 1752 (1965)], the main products of the reaction were: alkyl

(dialkylphosphono)thioacetate, $(RO)_2P(O)CH_2COSR'$ (I), dialkyl 1-(alkylthio)vinyl phosphate (II), $(RO)_2P(O)OC(CH_2)SR'$, and alkyl(dialkylphosphono)acetate, $(RO)_2P(O)CH_2COOR'$. The ratios of the vinyl (II) to carbonyl (I) isomer in the products were greatly affected by the nature of the R' [sic] radical. Only the carbonyl isomer (17—20% yield) was produced by the $(CH_3O)_3P$ or $(C_4H_9O)_3P$ reaction with $ClCH_2COSCH_3$ or $ClCH_2COSC_4H_9$, while a 1:0.85 mixture of the two isomers resulted from the $(C_2H_5O)_3P$ reaction with $ClCH_2COSCH_3$. In many instances, the presence of $(RO)_2P(O)CH_2COR'$ was detected in the mixture of the reaction products. The formation of $(RO)_2P(O)CH_2COR'$ by the reaction: $(RO)_3P + (RO)_2P(O)CH_2COSR' \rightarrow (RO)_2PSR' + (RO)_2P(O)CH_2COOR'$ was confirmed experimentally. Chromatographic data on separation of the reaction products were tabulated. Thin layer chromatographic technique with silicagel adsorbents was described as the most suitable for separation of the reaction products,

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut khimicheskikh sredstv zashchity rasteniy (All-Union Scientific Research Institute of Chemicals for Plant Protection) [JK]

AGROPYRIN INHIBITS PLANT GROWTH

GDR Review, no. 1, p. 21, col. 1.

Research workers on the staff of the agrobiological institute of the Ernst Moritz Arndt University of Greifswald have discovered that couch-grass produces a poisonous substance known as agropyrin. It is secreted from the roots and has an inhibiting effect on neighboring plant growth. [DM]

PYROGENAL, A NEUROTROPIC DRUG

Sovetskaya Rossiya, 12 Mar 1966, p. 4, col. 2.

Ye. Shul'ga, Assistant Head of a division of the Main Medical Administration of the RSFSR Ministry of Health states that a new preparation, pyrogenal, is used for therapeutic purposes. The drug stimulates and accelerates the recovery of the central and peripheral nervous systems from shock and infectious diseases such as poliomyelitis, encephalitis, etc. [DM]

CONFERENCE OF ENTOMOLOGISTS IN DRESDEN

Zashchita rasteniy, no. 2, 1966, 56-57.

The Tenth Conference of GDR Entomologists in Dresden in September 1965 was attended by representatives from some 13 countries, including the USSR, Czechoslovakia, Poland, etc. The Soviet delegation included M. S. Gilyarov, G.A. Viktorov, B. V. Vereshchagin, and B. V. Ryvkin. Most of the papers dealt with methods of combating agricultural and forest pests and parasitic insects. [DM]

II. BIOLOGICAL FACTORS

1964 TULAREMIA OUTBREAK IN AZERBAYDZHAN

Akhundov, M. G., and D. D. Dzhebrailov. *Tularemia epizootic and outbreak in three districts of the Azerbaydzhane SSR. Zhurnal mikrobiologii, epidemiologii i immunobiologii*, no. 12, 1965, 63-69.

Investigation of the 1964 tularemia outbreak in 3 northern Caucasian districts of the Azerbaydzhane SSR included a survey of the occurrence of *Pasteurella tularensis* in mice and murine fleas and ticks and the incidence of the disease among the human population, and a review of countermeasures used against the outbreak. The fauna of the 3 districts includes 13 species of rodents. Before 1958 no tularemia foci were recorded. In 1963 and 1964, however, epizootics occurred. A total of 25 tularemia strains were isolated from field mice and murine and from *Ceratophylus consimilis*, *Stenophthalmus secundus*, and gamasid mites. The epizootics lasted only a few months. In humans, 58 cases were reported, 35% in children. Vaccination begun in April 1964 achieved an immunity rate of 87.7%. The anginaledematous form of the disease was most common, but abdominal, pulmonary, dermal, and skin tularemia were also seen. Apparently climatic conditions favorable to rodent proliferation were followed by cold weather causing massive migration. The infection seemed to center in mice. Besides vaccination of 400,000 persons, countermeasures included extermination of rats and mice, special courses for doctors and medical workers and lectures for the public. It was concluded that the region contains a natural steppe-type focus of tularemia. This possibility is receiving further study.

ASSOCIATION: Azerbaydzhanskaya protivochumnaya stantsiya Ministerstva zdravookhraneniya SSSR (Azerbaydzhane Anti-Plague Station of the Ministry of Health SSSR)

[DP]

BIOLOGICALLY ACTIVE COMPOUNDS IN PLANT FLORA OF TURKMENISTAN

Allayarov, Kh. B., P. K. Dengliev, A. A. Meshcheryakov, and N. D. Tairova. Further study of biologically active compounds in plant flora of Turkmenistan. *Izvestiya. AN Turk SSR, Seriya biologicheskikh nauk*, no. 6, 1965, 44-50.

Plant stock was gathered by an expedition of the Institutes of Botany and Chemistry, Turkmen Academy of Sciences, to the Central Kopet-Dage, Kyuren-Dage, and the Lesser and Great Balkhan ranges during May-June 1964. Botanical preparation was done by A. A. Meshcheryakov. Chemical analysis was made for: 1) alkaloids (by Kh. B. Allayarov) using the method given in "Practical Problems in the Chemistry of Natural Compounds" (Izd-vo "Vysshayashkola," 1961) and quantitative analysis by the methods used at the Alkaloid Chemistry Laboratory of the Institute of Plant Chemistry, Uzbek Academy of Sciences; 2) flavone substances (by P. K. Dengliyev) using alcohol extracts with intermediate products removed; qualitative reaction being done with lead acetate, FeCl_3 , and MgHCl ; 3) coumarin-derived substances, glucosides with cardiac activity, and anthraquinones, (by N. D. Tairov), using the method accepted at the All-Union Scientific Research Institute of Medicinal and Aromatic Plants (Table 1).

Table 1. Results of chemical analyses

o - Compound absent from specimen; tr - traces of compound; + - positive reaction for compound; ++ - very marked reaction for compound; — - analysis not made; SGB - southern part of the Great Balkhan range; NGB - northern part of the Great Balkhans; E - Ekerem - village in the northwest part of the Great Balkhans; Chm - Chil'mamedkum sands (northern part); KD - Kule-Dere ravine (north of the Great Balkhans); KO - vicinity of the Kosha-Akhyr settlement; SLB - southern part of the Lesser Balkhans; Uz - Uzboy, between the Lesser and Great Balkhans; Ya - around Lake Yaskhan; NK - Nokhur-Karaul; KS - Kara-Su; ChCh - Chonur-Chinar; RN - road to Nokhur; B - Bakharden, near the underground lake; KiKa - highway from Kizyl-Arvat to Kazandzhik; ZV - Zelenaya valley; NK - to the north of Kazandzhik.

Table 1. Results of Chemical Analysis

Plants	locality of specimen	Plant part studied	Analysis for							
			Alkaloids		Flavone Substances		glucosides of cardiac action	coumarin derivatives	anthraquinones	
			qualitative evaluation	%	qualitative evaluation	%				
1	2	3	4	5	6	7	8	9	10	
Cupressaceae										
Juniperus turcomanica B. Fedtsch.	SGB	ag/part	o	—	++	0.51	o	o	o	
" "	KD	"	tr	—	++	0.48	o	—	tr	
" "	NGB	"	tr	—	++	0.56	o	—	tr	
Ephedraceae										
E. intermedia Schrenk ex C. A. Mey.	SLB	"	tr	—	++	0.50	—	o	o	
" "	SGB	"	tr	—	++	0.48	—	o	o	
" "	FD	"	tr	—	+	—	o	o	o	
Liliaceae										
Eremurus iberiensis (M. B.) Rgl.	KC	roots	o	—	++	0.48	o	o	o	
" "	Ya	ag/part	tr	—	o	—	tr	—	tr	
Asparagus breslerianus Schult.	SGB	"	o	—	+	—	o	—	o	
Iridaceae										
Iris sp.	SLB	"	o	—	++	0.62	o	++	tr	
" songarica Schrenk	Chp	"	o	—	++	0.42	o	++	tr	
" "	"	roots	o	—	++	0.29	o	++	o	
Urticaceae										
Parietaria judaica Strand.	SGB	ag/part	o	—	o	—	o	—	o	
" "	E	"	—	—	+	0.47	o	—	o	
Polygonaceae										
Rumex dictyocarpus Boiss. et Buhse	KD	"	o	—	o	—	+	o	+	
" "	"	fruit	o	—	++	0.42	o	tr	o	
Calligonum junceum (Fisch. et Mey.) Litv.	SLB	ag/part	o	—	++	0.58	o	+	o	
" "	"	fruit	o	—	++	0.40	o	+	o	
" aphyllum (Pall.) Guerke	"	ag/part	o	—	++	0.61	o	++	o	
" turkestanicum (Korov.) Pavl.	UZ	"	++	0.3	++	0.60	tr	+	o	
Chenopodiaceae										
Atriplex tatarica L.	Ya	"	o	—	++	0.48	o	+	o	
" "	KO	"	o	—	++	0.50	o	+	o	
Ceratocarpus turkestanicus Sav-Rycz.	"	"	o	—	o	—	o	o	o	
Londesia eriantha Fisch. et Mey.	UZ	"	o	—	o	—	—	+	o	
" "	KO	"	o	—	o	—	—	+	o	
Agriophyllum latifolium Fisch et Mey.	UZ	"	o	—	o	—	o	o	o	
" arenarium M. B.	"	"	o	—	o	—	o	o	o	
Halostachys caspica (Pall.) C. A. Mey.	Ya	"	tr	—	++	0.49	o	—	o	
Salicornia herbacea L.	"	"	o	—	o	—	o	—	o	
" "	"	roots	+	0.09	+	—	o	—	o	
Suaeda arcuata Bge.	"	ag/part	tr	—	++	0.51	o	tr	tr	
Haloxylon persicum Bge. ex Boiss.	"	"	o	—	o	—	tr	+	tr	
" "	SLB	"	o	—	tr	—	o	+	o	

Table 1. (Cont.)

1	2	3	4	5	6	7	8	9	10
<i>Salsola glauca</i> M. B.	ZV	ag/part	o	—	o	—	o	+	o
" <i>subaphylla</i> C. A. Mey.	"	"	+	—	tr	—	o	+	o
" <i>gemmascens</i> Pall.	SLB	"	o	—	o	—	o	+	o
<i>Salsola richteri</i> Kar.	SLB	"	tr	—	++	0,62	o	tr	o
" <i>pellucida</i> Litv.	Ya	"	o	—	o	—	o	+	o
" <i>arbuscula</i> Pall.	SLB	"	o	—	++	0,52	—	+	o
" <i>sclerantha</i> C. A. Mey.	UZ	"	o	—	o	—	—	+	o
" <i>lanata</i> Pall.	SLB	"	o	—	++	0,63	o	+	o
" " "	Ya	"	o	—	o	—	o	+	o
" " "	Ya	"	++	0,6	o	—	o	tr	o
" " "	KO	"	o	—	o	—	o	+	o
" " "	SGB	"	o	—	o	—	o	+	o
<i>Noaea mucronata</i> (Forsk.)	"	ag/part	o	—	++	0,50	o	+	o
Aschers. et Schweinf.	ZV	"	tr	—	++	0,45	o	o	o
<i>Anabasis eriopoda</i> (Schrenk)	Benih.	"	+	0,13	+	—	o	tr	o
<i>Halocharis hispida</i> (C. A. Mey.) Bge.	Ya	"	o	—	o	—	o	—	o
<i>Halimocnemis mollissima</i> Bge.	"	"	o	—	o	—	o	—	o
" sp.	"	"	o	—	o	—	o	—	o
" sp.	KO	"	o	—	o	—	o	—	o
Caryophyllaceae	ZV	"	o	—	++	0,61	o	—	o
<i>Acanthophyllum adenophorum</i> Freyn	SGB	"	o	—	+	—	o	—	o
<i>Dianthus turcomanicus</i> Schischk.	"	"	o	—	+	—	o	—	o
Ranunculaceae	NK	w/plant	o	—	++	0,57	o	o	o
<i>Ranunculus arvensis</i> L.	"	"	o	—	++	0,60	—	—	o
" <i>leptorhynchus</i> Aitch. et Hemsl.	"	"	o	—	++	0,58	o	—	o
" <i>oxyspermus</i> M. B.	"	"	o	—	o	—	o	o	o
<i>Adonis aestivalis</i> L.	"	"	o	—	o	—	o	o	o
Papaveraceae	"	"	tr	—	+	—	o	o	o
<i>Glaucium corniculatum</i> (L.) Curt.	ZV	"	+	—	++	0,54	o	—	—
<i>Glaucium elegans</i> Fisch. et Mey.	"	"	+	—	++	0,54	o	—	—
Capparaceae	NK	ag/part	tr	—	+	—	+	+	o
<i>Buhsea coluteoides</i> (Boiss.) Bge.	"	roots	o	—	—	—	o	+	o
" " "	SGB	ag/part	tr	—	o	—	o	+	o
Cruciferae	CS	"	tr	—	+	—	o	o	o
<i>Sisymbrium hesleri</i> L.	NK	roots	++	—	o	—	o	o	o
<i>Goldbachia laevigata</i> (M. B.) DC.	SLB	w/plant	o	—	++	0,61	o	—	o
<i>Matthiola chenopodiifolia</i> Fisch. et Mey.	SGB	"	o	—	+	—	o	—	o
" <i>farinosa</i> Bge.	SLB	ag/part	tr	—	o	—	o	—	o
<i>Crembe edentula</i> Fisch. et Mey.	NK	"	o	—	tr	—	o	o	o
<i>Peltaria turkmena</i> Lipsky	SGB	"	tr	—	o	—	o	tr	o
Resedaceae	NK	"	tr	—	o	—	o	tr	o
<i>Reseda luteola</i> L.	SGB	"	tr	—	o	—	o	tr	o
" " "	NK	"	tr	—	++	0,49	o	o	o
Многолетние из Resedaceae	ZV	roots	tr	—	++	0,47	o	o	o
" " "	"	"	tr	—	o	—	o	++	o
Rosaceae	KD	ag/part	o	—	+	0,55	tr	+	o
<i>Cotoneaster racemiflora</i> (Desf.) C. Koch.	NK	"	o	—	++	0,51	o	tr	o
<i>Amygdalus scoparia</i> Spach	"	"	o	—	++	0,49	o	tr	tr
<i>Cerasus microcarpa</i> (C. A. Mey.) Boiss.	SGB	"	o	—	—	—	o	+	o

Table 1. (Cont.)

1	2	3	4	5	6	7	8	9	10
Leguminosae									
<i>Ammodendron lehmannii</i> Bge.	Ya	ag/part	++	1.55	o	—	o	+	o
<i>Melilotus offinalis</i> (L.) Desr.	NK	"	o	—	o	—	o	+	o
<i>Smirnovia turkestanica</i> Bge.	Ya	"	++	0.28	o	—	o	+	o
<i>Caragana grandiflora</i> (M. B.) DC.	SGB	"	o	—	o	—	o	+	o
<i>Astragalus ellbrusensis</i> Boiss.	NK	"	o	—	tr	—	o	tr	o
" <i>severzovii</i> Bge.	"	"	—	—	o	—	o	o	o
" sp. "на «сынгрен»"	KS	"	+	—	tr	—	o	+	o
<i>Meristotropis triphylla</i> Fisch. et. Mey.	SLB	"	o	—	tr	—	o	+	o
<i>Hedysarum</i> sp.	ZV	fruit	tr	—	+	—	tr	o	+
<i>Onobrychis cornuta</i> (L.) Desv.	ag/part	tr	—	—	+	—	tr	o	+
Geraniaceae									
<i>Geranium divaricatum</i> Ehrh.	NK	"	o	—	+	—	o	—	o
<i>Erodium oxyrhynchum</i> M. B.	"	roots	o	—	tr	—	o	—	o
<i>Biebersteinia multifida</i> DC.	SLB	ag/part	o	—	++	0.59	o	—	tr
Zygophyllaceae									
<i>Malacocarpus crithmifolius</i> (Retz.) C. A. Mey.	KO	"	o	—	+	0.55	—	—	+
<i>Zygophyllum atriplicoides</i> Fisch.	KD	roots	tr	—	++	0.45	o	o	o
Rutaceae									
<i>Haplophyllum pedicellatum</i> Bge.	SLB	"	tr	—	++	0.65	o	—	o
<i>Chrozophora gracilis</i> Fisch. et Mey.	Ya	"	o	—	++	0.56	o	+	o
<i>Euphorbia monostyla</i> Prokh.	NK	"	o	—	o	—	o	tr	o
" <i>bungei</i> Boiss.	"	roots	o	—	tr	—	o	—	o
" <i>balchanensis</i> R. Tar.	SLB	ag/part	tr	—	—	—	o	tr	o
" <i>kopetdaghi</i> Prokh.	SGB	"	o	—	tr	—	o	tr	o
" <i>cheirolepis</i> Fisch. et Mey.	UZ	"	o	—	+	0.50	tr	+	o
Guttiferae									
<i>Hypericum elongatum</i> Ledeb.	NK	"	o	—	++	0.55	o	o	tr
" "	"	roots	o	—	—	—	o	—	o
" "	"	flowers	o	—	++	1.05	o	o	o
Tamaricaceae									
<i>Reaumuria reflexa</i> Lipsky	ZV	ag/part	o	—	++	0.52	o	+	o
" "	SLB	"	o	—	—	—	o	+	o
Thymelaeaceae									
<i>Dendrostellera olgae</i> Pobed.	KD	"	o	—	o	—	tr	++	o
Umbelliferae									
<i>Eryngium balchanicum</i> Bobr.	SGB	"	o	—	o	—	o	+	o
" "	"	roots	o	—	o	—	o	+	o
<i>Prangos latiloba</i> Korov.	QCH	ag/part	o	—	tr	—	o	o	o
" "	"	roots	o	—	o	—	o	o	o
<i>Reutera bobrovi</i> Woronow	QCH	ag/part	o	—	o	—	o	tr	o
<i>Korovinia microcarpa</i> Korov.	KK	"	o	—	o	—	o	+	o
<i>Zosimia absinthifolia</i> (Vent.) Link	"	fruit	tr	—	++	0.45	o	+	o
<i>Fenula ovina</i> Boiss	E	ag/part	o	—	o	—	—	tr	o
" sp.	SGB	"	o	—	o	—	o	+	o
<i>Dorema hircanum</i> K. Pol.	KD	"	tr	—	o	—	o	o	o
" "	"	fruit	o	—	o	—	o	tr	o
" "	"	roots	tr	—	o	—	o	+	o
Cornaceae									
<i>Cornus mas</i> L.	SGB	ag/part	o	—	++	0.45	o	+	tr

Table 1. (Cont.)

1	2	3	4	5	6	7	8	9	10
Plumbaginaceae									
Acantholimon sp.	ZV	ag/part	o	-	++	0,56	o	-	o
" balchanicum Korov.	SGB	"	o	-	+	-	o	-	o
Limonium sulfruticosum (L.) Kuntze	"	"	o	-	+	-	o	-	o
Asclepiadaceae									
Antitoxicum pumilum (Decne.) Pobed.	"	"	+	-	o	-	o	o	o
" Convolvulaceae	KD	"	tr	-	o	-	o	-	o
Convolvulus lineatus L.	ChCh	w/plant	++	0,25	tr	-	o	o	o
" fruticosus Pall.	ZV	ag/part	tr	-	tr	-	o	o	o
" hamadae (Vved.) V. Petrov	E	"	o	-	o	-	o	o	o
"	SLB	"	++	0,12	o	-	o	+	-
" Boraginaceae	Uz	"	+	-	o	-	o	o	o
Heliotropium arguzioides Kar. et Kir.	SLB	"	++	1,1	++	0,44	o	o	o
Nonea caspica (Willd.) G. Don.	NK	roots	o	-	+	-	o	o	o
Onosma dichroanthum Boiss.	"	ag/part	o	-	o	-	o	+	o
" leucocarpum M. Pop.	SGB	"	tr	-	o	-	o	+	o
Rochelia persica Bge. ex Boiss.	ChCh	w/plant	o	-	+	-	o	o	o
Rochelia sp.	ZV	"	tr	-	++	0,44	o	o	o
Verbenaceae									
Verbena supina L.	E	ag/part	++	0,1	o	-	tr	+	o
Labiatae									
Teucrium polium L.	SGB	"	tr	-	+	-	tr	o	tr
"	E	"	o	-	++	0,47	tr	o	o
Marrubium vulgare L.	NK	"	o	-	o	-	o	o	o
Nepeta kopetdaghensis Pojark.	ChCh	"	o	-	tr	-	tr	+	o
Hymenocrater bituminosus Fisch. et Mey.	"	"	o	-	o	-	o	+	o
Eremostachys subspicata M. Pop.	SGB	"	tr	-	+	-	-	tr	o
"	"	roots	o	-	o	-	o	++	o
Stachys turcomanica Trautv.	"	ag/part	o	-	++	0,46	o	+	tr
Chamaesphacos ilicifolius Schrenk	Uz	"	o	-	+	-	-	-	o
Salvia kopetdaghensis Kurd.	ChCh	"	o	-	o	-	o	o	o
Thymus transcaspicus Klok. et Schost.	NK	"	tr	-	o	-	o	+	o
Mentha kopetdaghensis Boriss.	KD	"	o	-	o	-	o	+	o
Solanaceae									
Lycium kopetdaghi Pojark.	SLB	"	tr	-	o	-	o	tr	o
Scrophulariaceae									
Verbascum songoricum Schrenk ex Fisch. et Mey.	EV	"	tr	-	o	-	o	tr	o
"	"	roots	o	-	-	-	+	++	o
Scrophularia turcomanica Bornm. et Sint. ex Rech.	SGB	ag/part	+	-	-	-	o	o	o
"	SGB	roots	o	-	o	-	o	tr	o
" Orobancheaceae	E	ag/part	o	-	o	-	o	+	o
Cistanche salsa (C. A. Mey.) G. Beck.	NK	w/plant	o	-	++	0,56	o	-	o
Plantaginaceae									
Plantago lanceolata L.	NK	ag/part	o	-	tr	-	o	o	o
Rubiaceae									
Galium coronatum Sibth. et Sm.	ChCh	"	o	-	tr	-	+	-	o

Table 1. (Cont.)										
1	2	3	4	5	6	7	8	9	10	
Rubia pauciflora Boiss.	ChCh	ag/part	o	-	++	0,55	o	o	o	
Valerianaceae	"	.	o	-	tr	-	o	o	o	
Valeriana sisymbriifolia Vahl	"	.	o	-	tr	-	o	o	o	
Compositae	SGB	.	tr	-	o	-	o	+	o	
Pulicaria salviifolia Bge.	E	.	+	-	o	-	o	+	o	
Lepidolopsis turkestanica	NK	.	o	-	++	0,46	tr	o	o	
(Rgl. et. Schmalh.) Poljak.	"	.	o	-	tr	-	o	o	o	
Artemisia balhanorum Krasch.	KS	.	o	-	tr	-	o	tr	o	
Artemisia santolina Schrenk	SLB	.	tr	-	++	0,59	tr	tr	o	
Artemisia scoparia Waldst. et Kit.	"	.	++	0,2	++	0,55	o	+	o	
Artemisia gypsacea Krasch.	"	.	tr	-	+	-	tr	+	tr	
Artemisia M. Pop. et Lincz. ex Poljak.	B	.	tr	-	++	0,58	o	+	o	
Senecio subdentatus Ledeb.	B	.	o	-	o	-	o	tr	o	
Cousinia bipinnata Boiss.	NK	.	++	-	o	-	o	+	o	
Cousinia leptoccephala Fisch.	E	.	tr	-	o	-	-	tr	o	
et Mey.	KD	.	o	-	o	-	o	tr	o	
Amberboa turanica Iljin	"	.	o	-	o	-	o	tr	o	
Rhabdofrerea korovinii (M. Pop.) Kirp.	SLB	.	tr	-	tr	-	o	++	o	
Centaurea depressa M. B.	RN	.	+	0,15	o	-	o	o	o	
Lactuca orientalis Boiss.	UZ	.	o	-	o	-	o	+	o	
Lactuca undulata Ledeb.	"	.	o	-	o	-	o	+	o	

Analysis of 133 types of plants belonging to 100 species and 37 families demonstrated alkaloids in 133 species or 40% of specimens examined; flavone substances in 133 or 62.4%; glucosides of cardiac activity in 119 or 15.9%; coumarin derivatives in 127 or 51.9%; and anthraquinones in 130 or 10%. Preliminary qualitative and quantitative analysis yielded an extensive list of alkaloid carriers for use in detailed chemical and pharmacological study.

ASSOCIATION: Institut botaniki AN Turkmenskoy SSR
(Institute of Botany, AN Turkmen SSR); Institut khimii
AN Turkmenskoy SSR (Institute of Chemistry, AN Turkmen SSR)
[SW]

NEW CULTURE METHOD

Beker, M. Ye. Microorganism culture method (Class 30, no. 178947). Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 4, 1966, 58.

A deep fermentation method has been developed for culturing microorganisms. To intensify the process and improve product quality, culturing and dehydration are conducted simultaneously in a layer of the culture broth and under spray conditions in the flow of the drying agent. [DP]

COMBINED EFFECT OF CHEMICAL MUTAGENS ON PHAGE MUTATION

Belyayev, D. L., and V. A. Zuyev. Intensification of T2 phage e-mutation induced by the combined effect of chemical mutagens. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 49-52.

The normal frequency of spontaneous e-mutation is low, between 0.10 and 0.15×10^{-7} . Used alone, 5-bromouracil has a high inductive capacity for T2 phage e-cistron, in-

creasing the number of e-mutants in a phage population by 140 times. Treatment of intracellular T2 phage with acridine orange alone induces few e-mutants. However, the combination of 5-bromouracil and acridine orange tremendously increases the incidence of e-mutations (to about 450 times the normal frequency, or 3 times the maximum frequency induced by either agent alone).

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology imeni Gamaleya, Academy of Medical Sciences SSSR) [LP]

MONKEY B ENCEPHALITIS IMMUNIZATION

Benda, R. Active immunization against monkey B virus (Herpesvirus simiae) infection. I. Experience obtained during the preparation and evaluation of Hull's formol vaccine. Ceskoslovenska epidemiologie, mikrobiologie, imunologie, v. 14, no. 6, 1965, 330-338.

Active immunoprophylaxis using modified Hull's formol vaccine was studied in rabbits, by infecting them with monkey B virus one week after the last injection of the vaccination series. Observation time was four weeks. On the basis of results, it is recommended that the vaccine be stored in the deformolized state. A laboratory technique was developed for determining immunogenic effectiveness of the vaccine. Quality requirements for the vaccine are as follows: the vaccine must be safe; it

must protect rabbits against about 100 intracutaneous LD of live monkey B virus; and the post-vaccination neutralizing antibody titer in rabbits should attain an average value of at least 1:11. In 39 nonimmunized rabbits receiving 100 to 1000 intracutaneous LD₅₀ doses of the virus, the average time of death was 8.1 days, while in 54 immunized rabbits it was 9.9 days. The difference between the two groups can be considered statistically significant.

ASSOCIATION: Vojensky ustav hygieny, epidemiologie a mikrobiologie, Prague (Military Institute of Hygiene, Epidemiology, and Microbiology) [LP]

COXSACKIE VIRUS RIBONUCLEIC ACID

Bocharov, Ye. F., and V. Ye. Yavorovskaya. Preparation and properties of Coxsackie A13 virus RNA. IN: Akademiya nauk SSSR. Sibirskoye otdeleniye. Izvestiya. Seriya biologomeditsinskikh nauk, no. 12, 1965, 101-105.

RNA was obtained from a human embryo skin-muscle tissue culture 18 to 20 hours after inoculation with Coxsackie A13 virus. Earlier studies have shown that the maximum virus concentration is reached at this time. The infectious nature of virus nucleic acids is well established. The viral origin of the infectivity of the present material is shown by the fact that phenol extracts of noninoculated cells were not infective. RNA, rather than viral particles surviving deproteinization, was shown to be the infective principle of preparations from virus-inoculated cells. Spectrophotometric data, the great rapidity of cell penetration by RNA, sensitivity to RN-ase, and thermal and UV-inactivation dynamics all indicate that Coxsackie A13 virus RNA is very similar to other enterovirus nucleic acids.

ASSOCIATION: Novosibirskiy meditsinskiy institut (Novosibirsk Medical Institute) [DP]

COXSACKIE EPIDEMIOLOGY IN RIGA

Bratsslavskaya, O. Distribution of Cocksackie virus among the population of Riga. IN: Akademiya nauk Latviyskoy SSR. Izvestiya, no. 2, 1966, 99-104.

Cocksackie viruses are known to be very widely distributed among the population of Riga. This distribution is subject to pronounced seasonal variation. Cocksackie virus incidence is 2.6 times higher among school children than among children who do not attend school or nursery school. In the fall (based on 1962 and 1963) Cocksackie B virus is 1.5 times more frequent than Cocksackie A virus. In 1962, the predominant serotypes were B-5 (for Cocksackie B) and A-4 (for Cocksackie A). In 1963 serotypes B-1, A-5, and A-8 predominated. Proper diagnosis of Cocksackie virus infection requires both tissue cultures and study of the clinical and pathological effects on newborn mice.

ASSOCIATION: Institut mikrobiologii im. A. Kirkhenshteyna
AN LatvSSR (Institute of Microbiology, Academy of Sciences
LatSSR) [DP]

PRELIMINARY STUDY OF CITRUS YELLOW SHOOT VI.A.US

Ch'en, Yen-hsi (7115/1693/3556), and Mei, Ju-hung (2734/3067/7703). A preliminary study of the citrus yellow shoot virus. Chih wu pao hu hsueh pao (Acta phytophylacica sinica), v. 4, no. 4, 1965, 361-364.

In mainland China, the citrus yellow shoot disease is limited to the provinces of Kwangtung, Fukien, and the Chuang Autonomous District of Kwangsi. The present study, however, reveals that the virus is also distributed in non-epidemic areas, including Szechuan, Hunan, and Peking, where sweet oranges (*C. sinensis*), mandarins (*C. reticulata*), and Peking lemon (i.e., Meyer lemon) are symptomless carriers of the virus.

According to the types of response of the two indicator plant species to inoculation, the isolates of citrus

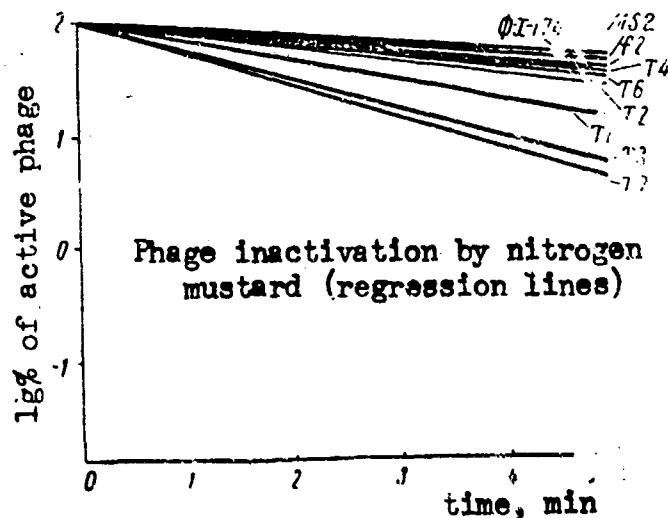
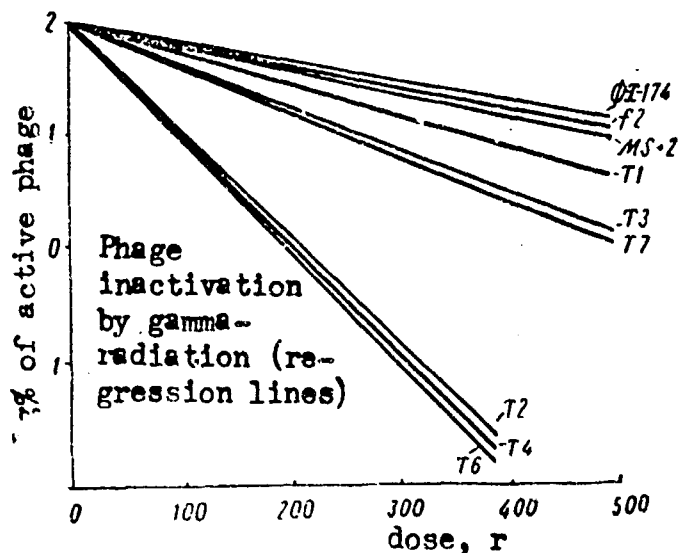
yellow shoot virus have been tentatively grouped into three categories: severe, mild, and very mild. Experimental results show that the Pokan citrus carries only the severe isolates, varieties of the sweet orange carry both severe and mild isolates, while mandarins and Peking lemon carry mild and very mild isolates respectively.

ASSOCIATION: Pei-ching nung yeh ta hseeh (Peking Agricultural University [CR])

RADIOLOGICAL AND RADIOMIMETIC PHAGE INACTIVATION

Fomichev, Yu. Ye., and I. M. Gabrilovich. Comparative study of the effects of ionizing radiation and radiomimetic substances on *Escherichia coli* phages. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 65-70.

The effect on some *Escherichia coli* phages of gamma-radiation and the radiomimetic alkylating agent di-(2-chloroethyl) methylamine (nitrogen mustard) were compared. The results are shown in the figures below.



Although the final biological effect (inactivation of phage infectivity) is the same with both agents, differences in the types of damage caused by the two agents in individual phages indicate the existence of substantial differences in the mode of action of gamma-irradiation and nitrogen mustard.

ASSOCIATION: Belorusskiy institut epidemiologii i mikrobiologii (Belorussian Institute of Epidemiology and Microbiology); Belorusskiy universitet imeni V. I. Lenina, Minsk (Belorussian University) [LP]

DETOXIFICATION OF TYPHUS RICKETTSIAE

Frygin, C., E. Wojciechowski, and E. Mikolajczyk. Effect of certain antibiotics and para-aminobenzoic acid (PABA) on the toxic properties of typhus rickettsia. Medycyna doswiadczalna i mikrobiologia, v. 18, no. 1, 1966, 39-45.

Incubation (1 hr at 34°C) with the investigated antibiotics and PABA deprived toxic suspensions of *Rickettsia prowazeki* and *Rickettsia mooseri* of their toxicity for mice and their capacity to hemolyze sheep and rabbit erythrocytes. Doses of the detoxifying agents required to fully inhibit the toxicity for mice of 1 LD₅₀ of rickettsia suspension were: PABA, 1.25 mg; penicillin G, 1.25 mg; chloramphenicol, 0.5 mg; cycloserine, 0.5 mg; erythromycin, 0.1 mg; tetracycline, 0.1 mg; oxytetracycline, 0.05 mg; aureomycin, 0.005 mg. The doses required to fully inhibit hemolytic activity were 2- to 10-fold higher. PABA, penicillin, chloramphenicol, and aureomycin in doses inhibiting the lethal effect of *Rickettsia prowazeki* in mice failed to inhibit chick embryo yolk sac propagation of the rickettsia.

ASSOCIATION: Zaklad bakteriologii Panstwowego zakladu Higieny, Warsaw (Bacteriology Department of the Public Health Department) [DP]

DNA CODING CHAINS ISOLATED AND STUDIED

Il'yashenko, B. N., O. N. Rudchenko, and R. Yu. Tashpulatov. Isolation of replicating DNA coding chains from ϕ -X-174 phage and study of their replicative function. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 34-38.

Coding DNA chains were isolated by thermal denaturation of replicative ϕ -X-174 phage followed by fractionation on methylated albumin. It was shown that in addition to its coding function, the chain can also behave as a replicating element and is infectious for bacterial spheroplasts. It is quite probable, in view of the ability of the coding chain to function as a replicating element, that the reduplication of the replicative form is accomplished by semiconservative means with the participation of both chains. Other properties of the replicative form of ϕ -X-174 DNA were also studied.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR)

[LP]

BW COUNTERMEASURES

Ivanov, A. Protection against biological weapons. Tekhnika i vooruzheniye, no. 12, 1966, 87-89.

The article is a review of BW countermeasures based on "imperialist" (i.e., US) sources. Basic countermeasures are: 1) increasing individual resistance, 2) individual protection, and 4) decontamination. Increased resistance is achieved by maintaining sanitary messing, quartering, and water supply conditions, a good state of physical training, and by immunization and drug-antibiotic prophylaxis. Q-fever may be prevented by tetracycline, tsutsugamushi by chloramphenicol or tetracycline, and pulmonary anthrax by penicillin in combination with vaccine. Needle-less hypodermic and aerogenic vaccination techniques are described. BW agents may be detected by tell-tale signs in soil, water, or vegetation. More

sophisticated means include aerosol counters (such as the "Aerosoloscope"), and other devices capable of detecting sharp increases in the amount of protein in suspension in the air (under normal conditions the layer of air next to the ground contains not more than one viable bacterium and approximately 3×10^{-9} g of protein per liter). For rapid identification, essential to the timely application of appropriate countermeasures, the fluorescent antibody method appears most promising, being capable of providing an answer within a few hours. Against the principal delivery method, aerial spray, modern gas masks which exclude 99.99% of aerosol particles in the 1- to 5- μ range from inhaled air, can be used. A simple face mask covering nose and mouth also affords good protection. Since BW agents can also enter the organism through the skin, decontamination and disinfection of areas and clothing are important. Chlorine compounds such as STB and DANC are widely used for this purpose, as are tincture of green soap and boiling, drying, and exposure to sunlight. For neutralizing BW agent residues on equipment, on the ground, and in buildings, formaldehyde, methyl bromide, ethylene oxide, and beta propiolactone are used. Painting buildings and equipment with bactericidal paints may simplify the problem of decontamination. Insect carriers of disease are combatted with insecticides and repellents.

ASSOCIATION: Meditsinskoy sluzhby (Medical Corps)

[DP]

VIRULENCE CHARACTERISTICS OF *BACILLUS ANTHRACIS* MUTANTS

Ivanovich, G., and M. Mardzhay. Investigation of auxotrophic Bacillus anthracis mutants. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 78-82.

The purpose of this study was to investigate the possibility that, in addition to toxin and capsule formation, there exist other processes contributing to the virulence of *Bacillus anthracis*. Mutants with various biochemical derangements were studied to determine the effect of these hereditary defects on virulence. Adenine-dependent mutants were nonvirulent. In 3 of these auxotrophs, adenylsuccinase synthesis did not occur with the result that they accumulated 5-amino-imidazole-N-succinocarboxy-amide ribonucleotide. One adenine-dependent mutant amassed other diazo-amines. Apparently the "third" virulence

factor sought by the author is produced by the cells only when the de novo biosynthesis of adenine is unimpaired. Exogenous adenine, though it can maintain the growth of the bacteria outside the host organism, is not capable of participating in the formation of those structural elements of the cell which are necessary for it to overcome the protective mechanism of the host.

ASSOCIATION: Institut mikrobiologii (Institute of Microbiology); Meditsinskiy universitet, Seged, Hungary (Medical University) [LP]

AEROSOL IMMUNIZATION OF CATTLE AGAINST BRUCELLOSIS

Kharisov, Sh. Kh., P. V. Sakharova, and Yu. Sh. Abuzarov. Aerogenic immunization of cattle against brucellosis. Veterinariya, no. 2, 1966, 37-39.

Aerogenic immunization of young cattle with strain 19 and 82 brucella vaccines produced no ill effects. Both strains induced formation of agglutinins and complement-fixing substances. Serological studies showed that aerogenic immunization with either strain causes the same immunological adjustment in the organism as subcutaneous vaccination. An adequate level of immunization was attained with 32.4 billion units of aerosol vaccine (strain 19), as against 70 billion units of subcutaneous vaccine. Aerogenically induced immunity was found to be as stable as that produced by subcutaneous vaccination. The immunity produced by aerogenic and subcutaneous immunization with strain 82 vaccine is weaker (34% for aerogenic and 40% for subcutaneous vaccination) than that obtained with strain 19 vaccine. Strain 82 immunization was often followed by generalized infection; strain 19 vaccination was not. After strain 82 immunization *Brucella* cultures were isolated from the parenchyma and lymph nodes of 63% of the aerogenically immunized and 87% of the subcutaneously immunized animals. Formation of stable immunity in cattle by aerogenic means requires a vaccine microbe concentration high enough to assure inhalation of 32 to 35 billion units in 45 min. Aerogenic immunization of cattle can be accomplished in ordinary cow barns if cracks and holes are first sealed up.

ASSOCIATION: Kazanskiy veterinarnyy institut (Kazan'
veterinary institute) [DP]

ROLE OF BIRDS IN TICK-BORNE ENCEPHALITIS FOCI

Korenberg, E. I. *Birds and the problem of natural foci of tick-borne encephalitis. Zoologicheskiy zhurnal*, v. 45, no. 2, 1966, 245-260.

In this review the author finds that materials so far available on the significance of birds as host to *Ixodes* ticks and their relation to the tick-borne encephalitis virus (including data on experimental infection and results of virusological examination of birds from various natural foci) fail to support the view that birds play an essential part in maintaining natural foci of this disease; or that the virus is highly adaptable to the avian organism. Theories on the winter circulation of the virus in birds must await more detailed knowledge of the role of bird parasites in foci of the disease. The question of the place of birds in foci of tick-borne encephalitis is obviously distinct from that of their relationship to the "mosquito virus" encephalitides, which they do help to maintain. Most likely birds are only an additional host for tick-borne encephalitis, and play a significant role in its circulation only in those localities where they are heavily infested with ticks. All this supports the author's view that over the greater part of the East European plain, where birds are little parasitized by ticks, they have little contact with the virus and negligible importance as reservoirs. Toward the eastern and western territorial limits of the disease, where *Ixodes persulcatus* and *Ixodes ricinus* thrive, both birds and mammals encounter greater numbers of larvae and nymphs, and bird participation in the virus cycle is more likely. Even in these areas, however, birds are not the most important vertebrates in the focus, and do not determine either the structure or the epizootic situation of natural foci of tick-borne encephalitis.

ASSOCIATION: Laboratoriya meditsinskoy zoologii Instituta epidemiologii i mikrobiologii AMN SSR, Moscow (Laboratory of Medical Zoology, Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR) [DP]

DYNAMICS OF SIBERIAN SILKWORM PROPAGATION

Kozlov, V. I. Determination of the phenophases of *Dendrolimus sibiricus* according to plant indicators in intervals between outbreaks in larch woods of the Chulym-Yenisey basin. IN: *Sibirskiy nauchno-issledovatel'skiy institut lesnoy promyshlennosti. Trudy*, no. 12, 1965, 40-44.

Correlations were sought between massive outbreaks of the Siberian silkworm, *Dendrolimus sibiricus*, and other insects, blossoming of plants, and the life cycle of the pest. Observations began in 1958, when propagation of this pest was low. Massive outbreaks of birdcherry moth, *Halias chlorana* and sawflies in 1960 were followed in 1962 by a massive outbreak of *Dendrolimus sibiricus*. The outbreaks vary with time, locale, and climatic conditions. Onset and duration of developmental periods of *Dendrolimus sibiricus* coincided with definite stages in the cycle of flowering plants such as willow weed. Oviposition by *Dendrolimus sibiricus* occurred at the end of July, when the first willow weed blossoms appeared; massive blossoming coincided with massive flight and egg-laying. The new generation of caterpillars appeared around 10-15 August, at the end of the blossoming period.

ASSOCIATION: *Sibirskiy nauchno-issledovatel'skiy institut lesnoy promyshlennosti* (Siberian Scientific-Research Institute for the Timber Industry) [LP]

A TICK-BORNE ENCEPHALITIS FOCUS IN CZECHOSLOVAKIA

Kozuch, O., J. Nosek, M. Lichard, and J. Chmela. Isolation of tick-borne encephalitis virus from *Ixodes ricinus* ticks from a natural focus near Bouzov. *Ceskoslovenska epidemiologie, mikrobiologie, imunobiologie*, v. 15, no. 1, 1966, 24-27.

Two hundred and fifty-four *Ixodes ricinus* ticks (139 nymphs, 51 females, and 64 males) were examined from a natural focus of tick-borne encephalitis near Bouzov for presence of the virus. Two strains were isolated, one from the nymphs and the other from the males. Virus incidence was 0.7% (nymphs) and 1.5% (male ticks).

ASSOCIATION: Virologicky ustov CSAV, Bratislava (Virology Department of the Czechoslovak Academy of Sciences); Okresna hyg-epid stanica, Olomouc (District health and epidemiological station) [DP]

Q FEVER DIAGNOSIS

Kulagin, S. M. Some clinical and diagnostic problems of Q fever. *Sovetskaya meditsina*, no. 12, 1965, 65-70.

Since its clinical symptoms closely resemble those of other diseases, Q fever is difficult to diagnose. Q fever patients are often hospitalized with diagnoses of typhoid fever, influenza, pneumonia, or brucellosis. The patient's occupation is important, since Q fever is largely an occupational disease of wool, meat, dairy, and leather industry workers. Diagnosis of Q fever should be based on epidemiological, clinical, and laboratory findings. In some cases, chest x-rays are helpful. Daily dosage of 2 g or more of chloro- and oxytetracycline reduces temperature in 24 to 48 hr and alleviates other symptoms. Serological tests exist for distinguishing residual or false positive reactions from the positive reactions of newly infected persons.

ASSOCIATION: Institut epidemiologii i mikrobiologii im. N. F. Gamalei AMN SSR, Moscow (Epidemiology and Microbiology Institute im. N. F. Gamaleya AMN SSR) [LP]

MODE OF ACTION OF COLICIN D

Larionova, T. I. *Materials for a study of the mode of action of colicin D.* IN: *Akademiya meditsinskikh nauk SSSR. Vestnik*, no. 2, 1966, 87-92.

A study was made of some aspects of the mode of action of highly bactericidal colicin D produced by the wild colicinogenic *Escherichia coli* strain 026/14 as it affected *Escherichia coli* metabolism. It was established that the respiratory (on glucose and pyruvate substrates) and dehydrogenase systems (in the presence of glucose and glutamate) of *Escherichia coli* ϕ are not sensitive to colicin D. Cells grown under aerobic conditions were very sensitive, and cells processed with metabolic poisons (2,4-dinitrophenol and NaCN) were less sensitive, to colicin D. This suggests that the mode of action of colicin D is similar to that of colicin K and colicin E₁, which impair the process of oxidative phosphorylation.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR)

[LF]

EFFECT OF ACRIDINE DYES ON CONJUGATION

Likhoded, V. G., and T. B. Padalko. *Effect of acridine dyes on conjugation mediated by the colicinogenic 1^m factor.* IN: *Akademiya meditsinskikh nauk SSSR. Vestnik*, no. 2, 1966, 70-73.

The effect of acridine orange in a concentration of 20 γ /ml on marker transmission and colicinogenicity during conjugation mediated by the colicinogenic factor 1^m in *Salmonella typhi*. When the acridine orange was added at the beginning of conjugation, a pronounced inhibitory effect was observed. Depression is particularly distinct when the conjugating pairs are separated on a high-speed mixer. It was concluded that the dye does not prevent the formation of effective contacts between donor and receptor cells but does inhibit the transfer of genetic material by suppressing conjugative DNA replication in the donor cells.

ASSOCIATION: Moskovskiy nauchno-issledovatel'skiy institut vaktsin i syvorotok imeni I. I. Mechnikova (Moscow Scientific Research Institute of Vaccines and Serums) [LP]

PREPARATION OF BACTERIAL RODENTICIDES

Malushko, L. V. Culturing murine typhus bacteria on fish hydrolysates. Veterinariya, no. 2, 1966, 111-112.

Media of concentrated fish hydrolysates containing 90 to 120 mg % amino nitrogen and 0.4 to 0.5% NaCl are suitable for growing original (mother) cultures of murine typhus. Addition to the medium of sodium or potassium phosphate (0.1%) increases the bacterial titer one and a half times. The culturing qualities of fish hydrolysates were unchanged by prolonged storage (18 months).

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut sel'skokhozyaystvennoy mikrobiologii (All-Union Scientific Research Institute of Agricultural Microbiology) [DP]

BRUCELLA VACCINATION INDUCED ABORTIONS

Minkov, G. B. Identification of Brucella strains isolated from aborted fetuses of sheep vaccinated against brucellosis. Zhurnal mikrobiologii, epidemiologii i immunobiologii, no. 2, 1966, 117-121.

Vaccination of sheep with live brucella vaccine (strain 19) occasionally caused abortions in the vaccinated animals. Correct identification of brucella cultures isolated from

the aborted fetuses was complicated by changes which had occurred in the vaccinal strain 19 in the organism of the sheep. These included increased growth capacity on a thionine medium and loss of susceptibility to lysis by T-phage. Thorough selection (using White and Wilson's method) for "reversion to initial condition" was made on the isolated cultures. After the 3d selection, the isolated cultures were identical in their main characteristics with the reference strain (*Brucella abortus* no. 544).

ASSOCIATION: Astrakhanskaya protivochumnaya stantsiya
(Astrakhan Anti-Plague Station) [DP]

PLANT DISEASES OF THE SOVIET FAR EAST

Nelen, Ye. *Plant diseases in the [Soviet] Far East.*
Zashchita rasteniy, no. 1, 1966, 46-47.

The following phytopathogenic fungi are reported for the first time from the Amurskaya oblast': *Ovularia brassicae* (at Uril stanitsa); *Phyllosticta citrullina* (Tambovskiy rayon); *Phyllosticta helianthi*. Very harmful fungi observed in the Amurskaya oblast' include *Phyllosticta cucurbitacearum*, *Phyllosticta hortorum*, and *Phyllosticta polygonorum*. These also occur in Khabarovskiy kray and on Sakhalin, and attack lupine, alfalfa, peas, beans, corn, shchavel', and red pepper. In Primorskiy kray, melons, watermelons, and tomatoes are subject to phomosis, alterneriosis, and anthracnosis. Tomatoes are also attacked by stem rots caused by *Stemphylium solani* and *Phoma solanicola*. New diseases in this area include mildews of parsley and peas, helmithosporiosis and phyllostictosis attacking onions, ovulariosis of wheat, and ramulariosis attacking rhubarb. Cabbages are afflicted by *Macrosporium brassicae*. Widespread phytopathogens include *Phoma allicola*, septoriosiis, and ascochitosis. A new focus of clubroot (seen earlier in Nikolayevsk-on-Amur) has been located in Vladivostok garden plots, where it attacks cabbages and radishes.

ASSOCIATION: Biologo-pochvennyy institut Dal'nevostochnogo filiala SO AN SSSR (Biology and Pedology Institute, Far Eastern Branch, Siberian Department, Academy of Sciences SSSR) [DP]

SIBERIAN SILKWORM PARASITES

Orlov, L., and N. Gorshkov. *Ooencyrtus*, a parasite of the Siberian silkworm. *Zashchita rasteniy*, no. 1, 1966, 39-40.

The eggs of the Siberian silkworm are parasitized by *Telenomus gracilis* (which may infest up to 99% of the eggs in dark coniferous silkworm foci), *Trichogramma* spp. (which has only negligible importance), and *Ooencyrtus pinicola* (which infests 60% to 100% of the silkworm eggs in light coniferous larch forests of the Trans-baykal region in late July). *Ooencyrtus* develops in 28 to 45 days and emerges between early August and mid-September. In the northern parts of Tungokochenskiy rayon early frosts kill some before they are fully developed. Additional hosts (the drinker moth, white-toothed moth, and vapor moth) have raised *ooencyrtus* infestation to 61.1% in foci in Sretenskiy and Nerchinskiy rayons (1957) and up to 13.4% in Tungokochenskiy rayon (1958). Infestation statistics are complicated by *Pachyneuron solitarius*, a secondary parasite which lays 1 to 4 eggs in each silkworm egg 5 to 6 days after *ooencyrtus* oviposition. The *pachyneuron* larva eats the *ooencyrtus* larvae, but destroys only about 1 out of 6, so that both *ooencyrtus* and *pachyneuron* may emerge from one silkworm egg. Analysis of 1760 *ooencyrtus*-infested silkworm eggs showed from 1 to 6 larvae per egg, with an average of 2.8. Of these *ooencyrtus*, 44% were parasitized by *pachyneuron*. The one-year growth cycle of the additional hosts (the drinker moth and others) permits *ooencyrtus* and *telenomus* to multiply in the years between Siberian silkworm egg-laying cycles. In areas where these additional hosts are present, population increases in the Siberian silkworm seldom develop into massive outbreaks.

ASSOCIATION: Pedagogicheskiy institut, Komsomol'sk-na-Amure (Pedagogical Institute); Zabaykal'skiy institut SO AN SSSR, Chita (Trans-Baykal Institute, Siberian Department, Academy of Sciences SSSR) [SW]

GROUP E COLICIN DIFFERENTIATION

Petrosov, V. V., D. G. Kudlay, V. G. Petrovskaya, and N. V. Davydova. Differentiation of group E colicins by antiserum neutralization typing and specific immunity of colicinogenic bacteria. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 73-78.

Immune serum neutralization of colicins obtained from colicinogenic cultures, and the sensitivity spectra and inhibitory activity spectra of the cultures themselves, were used to refine the classification of group E colicins. Based on specific immunity, colicins J and S₅ were assigned to Fredericq's subgroup E₁ and colicin F to subgroup E₂. A correlation was noted between the specific immunity of colicinogenic bacteria and colicin neutralization by immune sera, indicating that the specificity of the effect of colicins is due to the existence of determinant groups in the colicin molecule. The adsorption of group E colicins by a resistant strain was compared with their adsorption by a noncolicinogenic culture isolated from a natural medium and resistant only to E₁ and E₂ colicins. Results support Nomura's hypothesis that the various colicin resistance mechanisms of the bacterial cell are not impaired by disruption of the adsorption process.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR)

[LP]

A COLICINOGENIC VARIANT OF ESCHERICHIA COLI STRAIN M-17

Petrovskaya, V. G., and N. V. Davydova. Experimental production of polycolicinogenic Escherichia coli strains with broad-spectrum inhibitory effects. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 83-87.

It was demonstrated by studies using *Escherichia coli* and K-12 as indicators, and also by UV- and gentian

violet induction, that the *Escherichia coli* strain M-17, which is widely used in preparing the drug Colibacterin, does not produce colicins. By means of successive genetic recombinations, the authors succeeded in obtaining a variant of the M-17 strain which simultaneously produces 3 types of colicin (V, B, and E) and possesses a wider range of activity against the conditionally pathogenic group of enterobacteria. The colicinogenic variant has the same rate of propagation as the initial strain, does not exceed it in virulence, and has a higher antagonistic activity and greater resistance to colicins and streptomycin.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR)

[LP]

AIR POLLUTION DETECTION

Piteran, A. Air purity bioindicators. *Nauka i tekhnika*, no. 12, 1965, 54-55.

The growth of lichens is retarded by noxious gases. The use of lichens to indicate safe levels of air pollution is proposed. An extensive survey of lichen growth in Riga and environs showed that no lichens grow in the center of the city or near cement and superphosphate plants. Greater numbers of *Squamaria* and *Physcia* on limestone substrates, and of *Xanthoria*, *Physcia*, *Candelariella*, and others on wood, were found in less contaminated areas. Normally developed lichen flora appeared only 1-3 km outside the city.

[LP]

BACTERIAL INSECTICIDES

Plokhikh, V. Use of entobacteria against forest pests. Zashchita rasteniy, no. 1, 1966, 40-41.

Experiments in 1963—1964, testing the efficacy of All-Union Plant Protection Institute biomethods against 10 species of insects from the orders lepidoptera, hymenoptera, and coleoptera, demonstrated the great effectiveness of entobacteria against tree belt pests. In laboratory experiments 30—40 caterpillars and larva were placed in a breeding place with food (changed daily) sprayed with an 0.5% entobacteria suspension and with 1% and 0.5% suspensions with additions of 0.0005% hexachlorocyclohexane. Field tests were conducted on gauze-insulated branches. Daily insect mortality was counted for 7 to 10 days. Entobacteria were highly effective against lepidoptera (buff-tip, brown-tail, and gypsy moths, and the green oak tortrix); and less effective against hymenoptera (common, red pine, and poplar sawflies) and coleoptera (oak flea beetle). Field and laboratory data show little difference in the effectiveness of the 0.5 and 1% suspensions; addition of some chemical toxin enhances the effect. Experiments in May 1964 studied the effect of various concentrations, with and without 0.005% DDT, against the green oak tortrix and brown-tail moth. At the Volgograd experimental station, a 4 hectare oak belt, infested with actively feeding caterpillars in the 3d or 4th growth stage, was sprayed. A variation of 30% wetting powder DDT (4 kg per 1000 liters of water) was found most effective by the third day, with an additional increase in mortality on the fifth day. An 0.5% entobacteria suspension with DDT gave maximum effect, and a 1% suspension without chemical toxin additive was quite good. Five hectares were treated with entobacteria at the Povalzhskaya experimental station (Kuybyshevskaya oblast'). From 150 to 200 brown-tail caterpillars in the 4th growth stage were found on a single oak. Variants containing entobacteria with DDT or DDT alone gave best results by the third day, while mortality was essentially the same for all variations by the fifth day. Use of entobacteria is recommended against lepidoptera. Spraying against the green oak-tortrix should be done when the caterpillars are in the 3d growth stage, and against brown-tail, gypsy, and buff-tip moth when the caterpillars are in the 3d or 4th growth stage.

ASSOCIATIONS: Vsesoyuznyy institut agrolesomelioratsii, Volgograd (All-Union Institute of Agricultural, and Timberland Amelioration)

[SW]

AUTOMATION OF GAMMA GLOBULIN PROCESSING

Podol'skiy, M. V., and Z. Z. El'pin. Experimental automation and mechanization of the gamma globulin manufacturing process. Meditsinskaya promyshlennost' SSSR, no. 12, 1965, 39-41.

Automation and mechanization of the exterior chamber process doubled the production of gamma globulin in 1960 and has since more than tripled it. The industrial installation contains 2 antechambers (kept at 0°C) where the proteins are precipitated by alcohol addition, and 2 super-cold chambers (air temperatures of -3° to -5° and -10° to -15°C) containing supercentrifuges. All components are surrounded by coolant pipes. Up to 1000 kg of the pastelike protein precipitate can be processed each month. The processing machinery can also be used for dry preparation. Process fluids are moved by vacuum. Temperature control is electronic, with control panel display of temperatures at 24 check points. The dry product is triple filtered by air pressure. The equipment is in use at MNIIEM and other institutes. This system can also be used for blood protein fractionation, by either the exterior or interior chamber method, on a manufacturing scale.

ASSOCIATION: Tsentral'nyy ordena Lenina institut gematologii i perelivaniya krovi Ministerstva zdavookhraneniya SSSR (Central Order of Lenin Institute of Hematology and Blood Transfusion, Ministry of Health, SSSR); Moskovskiy nauchno-issledovatel'skiy institut epidemiologii i mikrobiologii Ministerstva zdavookhraneniya RSFSR (Moscow Scientific Research Institut of Epidemiology and Microbiology, Ministry of Health, RSFSR) [LP]

BACTERIAL RODENTICIDES

Prokhorov, M. I. Bacterial method against rodent pests. Zashchita rastaniy, no. 1, 1966, 32-33.

Advantages of bacterial pesticides (consistent high effectiveness, suitability for applications where chemical poisons would be ineffective or dangerous) are discussed. Murine typhus bacteria (Isachenko and no. 5170 strains)

which are harmless for man and domestic and game animals are best against rodents. These may be used to poison seeds or grain, or sprayed by airplane or hand sprayers in areas infested by rodents (silos, cutover fields with corn shocks, etc). The most effective types of application for various conditions are discussed. Use of bacterial pesticides once or twice a year suffices for almost complete eradication of house and field mice; against rats, two or three applications are 80% to 95% effective. Effectiveness of the bacterial agent for poisoning grain is enhanced by addition of 3% zoocoumarin or 1.5% ratindane. Before treatment, the area should be cleared of other rodent food sources, and kept free of cats and dogs which might frighten them away from the poisoned food. The bodies of the dead rodents should be buried at least 1 m deep to prevent swine or other animals from eating them and falling victim to the various infectious diseases of which rodents are carriers.

ASSOCIATION: Institut sel'skokhozyaystvennoy mikrobiologii (Institute of Agricultural Microbiology)

[DP]

A NEW BACTERICIDAL OINTMENT

Rivkin, Ya. M. Bactericidal-acaricidal ointment (Class 30, no. 178047). Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 2, 1966, 77.

A bactericidal-acaricidal ointment consisting of antiseptic ingredients and solvents has been developed. To enhance the bactericidal-acaricidal effect of the ointment, it contains: lysol, 5%; tar, 5%; sulfur, 10%; turpentine, 2%; lanolin, 25%; and vaseline, 38% (by weight).

[DP]

MULTIPLE REACTIVATION OF F2 PHAGE FOLLOWING UV INACTIVATION

Rozental', G. [Rosenthal, G.], D. Shol'ts [D. Scholz], and K. Shpis [K. Spiess]. Multiple reactivation of f2 phage following UV inactivation. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 63-65.

A suspension of f2 phage in a physiological medium was irradiated with increasing doses of UV. Samples of the suspension were mixed with K-13 cells and the infection multiplicity factor m was determined. The inactivation curves obtained indicate that multiple reactivation in f2 phage is low or entirely absent. This may be due to a low incidence of genetic recombinations in the virus.

ASSOCIATION: Institut virusologii pri Universitete imeni Gumbol'ta, Berlin, GDR (Institute of Virusology, Humboldt University) [LP]

DETOXIFICATION OF DIPHTHERIA TOXIN

Shapiro, N. I. The shielded position of toxophoric groups in the diphtheria toxin molecule. Voprosy meditsinskoy khimii, v. 12, no. 1, 1966, 84-87.

Experimental detoxification with benzaldehyde, of native diphtheria toxin and of diphtheria toxin in which hydrogen bonds had been ruptured by treatment with urea, revealed partial shielding of the toxophoric groups by structural elements of the protein molecule. This internal shielding is probably related to the gradual nature and differential rate of anatoxin formation. Individual toxophoric groups may be more or less accessible to the detoxifying agent. They are not simultaneously blocked, as shown by the dynamics of detoxification and the nature of changes occurring in the physical and chemical properties of the proteins. Vasil'yev's interesting data on energy heterogeneity may also be related to the nonuniform degree of shielding of individual toxophoric groups in the toxin molecule. The advantage of formaldehyde as a detoxifying agent is due to the small size of its molecule, which aids its penetration towards the shielded active sites in the protein molecule.

ASSOCIATION: Leningradskiy nauchno-issledovatel'skiy
institut vaktsin i syvorotok (Leningrad Scientific
Research Institute of Vaccines and Serums) [DP]

FIXATION AND PHENOTYPING OF CHEMICALLY INDUCED MUTATIONS

Skavronskaya, A. G., I. V. Andreyeva, N. B. Borisova, A. A. Kiryushkina, and V. N. Nizovtseva. The fixation mechanism and phenotyping of mutations induced with 5-bromouracil. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 38-42.

The dynamics of streptomycin-resistant mutation formation induced with 5-bromouracil was studied in *Salmonella typhimurium* (strain L2). The results obtained indicate that some of the induced mutations assume their phenotypical expression only after the first DNA replication, i.e., when the nucleotide sequence has been changed in only one of the chains. Mutation induction is complete after two DNA replications, no new mutations appearing after that. The data support the theory that the coding function belongs to only one of the two DNA strands.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR) [LP]

UV-INDUCED h-MUTATION IN T2 PHAGE

Soyfer, V. N. Investigation of the mutation process in T2 bacteriophage (induction of h-mutation in extracellular phage by UV-irradiation). IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 47-49.

The UV-induction of h-mutation in T2 phage was studied. In earlier experiments, gamma irradiation doses yielding a survival rate of 1% (200 kr) caused a 13-fold increase in mutation frequency. In the present study, UV doses yielding an equivalent survival rate (30,000 erg/mm²) caused a mutation frequency of $4.8 \pm 1.4 \times 10^{-6}$, 2 orders of magnitude greater than normal. It is concluded that UV in this dose range is more effective than gamma-radiation as a factor inducing h-mutation. At higher UV doses (100,000 erg/mm²; survival rate, 0.12%), mutation frequency fell off (from the maximum observed with a UV dose of 30,000 erg/mm²) to 3.1×10^{-6} . Various explanations of this drop in mutation frequency at higher doses are suggested, and further study of the mechanism of sequence change in the DNA chain is recommended.

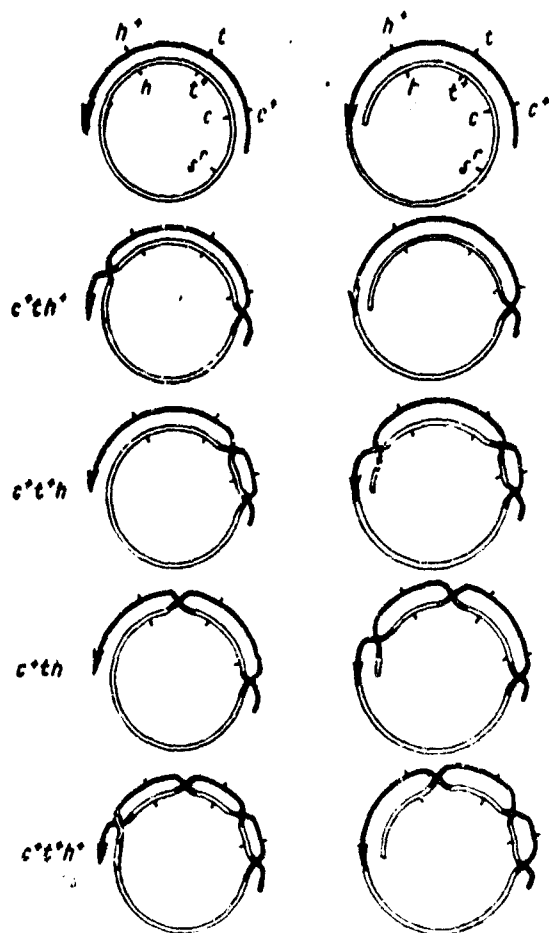
ASSOCIATION: Institut poliomielita i virusnykh entsefalitov AMN SSR, Moscow (Institute of Poliomyelitis and Virus Encephalitides, Academy of Medical Sciences SSSR)
[LP]

MECHANISMS OF CHROMOSOME INTERACTION IN *ESCHERICHIA COLI* CROSSINGS

Sukhodolets, V. V. Investigation of the mechanism of integration of Hfr markers in Kfr x F⁻ crossings in Escherichia coli K-12. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 52-58.

The regularities governing the integration of Hfr x F⁻ crossings in *Escherichia coli* K-12 were studied. It is demonstrated that two essentially different modes of Hfr marker integration exist. Characteristics of the F⁻ strain determine which of the two occurs in a given crossing. In the first mode (left column in figure) an even number of crossovers is needed to form recombination elements; in the second mode (right hand column)

an odd number of crossovers is needed. The effectiveness of Hfr marker integration thus varies in dependence on the *Escherichia coli* K-12 strain used.



Modes of interaction of Hfr chromosome fragments with annular F⁻ chromosomes. At left, crossing with strain S-21; at right, crossing with strain S-21m.

[LP]

TETANUS TOXIN SUPPRESSION OF REFLEX INHIBITION

Sverdlov, Yu. S., and V. I. Alekseyeva. Effect of tetanus toxin on the mechanism of presynaptic spinal inhibition. *Fiziologicheskiy zhurnal SSSR imeni I. M. Sechenova*, v. 51, no. 12, 1965, 1442-1451.

Thorough and prolonged suppression of reflex reactions, observed as a decrease in electrotonic potential (ETP) of posterior spinal root endings, may be caused by depolarization of the presynaptic terminals of afferent

fibers. One example of such presynaptic inhibition is the prolonged suppression of monosynaptic reflex discharges in extensor motor neurons by pulse volleys in primary afferent flexor fibers. Tetanus toxin inhibits or prevents reflex suppression. The present study was made to determine whether the banishment by tetanus toxin of prolonged monosynaptic reflex suppression would have any effect on the ETP picture in the posterior roots, as it should if presynaptic depolarization is really responsible for prolonged reflex inhibition. Twenty-four cats with local tetanus of one hind leg were used. Monosynaptic reflex discharges of motor neurons in the tetanized and normal (control) legs were compared. As expected, afferent volleys in group I flexors inhibited extensor reflexes in the normal (control) leg and had no effect on monosynaptic reflexes in the tetanized leg. There was no difference in the ETP picture or brain P-wave in the normal and tetanized legs. Tetanus toxin thus has no effect on ETP, and presynaptic depolarization is not the cause of monosynaptic reflex inhibition.

ASSOCIATION: Kafedra patologicheskoy fiziologii II Meditsinskogo instituta im. N. I. Pirogova, Moscow (Department of Pathological Physiology, Second Medical Institute) [DP]

RESEARCH TRENDS IN SOVIET MICROBIAL GENETICS

Timakov, V. D. The present state and future trends in Soviet research on microbial genetics. IN: Akademiya meditsinskikh nauk SSSR. Vestnik, no. 2, 1966, 3-10.

The author considers the following to be the most important interest areas in current Soviet basic research on the theory of microbial genetics: 1) genetic control of biosynthetic processes, control of gene activity and enzyme synthesis; 2) the mechanisms of genetic information transfer and protein synthesis; 3) gene structure and nucleic acid replication mechanisms in vivo and in vitro; 4) principles and mechanisms of genetic recombination; 5) role of genetic processes in virus-cell interactions; and 6) the mechanisms of mutation and the specificity of chemical mutagenesis. Additional knowledge in these areas is essential to

understanding the bases of life, the laws of evolution, the operation of the apparatus of cellular heredity and its place in the metabolism and internal environment of the cell. Such knowledge and understanding may eventually permit man to control the vital processes and to change the hereditary properties of organisms. In medicine this will aid in solving such problems as the etiology and pathogenesis of malignancies, the transplantation of organs and tissues, and the prevention and eradication of infection. Study of the roles of transformation, transduction, conjugation, and lysogeny in the transfer of genetic material in microbes will lead to new knowledge of the epidemiology of infections, and the pathogenesis and course of infectious diseases. Such knowledge will also help man to conquer the therapeutic resistance of microorganisms, which is the most important problem of contemporary medicine. The genetic aspects of virulence are very important to the future development of immunology. The Ministry of Health SSSR, the Academy of Medical Sciences SSSR, and Institute of Genetics have set up or are planning to set up new laboratories for the study of: 1) methods of controlling heredity; 2) aspects of virulence; 3) chemical mutagenesis; 4) genetic codes and coding; 5) controlling specific mutations; 6) all aspects of episomatic heredity factors; 7) lysogenesis and intracellular phage development as they relate to changes in serological specificity, immunogenicity, and virulence; 8) the mechanism of DNA transformation and the infectivity of isolated nucleic acids.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR) [LP]

DIPHTHERIA IN CROWS

Ursiny, J., and J. Jakubík. Mass study of diphtheria in black crows. *Veterinärstvi*, v. 16, no. 1, 1966, 23-25.

Clinical and pathoanatomical findings in 5 black crows (*Corvus corone* L.) which died of diphtheria are presented. General weakness and inability to fly was followed by death. Autopsy revealed cardiac dilation

with symptoms of serofibrous pericarditis, small necrotic foci (1/15) in the liver, and edema and hyperemia of the lungs. The results of exo- and endoparasitic tests and mycological tests were negative. Bacteriological study of the lungs, heart, and intestine showed only coliform bacteria and proteins. Toxicological tests and virological tests for plague were also negative. The test for diphtheria, however, was positive.

[LP]

BACTERIAL AEROSOL CHAMBER

Voytsekhovskiy, R. A. Aerosol device (Class 30, no. 177595). Izobreteniya, promyshlennyye cbratzsy, tovarnyye znaki, no. 1, 1966, 79.

An aerosol device, consisting of working chambers with atomizers, mixer, humidifier, dryer, compressor, vacuum pump, bacteria traps, and duct system with filters and screens. For studying the effect of radiant energy of certain wave lengths on bacterial aerosols under controlled temperature and humidity conditions, the device is further equipped with heat lamps, reflectors, various light filters, and a radiant energy flux meter (e.g., thermocouple with galvanometer). To assure constant pressure in the working chambers under conditions of partial vacuum, the chambers are compensated with elastic diaphragms. For measuring aerosol particle size and obtaining an aerosol count, a microscope with photoelectric attachment is provided.

[DP]

OVERSUMMERING OF CHINESE CABBAGE VIRUSES

Wang, Chun-lin (3769/0193/2651), Chai, Hsiu-mei (5049/4423/2734), Niu, Ai-hua (3662/1947/5478), Chang, Lin-ch'eng (1728/2651/2052), and Chang, Yueh-ming (1728/2588/2494). On the oversummering of Chinese Cabbage viruses. *Chih wu pao hu hsueh pao* (*Acta phytophylacica sinica*), v. 4, no. 4, 1965, 355-360.

The virus isolates of *Rorippa montana* (Wall.) Small, *Plantago depressa* Willd and *Rehmannia glutinosa* Libosch etc., in the region of Huitian, Honan are grouped into three types. Types I and II isolated from *Rorippa montana* (Wall.) Small and *Plantago depressa* Willd are strains of the Turnip Mosaic virus. Type III isolated from *Rehmannia glutinosa* Libosch is a strain of the Tobacco Mosaic virus (TMV). Type I is identical to the virus strain usually isolated from the Chinese cabbage.

It is believed that *Rorippa montana* (Wall.) Small and *Plantago depressa* Willd, are the major sources of the viruses that infect the autumn Chinese radish and cabbage. Since no cruciferous crops in this region are grown in the warm season, it is evident that these two weeds serve as hosts for the viruses over summer.

ASSOCIATION: Pai ch'uan nung yeh chuan k'o hsueh hsiao
(Pai Ch'uan Agricultural College) [CR]

PASTEURELLA PESTIS POLYSACCHARIDES

Yefimtseva, Ye. P. Polysaccharides of the cell wall and cytoplasm of *Pasteurella pestis* (EV strain). IN: *Volgogradskiy meditsinskiy institut. Trudy*, no. 15, 1964, 242-243. (TAKEN FROM: *Rezerativnyy zhurnal. Biologiya. Svodnyy tom* (A-K), no. 1, 1966, 1R216.)

Polysaccharide fractions were isolated from the cell wall and cytoplasm of *Pasteurella pestis* microbes of the nonvirulent EV strain and subjected to chemical analysis. Three fractions from the wall and one somatic polysaccharide preparation were obtained. The effect of levomycetin and furazolidine on several immunological indices in rabbits immunized with typhoid

was studied. Both levomycetin and furazolidine inhibited the immunological readjustment of the rabbit organism. This was shown by the mean titer, agglutination test, and mean bactericidal index for both antibiotics. [DP]

CORN EARWORM IN THE UPPER TARIM RIVER REGION

Yuan, Chu-chung (5313/0031/0022), Wang, Chan-yen (3769/0594/0917), Huang, Ta-wen (7606/1129/2429), and Liu, Fang-cheng (0491/5364/2398). Research on the corn earworm in the upper Tarim River region. *Chih yü pao hu hsueh pao* (*Acta phytophylacica sinica*), v. 4, no. 4, 1965, 315-322.

The authors investigated the development of the corn earworm (*Heliothis armigera*) in the region of the upper Tarim River. The species spreads rapidly when rainfalls are between 3.7 and 20.5 mm in the May-July period. Rate of development and fertility are related to the food of the caterpillar, which attacks both corn and cotton. Hexachloran aerosols have been used to combat the corn earworm, with losses 2.6 times greater on unsprayed fields. Spraying from aircraft is more effective over corn than over cotton.

ASSOCIATION: Hsin-chiang Nung i shih Nung k'o so (Sinkiang Agricultural Research Institute, First Agricultural Division) [Yuan, Wang]; Hsin-chiang pa i nung hsueh yuan (Sinkiang Pa I Agricultural College) [Huang, Liu] [HP]

ULTRAVIOLET PHAGE INACTIVATION

Zavil'gel'skiy, G. B., and B. N. Il'yashenko. *The role of pyrimidines in the UV-inactivation of bacteriophages.* IN: *Akademiya meditsinskikh nauk SSSR. Vestnik*, no. 2, 1966, 43-48.

The purpose of the present study was to evaluate the role of cytosine photohydration reaction products and the participation of thymine dimers in the ultraviolet inactivation of infectious ϕ -X-174 phage DNA and its replicative form (RF). It was found that DNA cytosine photohydration products (5-hydro-6-hydroxycytosine) do not participate in UV-inactivation of DNA phage. Phage sensitivity to UV is correlated with DNA thymine level for complementary chains of the ϕ -X-174 phage RF. No such correlation can be demonstrated when different phages are compared with one another, because of additional factors having a greater influence on UV-sensitivity than nucleotide composition. In addition to the "repair" hypothesis of Setlow and Carrier (that the greater part of DNA injuries are repaired enzymatically before or during the replication process), the authors propose an alternative explanation of nonlethal structural damage, the "information correction" hypothesis. In their view, it is possible (and more likely) that while the initial DNA strand remains injured throughout the replication process, an undamaged "corrected" DNA strand is formed on it by a process analogous to the correction of transmission errors in systems containing redundant information, in communications theory.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR) [LP]

THE MOLECULAR-GENETIC THEORY OF ANTIBODY FORMATION

Zdrodovskiy, P. F. *Matrix-genetic theories of antibody formation.* IN: *Akademiya meditsinskikh nauk SSSR. Vestnik*, no. 2, 1966, 92-102.

The principal theories of antibody formation—the indirect matrix (instructive) theory, the clone selection theory, and the molecular-genetic theory—are critically analyzed and compared. Since the author regards antibody formation as a special (antigen-complementary) case of globulin formation, he considers the molecular-genetic theory the most promising. If this theory is correct, antibody formation should obey the same rules which govern protein synthesis (which has a DNA-coded matrix-genetic reproduction mechanism). All features of antibody formation, including the mechanism of immunological tolerance, can be logically explained by the molecular-genetic theory.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR) [DP]

GENETIC FEATURES OF T2 PHAGE LYTIC ENZYMES

Zuyev, V. A. *Genetic evidence for the identity of T2 phage lytic enzymes, linked with viral particles and liberated from the infected cell.* IN: *Akademiya meditsinskikh nauk SSSR. Vestnik*, no. 2, 1966, 58-62.

The phages T2e⁺ and T2e in bullion and saline suspensions have thermal inactivation rates (heated to 58°C for 30 min) similar to each other and to the rate for wild phage. Partially purified free and bound lytic enzymes, isolated from spontaneous or from 5-bromouracil-induced e-mutants of T2 phage, showed increased thermal sensitivity (heating to 45°C for 30 min drastically reduced their lytic activity). Both bound and free lytic enzymes have one

genetic determinant (cistron), and they therefore represent a single enzyme. The degree to which the thermosensitive lytic enzyme is protected against thermal inactivation by protein structures of the phage caudate process when it combines with a T2e phage particle is discussed.

ASSOCIATION: Institut epidemiologii i mikrobiologii imeni N. F. Gamalei AMN SSSR, Moscow (Institute of Epidemiology and Microbiology, Academy of Medical Sciences SSSR) [LP]

NOMINATIONS FOR THE ACADEMY OF MEDICAL SCIENCES USSR

Candidates for full and corresponding membership to the Academy of Medical Sciences USSR. Meditsinskaya gazeta, 8 Feb 1966, p. 4, cols. 1-5.

The following specialists in virusology have been nominated for full membership in the Academy of Medical Sciences USSR (AMN SSSR):

Smorodintsev, Anatoliy Aleksandrovich. Institute of Experimental Medicine, AMN SSSR, and Leningrad Institute of Epidemiology and Microbiology im. Pasteur

Solov'yev, Valentin Dmitriyevich. Institute of Epidemiology and Microbiology im. N. F. Gamalei, AMN SSSR, and Central Institute for Post-Graduate Medical Study

The following specialists in infectious diseases were nominated as corresponding members of the Academy of Medical Sciences SSSR:

Bunin, Konstantin Vladimirovich. First Moscow Medical Institute im. I. M. Sechenov

Loban, Konstantin Mikhailovich. University of Peoples' Friendship im. Patrice Lumumba

Sukhareva, Mariya Yefimovna. Central Institute for Post-Graduate Medical Study

Specialists in microbiology nominated as corresponding members of the AMN SSSR are:

Vashkov, Vasilii Ignat'yevich. Central Scientific Research Disinfection Institute

Domaradskiy, Igor' Valer'yanovich. Rostov-on-Don Research Institute of Plague Control

Kiktenko, Vasilii Sil'vestrovich. University of Peoples' Friendship im. Patrice Lumumba

Kiselev, Prokhor Nikiforovich. Central Scientific Research Institute of Roentgeneology and Radiology

Kravchenko, Anatolii Timofeyevich. State Control Institute of Medical Biological Preparations im. L. A. Tarasevich

Matveyev, Konstantin Ivanovich. Institute of Epidemiology and Microbiology im. N. F. Gamalei, AMN SSSR

Nikolayev, Nikolai Ivanovich. State Scientific Research Institute of Microbiology and Epidemiology of the southeastern USSR

Chistovich, Georgiy Nikolayevich. Leningrad Sanitation and Hygiene Medical Institute

Shorin, Vitaliy Aleksandrovich. Institute for Research in New Antibiotics, Ministry of Public Health USSR
[SW]

III. ENVIRONMENTAL FACTORS

CALCULATION OF BIOCLIMATIC FACTORS

Ayzenshtat, B. A. A method for calculating certain bioclimatic factors. Meteorologiya i gidrologiya, no. 12, 1964, 9-16. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B660.)

On the basis of an analysis of heat- and radiation-balance equations of a hollow metal sphere, measuring the so-called resultant temperature, a method was devised for calculating the bioclimatic indices of the heat regime of persons under various conditions. It was found from the heat-balance equation of a sphere whose surface temperature was constant and equal to that of human skin, that the cooling at given wind velocities and skin temperatures is a linear function of the temperature of the sphere. Formulas were derived for converting from measurements of sphere temperature to moisture losses of a person under different conditions. The results obtained from a theoretical approach were very close to experimental results derived from measurements in a desert. A table is presented of calculated values of bioclimatic indices for 1300 hr during July at Termez, Tashkent, Krasnovodsk, Leningrad, Minsk, and Kiev.

ASSOCIATION: Sredneaziatskiy nauchno-issledovatel'skiy gidrometeorologicheskiy institut (Central Asia Scientific Research Hydrometeorological Institute) [EO]

ATMOSPHERIC TURBULENCE ABOVE BULGARIA

Barov, V. B. Atmospheric turbulence above Bulgaria (Part I). Studia geophysica et geodastica, v. 8, no. 3, 1964, 297-313. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B454.)

Mean values of the turbulent diffusion coefficient in the bottom 3-km layer of the atmosphere for various points,

heights, and times of the year were determined on the basis of pilot balloon wind observations over Bulgaria in 1925—1945.

ASSOCIATION: Akademiya na zemedelski naukite, Sofia, Bulgaria (Academy of the Agricultural Sciences)

[EO]

DEPENDENCE OF SEVERAL METEOROLOGICAL ELEMENTS ON VERTICAL TURBULENT HEAT EXCHANGE

Boryczka, J. Dependence of several meteorological elements on vertical turbulent heat exchange. Przegląd geograficzny, v. 36, no. 1, 1964, 119-129. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 4, 1965, 4B184.)

Values of the climatic turbulence factor, temperature, water-vapor density, moisture deficit, and wind speed were determined on the basis of a four-year series of observations (1959—1962) at different heights in the 0—200-cm layer.

ASSOCIATION: Kafedra klimatologii, IG UW (Department of Climatology, Geographical Institute, University of Warsaw)

[EO]

HORIZONTAL DISPERSION OF PARTICLES FROM A STATIONARY SOURCE

Byutner, E. K., and N. I. Kramer. Calculation of the horizontal dispersion of particles from a stationary source using meteorological measurements. IN: Glavnaya geofizicheskaya observatoriya. Fizika pogranichnogo sloya atmosfery (Physics of the atmospheric boundary layer). Leningrad, 1965, 178-183. (ITS: Trudy, no. 167, 1965.)

The author determines the mean characteristics of the horizontal dispersion of passive pollutants emitted from a continuously operating source in a turbulent atmosphere. Measurements were made for short distances (up to 10 km) at various short time intervals in a 1—2-hr period. Dispersion values are computed on the basis of data obtained in measuring various structural characteristics in wind-direction changes at a stationary point, assuming that the correlation of particle displacement $y(t, Y)y(t, T + x)$ is described by the function $e^{-x/L(t)}$,

where

$$L(t) = L_E \left(1 + \frac{t}{t_0} \right).$$

Here t is diffusion time, y is dispersion, x is an approximation function, $L(t)$ is the linear function. Results of the investigation of the dependence of particle concentration on the observation-time interval are presented diagrammatically in Fig. 1.

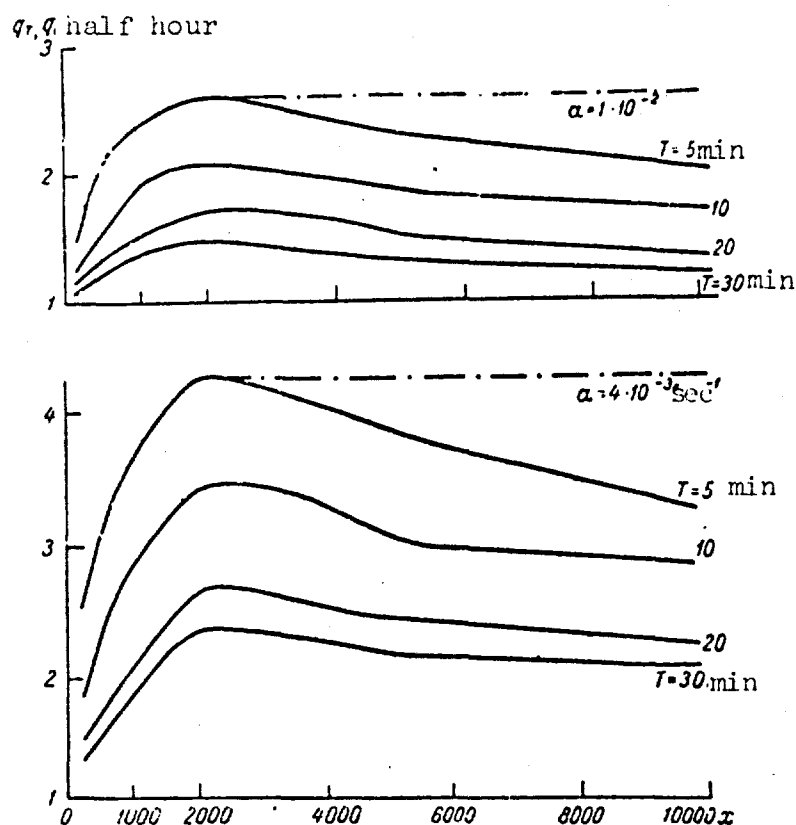


Fig. 1. Dependence of concentrations of particles issuing from a stationary source on the time intervals of the experiment.

ASSOCIATION: Glavanaya geofizicheskaya observatoriya,
Leningrad (Main Geophysical Observatory) [SP]

BOUNDARY LAYER SEDIMENTATION IN A TURBULENT DIFFUSION FLUX

Cadez, M., and H. Ertel. Sedimentation in the atmosphere with persistence of the intrinsic sources of the turbulent diffusion flux. Idojaras, no. 6, 1965, 327-331.

The downward motion of suspended matter in the atmosphere near the ground is investigated, by introducing a persistence principle regarding the intrinsic sources of the turbulent diffusion flux. Considered phenomenologically, the persistence principle appears to be a reasonable assumption, especially as the theoretical consequences are in agreement with the observations of G. Schubert and W. Hansch concerning the sedimentation of small salt particles at the bottom of the atmosphere. [Authors' abstract]

ASSOCIATION: Department of Natural Sciences and Mathematics, University of Beograd, Meteorological Plant, Beograd [Cadez]. Institute for Physical Hydrography, German Academy of Sciences, Berlin [Ertel]. [ER]

WATER TEMPERATURE, EVAPORATION, AND TURBULENT HEAT EXCHANGE WITH ATMOSPHERE

Ch'ou, Yung-yen (0092/3057/3508), Ch'en, Kuo-fan (7115/0948/5400). Some empirical relations of the phase difference between the field of heat supplied by the ocean and large-scale atmospheric disturbances. Ch'i hsiaang hough pao (Acta meteorologica sinica), v. 35, no. 4, 1965, 465-475.

The effect of ocean heat on the development of large scale disturbances was investigated. Using two empirical for-

mulas, the authors computed the heating due to sea surface evaporation and the turbulent exchange of heat with the ocean surface for 12 selected cases of weather processes in winter. These cases include 11 processes (about 60 days) over the North Pacific Ocean and one process over the North Atlantic Ocean. In the first part of the paper, a study of the relation of the phase difference between the heating field and large scale disturbances to the development of the disturbance is discussed. In Sections 5 & 6, the effect of heating on the change in the 500—1000-mb thickness and on the change of the 500-mb vorticity was analyzed in some selected cases. The following facts were demonstrated:

1) An upper trough is intensified when a heating maximum is located in front of it, whereas an upper trough weakens when a heat maximum is located behind it. 2) The relation between the location of extremes of heating and the development of a ridge is not clear. 3) The negative center of thickness is shifted to the trough line when the heating maximum is located in front of it, and is shifted in front of the trough line when the heating maximum is located behind it. 4) The production of vorticity before the trough line is favored when the heating center is located in front of it. Conversely, the dissipation of vorticity behind the trough line is favored when the heating center is located behind it.

Professors HSIEH I-ping (6200/5030/3521) and T'AO Shih-yen (7118/6108/6056) went over the manuscript of this paper. CHU Pao-chen (2612/2128/4176) LIAO Tung-hsien (1394/3159/6343), CH'EN Shou-Chun (7115/0649/6874), and CH'EN Ch'iu-shih (7115/4428/1102) were consulted on a number of problems. CH'EN Chih-ming (7115/1807/2494) helped in calculation. The first part of this paper is from CH'EN Kuo-fan's graduation thesis.

ASSOCIATION: Pei-ching ta hsueh Ti ch'iu wu li hsi
(Geophysics Department, Peking University) [CR]

DUST STORMS IN THE UKRAINE

Dolgilevich, M. I. Dust storms in the Ukraine. In: Akademiya nauk SSSR. Isslediya. Seriya geograficheskaya, no. 1, 1966, 34-40.

An analysis made of dust-storm data collected at 178 meteorological stations during the period 1943—1962 includes evaluation of such information as regional distribution, recurrence of these storms by time of year, and some of the genetic relationships between the natural factors causing them and dust-storm intensity. Fig. 1 shows the geographic distribution and duration of dust

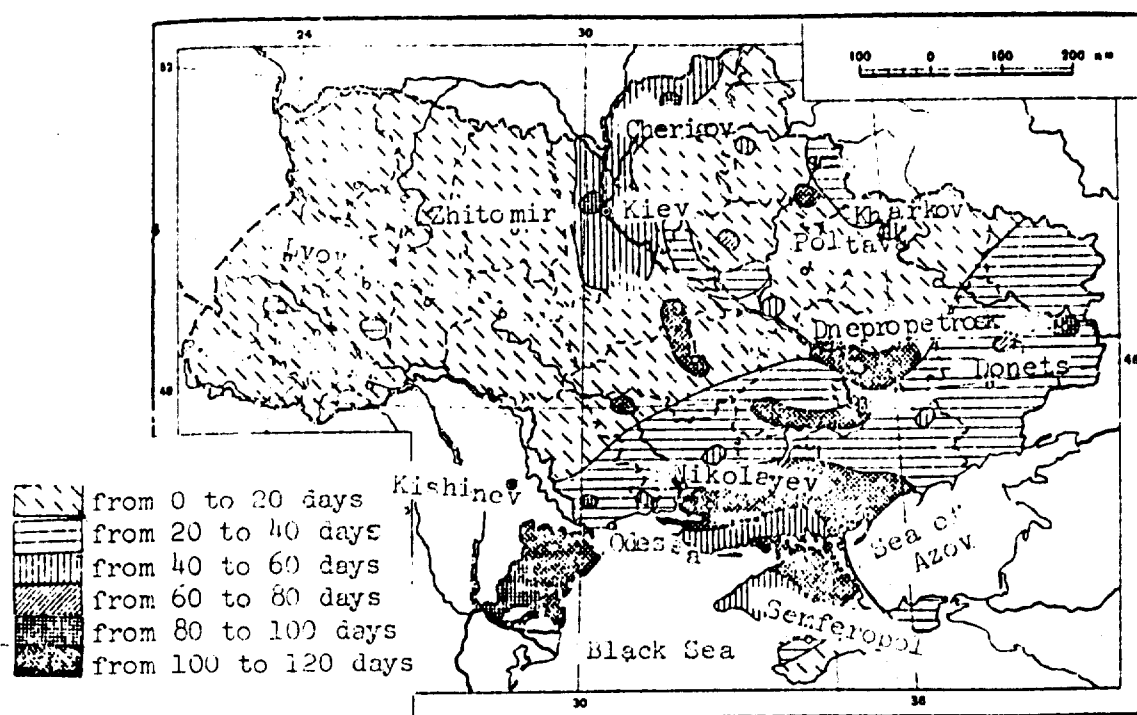


Fig. 1. Number of days with dust storms in the Ukraine (for 20 yr.)

storms in the Ukraine and Fig. 2, the number of days with dust storms, arranged by natural zones (30 meteorological stations in a zone, with measurements accumulated over a 20-year period).

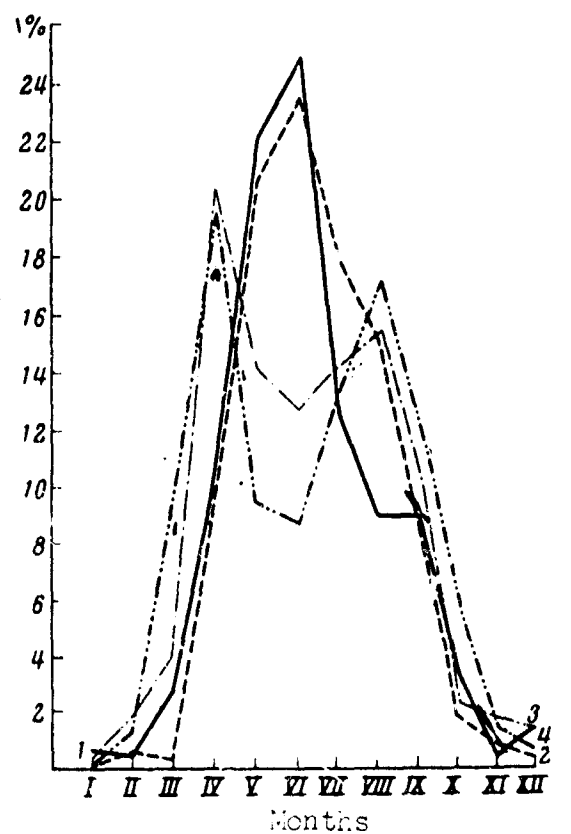


Fig. 2. Number of days with dust storms
in the natural zones of the Ukraine
(30 meteorological stations in a zone
for period of 20 yr.)

ASSOCIATION: Ukrainskiy institut inzhenerov vodnogo
khozyaystva (Ukrainian Institute of Hydraulic Engineers)
[ER]

ARBITRARY WIND-VELOCITY DETERMINATION

Dubrovina, L. V. Determining an arbitrary wind velocity by height under any conditions from gradient observation data. IN: Kuybyshevskaya gidrometeorologicheskaya observatoriya. Sbornik rabot, no. 1, 1964, 45-46. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 3, 1965, 3B266.)

On the basis of the well-known Laykhtman formula

$$u_z = u_1 \frac{z^e - z_0^e}{1 - z_0^e}$$

the author expresses the difference in velocities Δu at heights of 2 and 0.5 m in the following manner:

$$\Delta u = \frac{u_1 \epsilon}{1 - z_0^e} \cdot \frac{\sin h x}{x} \cdot \ln 2^2 \quad (x = \epsilon \ln 2)$$

or

$$\Delta u = \left(\frac{\partial u}{\partial z} \right)_{1m} \cdot \frac{\sin h x}{x} \ln 2^2.$$

Since $\sin h x/x \approx 1$ and $\ln 2^2 = 1.38$, $(\partial u/\partial z)_{2m} = 0.72 \Delta u$. Because of its simplicity, the last expression is proposed for rapid computation of the wind velocity gradient at a height of 1 m if the velocities at heights of 2 and 0.5 m are known. [EO]

STUDY OF 300-METER TOWER TURBULENT MIXING DATA

Ivanov, V. N. An estimate of turbulent mixing in the lower layer of the atmosphere. IN: Akademiya nauk SSSR. Izvestiya, Seriya geofizicheskaya, no. 12, 1964, 1869-1877. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B452.)

Using previously published data from measurements made at the high meteorological tower of the Institute of

Applied Geophysics, the author calculated the profile of the turbulence coefficient

$$k = \tau \left(\rho \frac{du}{dz} \right)^{-1}$$

(τ is the tangential stress of turbulent friction, u is the wind velocity, z is the height, and ρ is the air density) in the layer between the ground surface and a height of $\sim 0.2\delta$ (where δ is the thickness of the boundary layer of the atmosphere). The equation of the turbulent-energy balance $\epsilon = \tau(du/dz)$ (where ϵ is the rate of turbulent-energy dissipation whose magnitude is determined by the "2/3 law" from observation data) was used to calculate τ . Graphs were constructed showing the dependence of τ/τ_0 on z and $k/v_*\delta$ on z/δ (v_* is the dynamic velocity) in accordance with experimental data and a theory developed for plates. The mean values were found to be in satisfactory agreement with the predictions of theory, but data from individual series indicate significant differences. The magnitude of k at the height $z \sim 0.25\delta$, where k ceases to increase, is about $5\text{ m}^2/\text{sec}$. The turbulence coefficient k was also estimated in the longitudinal direction, by the relationships

$$k_1 = \bar{v}^2 \cdot t_0, \quad t_0 \sim \bar{v}^2/$$

where $\bar{v}^2$ is the dispersion of the longitudinal component of wind velocity; t_0 is the characteristic lifetime of eddies carrying the principal share of the energy.

Some statistical characteristics of a smoke cloud are treated. If motion in an inertial region is considered, then, beginning at time $t_1 \sim r_{ij}^{2/3} / \epsilon^{1/3}$, the mutual distance between particles r_{ij} ceases to play a noticeable role, and the motion of particles is determined by the difference in times and turbulent-exchange parameters. The following connection exists between the structural functions of the center of the cloud (σ^2), the coordinates of one particle (σ^2), and the differences in the coordinates of a pair of particles (D^2), for $t > t'$:

$$\sigma^2(t) \sim \sigma_c^2(t) - D^2(t)/2.$$

Using expressions established by dimensionless analysis for $\sigma^2(t)$ and $D^2(t)$, we find that

$$\sigma_y^2(t) = \bar{v}^2 t^2 - (c_1/3 - c^1/2) \epsilon t^3,$$

where $c_1 \approx 0.5$, $c^1 \approx 2$.

An estimate of the parameters of turbulent diffusion is given on the basis of a stream which is considered to consist of elementary disks participating in two independent statistical motions (the Gifford model). The time t^1 is of the order of 20—30 sec. The center of the stream moves along some winding curve; the width of the stream is about 100 m for 300 sec. The quantity $\sigma^2(t)$ is determined with an error of 10—20% with continuous observation of the process for 20—30 min; the time required to smooth out maximum and instantaneous concentrations is about 10—15 min. [EO]

TURBULENT ENERGY AND DISSIPATION AS STUDIED AT THE 300-M TOWER

Ivanov, V. N. Turbulent energy and its dissipation in the lower layer of the atmosphere. IN: Akademiya nauk SSSR. Izvestiya, Seriya geofizicheskaya, no. 9, 1964, 1405-1413. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B445.)

This article is devoted to an analysis of experimental data on the structure of the wind obtained on the high [300-m] meteorological tower of the Institute of Applied Geophysics. The results of measurements of fluctuations in the longitudinal component of the velocity (u) at 12 levels within the 300-m layer were utilized. The averaged value of the square of u was adopted as the turbulent energy characteristic. The dependence of $\bar{u}^2$ on the length of the averaging interval at various levels was investigated. The results obtained provide a basis for considering that averaging over a 5-min interval in this layer includes the main part of the spectrum. Profiles are derived of the intensity of turbulence ($\sqrt{\bar{u}^2}/U_{300}$, where U_{300} is the mean wind velocity at a height of 300 m) for stable, neutral, and unstable stratification. The empirical Reynolds number (B) served as the stability criterion. In cases of stable and neutral equilibrium, the intensity of turbulence decreases monotonically with height. When the stratification is unstable, this quantity reaches a minimum at a height of about 150—200 m, then begins to increase.

The rate of turbulent-energy dissipation (ϵ) was calcu-

lated from the results of determining the longitudinal structural function of the velocity field using the well-known "2/3 law" of Kolmogorov and Obukhov. The ϵ profiles were divided into the same three groups by B values, as were the turbulent-intensity profiles. In all of the cases considered, ϵ decreases with height (more sharply with stable and less sharply with unstable stratification). The results obtained for neutral stratification were compared with data from determination of $\bar{u}^2$ and ϵ in the turbulent boundary layer about a flat plate. That level at which the wind velocity was practically unchanged was taken to be the height of the boundary layer of the atmosphere. A noticeable similarity was noted between the dimensionless relationships describing the vertical distribution of both quantities under consideration, particularly in the lower half of the boundary layer. An analysis of the results obtained for unstable stratification is evidence that in this case, turbulence conditions at the upper levels closely approximate those of free convection. [EO]

IMPROVED ACOUSTIC ANEMOMETER AT THE HIGH METEOROLOGICAL TOWER OF THE INSTITUTE OF APPLIED GEOPHYSICS

Ivanov, V. N., and Yu. B. Burakov. Investigation of atmospheric turbulence with an acoustic anemometer. Meteorologiya i gidrologiya, no. 3, 1966, 49-53.

A recently developed acoustic anemometer with capacitor-type transducers has been installed on the high meteorological tower of the Institute of Applied Geophysics. This instrument is an improvement on the one now in use at the Institute of Physics of the Atmosphere of the Academy of Sciences USSR. In order to make effective stationary measurements of fluctuations in wind velocity, the transducers in the acoustic anemometer at the Institute of Applied Geophysics are TsTS ceramic piezoelectric elements made of 40 x 5 x 2.57-mm lead zirconate-titanate plates. The design of the ultrasonic receiver is shown

in Fig. 1. The sensor is made in the form of a vane with ultrasonic receivers arranged like a cross with

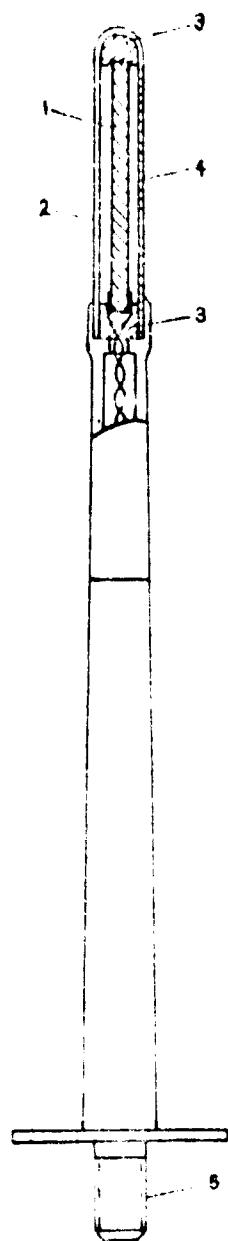


Fig. 1. Pillar-type holder for an ultrasonic receiver:

- 1 - Piezoceramic element;
- 2 - capsule; 3 - elastic spacers; 4 - metal screen;
- 5 - electric plug.

the radiator in the center. The original article contains a circuit diagram of the anemometer. The amplifier consists of four identical units tuned to the sound generator frequency (37 kc); it has a passband of 5 kc, gain factor on the order of 100,000, and automatic amplification control. The phasemeter consists of two almost identical channels for the vertical and longitudinal components of the wind velocity. The first has two scales for measuring velocities (vertical component, ± 3.4 and ± 6.8 m/sec) and

the second, three scales (horizontal component, ± 2.7 , ± 5.4 , and ± 10.8 m/sec); the corresponding sensitivities are 6 and 3 v-sec/m and 7.4, 3.7, and 1.85 v-sec/m. The time constant of the anemometer (0.05 sec for a wind velocity of 10 m/sec) permits inclusion of almost all of the energy-bearing part of the spectrum in the surface boundary layer except the lowest few meters. The sensor is installed on a boom on the second balcony of the tower, at a height of 50 m, and 7 m out from the side of the tower (2.5 m in diameter). Measurements of the turbulent energy of the vertical and longitudinal components of wind velocity pulsations are automated by means of an analog system, which is described with a block diagram in the original article. This acoustic anemometer has been on the high meteorological tower for six months and has been out of commission only once in that time. Some results of a two-day series of continuous observations are presented; they are essentially of a methodological nature and were run after the analog system was installed.

ASSOCIATION: Institut prikladnoy geofiziki (Institute of Applied Geophysics) [EO]

TURBULENT ATMOSPHERIC FLOW TRAJECTORIES

Kachurin, L. G., V. I. Bekryeyev, and G. P. Dydina. Trajectories of turbulent, heated, submerged streams in the atmosphere. IN: Akademiya nauk SSSR. Izvestiya, Seriya geofizicheskaya, no. 12, 1964, 1859-1863. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B450.)

A stream is divided into three sections: active, in which the velocity of motion of the stream relative to the air is considerably higher than the wind velocity; passive, in which the velocity of motion of the stream relative to the wind is negligibly small; and intermediate between the previously mentioned sections. The stream is assumed to be horizontally homogeneous. The Archimedes acceleration and the acceleration of mixing caused by losses in stream velocity because of mixing with the surrounding air are taken into consideration in the equation of motion for the

active section. The second equation is obtained from the condition for heat conservation of the stream, with and without consideration for the heat of condensation. The dependence of the radius of the stream R on the height above the source z is taken in the form

$$\frac{dR}{dz} = \tan \alpha \sqrt{1 - (u/v)^2},$$

where α is the diffusion angle of the stream, u is the horizontal component of wind velocity, v is the vertical component of flow velocity in the stream. The dependence of α on u is determined in the active section of the stream from photographs of smoke plumes from the stacks of the Pribaltiyskaya and Shchekinskaya Hydroelectric Power Stations and from 96 experiments on convection conducted under natural conditions and in a closed room. The following relationship was obtained in the passive section of the stream, where dissipation is determined by atmospheric turbulence:

$$D = uR \cdot \tan \alpha / 2A^2,$$

where D is the diffusion coefficient which was calculated with the above-mentioned experimental data, and A is a constant. The system of equations obtained here was solved numerically on a Ural-2 electronic computer. The results of the solution are compared with experimental data and the calculations of other authors. The mean relative error of the results is estimated.

ASSOCIATION: Leningradskiy gidrometeorologicheskii institut (Leningrad Hydrometeorological Institute)

[EO]

TURBULENCE CHARACTERISTICS OF THE ATMOSPHERIC SURFACE BOUNDARY LAYER AS DETERMINED FROM GRADIENT OBSERVATIONS

Kisene, T. E. Determination of the characteristics of turbulence in the surface boundary layer of the atmosphere from gradient measurement data. Idojiras, no. 4-5, 1965, 240-247.

The Monin-Obukhov method is used to determine turbulence characteristics (friction velocity and turbulent heat and humidity fluxes) in the surface boundary layer of the atmosphere. The data used were obtained over Szarvas, Hungary, during the 1964 growing season. Measurement and calculation results are accompanied by diagrams, tables, and critical analyses. [ER]

TURBULENCE IN THE ENERGY BALANCE OF ATMOSPHERIC SURFACE BOUNDARY LAYERS

Kissne, T. E. Role of turbulence in the energy balance of the surface boundary layers of the atmosphere. Időjárás, v. 67, no. 6, 1963, 355-361. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 3, 1965, 3B298.)

Basing her work on the results of field climatological measurements conducted in 1962 at the city of Siofok over dry land and water, the author uses the Timofeyev method to analyze the exchange coefficient. The diurnal change in the exchange coefficient for July and August, plotted on graphs, was found to be much larger over land than over water. The significant diurnal change is caused chiefly by the action of temperature stratification on the intensity of turbulent exchange. In conclusion, the problem of heat transfer over water and dry land is discussed. The Obukhov-Monin turbulent-diffusion method is applied in these computations. The results obtained indicate that during the day, dry land transfers heat to the air while water surfaces receive heat from the upper layers because of turbulent heat exchange. Consequently, the transfer of heat above the two types of surfaces proceeds in opposite directions; a large difference is also noted in the amount of heat transferred. [EO]

TURBULENCE IN THE ENERGY REGIME OF AIR LAYERS ABOVE A LAKE SURFACE

Kissne, T. E. Role of turbulence in the energy regime of layers of air above a lake surface. Orszagos meteorol. int. Hivatal. kiadv., no. 26, 1963, 284-290. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 3, 1965, 3B299.)

The purpose of this article is to clarify the role of turbulence in the energy regime of air masses over the lake surface. Since turbulent exchange plays the principal role in this instance, the problem is considered in more detail from this standpoint. Turbulent mixing processes are analyzed, and methods for determining the exchange coefficient are discussed. The applicability of the method to solving problems of evaporation and turbulent heat exchange connected with measuring the thermal regime are illustrated with factual materials. [EO]

SPRINGTIME AIR-MASS TRANSFORMATION OVER AN INLAND WATER BODY

Konovalov, D. A. Some characteristics of air-flow transformation over Tsimlyansk Reservoir in the spring. IN: Glavnaya geofizicheskaya observatoriya. Fizika pogranichnogo sloya atmosfery (Physics of the atmospheric boundary layer). Leningrad, 1965, 161-167, 1965. (ITS: Trudy, no. 167, 1965.)

A study was conducted with a helicopter equipped with a K-4-51 tape recorder in the spring of 1963 over the Tsimlyansk Reservoir region to determine the characteristics of air-mass transformation over a narrow body of water. Measurements were made of atmospheric temperature, pressure, and humidity, and wind velocity and direction from a heli-

copter vertically to 1000 m over the reservoir and adjacent land, and horizontally across the reservoir at 10, 30, 50, and 100 m levels. There were 4 land and offshore stations. Observations were made with an electric Ledokhovich meteorograph and a mechanical meteorograph developed by the Main Geophysical Observatory especially for airborne soundings; they were carried out at a period when the water-surface and land-surface temperatures differed greatly, causing a temperature inversion. Data were recorded with an ARIV radio wind recorder (see Figs. 1 and 2).

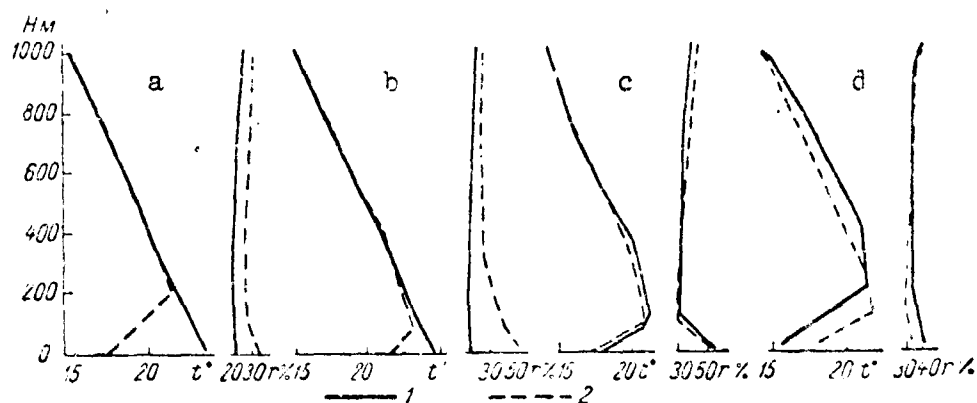


Fig. 1. Atmospheric temperature and humidity profiles over reservoir and land

1 - Land; 2 - reservoir.

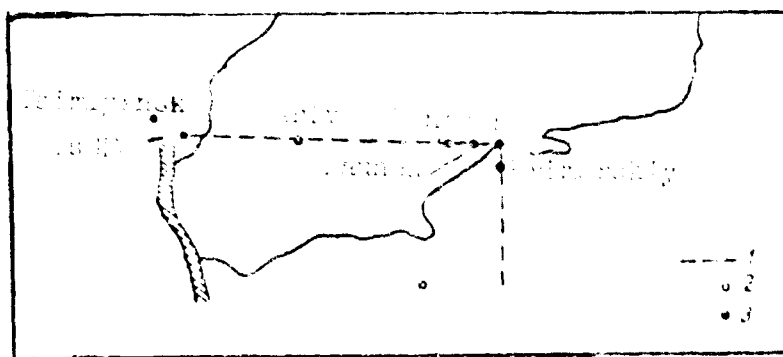


Fig. 2. Sketch of that portion of Tsimlyansk Reservoir near the dam

1 - Route of horizontal flights; 2 - regions of atmospheric soundings; 3 - stations from which land-based observations were made.

A special feature noted in the horizontal flight-data analysis was that the rather significant temperature fluctuations with amplitudes of up to 2.5° observed over the reservoir at a height of 10 m did not occur at the other flight altitudes; they were attributed to shore effect and turbulent exchange produced by uneven heating of the water. However, water-temperature data did not support this reasoning. All air-mass property changes noted took place in the 0—200-m layer.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya,
Leningrad (Main Geophysical Observatory) [SP]

WIND-VELOCITY PROFILE IN THE LOWEST 2-M ATMOSPHERIC LAYER

Konstantinov, A. R., and A. V. Tkachenko. Investigation of the wind-velocity profile in the lowest 2-m layer of the atmosphere. IN: Ukrainskiy nauchno-issledovatel'skiy gidrometeorologicheskiy institut. Trudy, no. 41, 1964, 116-125. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 3, 1965, 3B267.)

A previous article by A. R. Konstantinov dealing with analysis of the type of vertical profiles of meteorological elements established that at a level of several tenths of a centimeter, the curvature of the profile changes sign when stratification is not in equilibrium. This article is also devoted to verification of this matter. Wind-velocity profiles were constructed from measurement data for various temperature stratifications of the atmosphere. Analysis of the data showed that a change in the curvature of the profile actually occurs at a height of 0.25—0.50 m, and the distribution of velocities below this level cannot be represented by logarithmic or generalized power functions, by exponential laws, or by the formulas obtained from the works of A. M. Obukhov and A. S. Monin. The authors attempt to select a law for describing the entire profile, including the lowest layer. Some new ideas on the nature of the dependence of the level of roughness on the thermal stratification of the atmosphere are presented in light of the conclusions drawn here. [20]

AIRBORNE INVESTIGATIONS OF FOG

Koshelenko, I. V. Results from investigating fogs with the aid of an airplane. IN: Ukrainskiy gidrometeorologicheskiiy institut. Trudy, no. 43, 1964, 65-79. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B594.)

Systematic data are presented on the vertical thickness of various types of fogs in the Ukraine, and detailed information is given on the vertical distribution of temperatures and moisture in and above the fog layer, as well as of the vertical distribution of water vapor and the fog-droplet spectrum. The dependence of the thickness of a fog on the intensity of turbulent exchange is obtained. [EO]

INSTANTANEOUS VALUES OF ATMOSPHERIC POLLUTANT CONCENTRATION

Kramer, N. I. Distribution of instantaneous values of pollutant concentration in the atmosphere. IN: Glavnaya geofizicheskaya observatoriya. Fizika pogranichnogo sloya atmosfery (Physics of the atmospheric boundary layer). Leningrad, 1965, 195-200. (ITS: Trudy, no. 167, 1965.)

The author derives a probability distribution of instantaneous values of passive-pollutant concentration at various distances from a continuously acting-point source. Empirically derived data are used to obtain a qualitative evaluation of the dispersion distribution and to demonstrate that dispersion decreases sharply with distance from the source. This is in agreement with experimental findings. Calculations made of the integral distribution of instantaneous concentrations under various degrees of instability and in neutral and stable atmospheric stratification are shown in Fig. 1. The distribution of

instantaneous values of pollutant concentration at distances of 2000 and 5000 m are also calculated (Fig. 2).

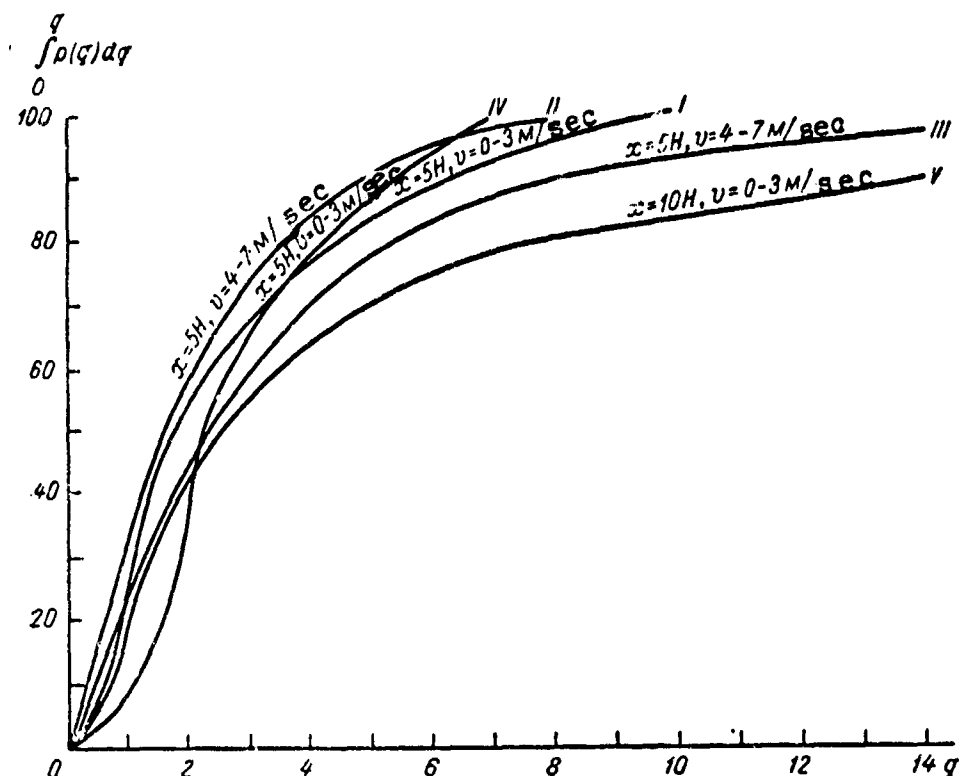


Fig. 1. Integral distribution of instantaneous values of concentrations experimentally derived for unstable (I, II, III), neutral (IV), and unstable (V) atmospheric stratifications

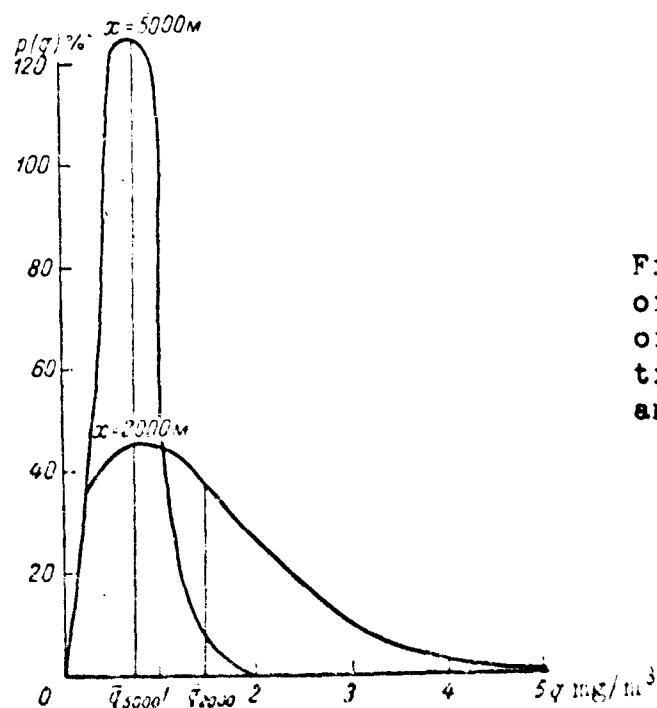


Fig. 2. Distribution of instantaneous values of pollutant concentrations for $x = 2000 \text{ m}$ and $x = 5000 \text{ m}$

ASSOCIATION: Glavnaya geofizicheskaya observatoriya, Lennigrad (Main Geophysical Observatory) [SP]

TANGENTIAL WIND-STRESS MEASUREMENTS

Kucherov, N. V. Results of measurements of tangential wind stress. IN: Glavnaya geofizicheskaya observatoriya. Fizika pogranichnogo sloya atmosfery (Physics of the atmospheric boundary layer). Leningrad, 1965, 168-170. (ITS: Trudy, no. 167, 1965.)

A description is given of additional improvements made in the instrument (GGO, Trudy, no. 150, 1964),* which was used by the author in 1963 for measuring tangential wind stress, including its method of operation and the results obtained with it. These improvements include better centering of the float in the initial position, and an increased artificial surface roughness of the float achieved by incorporation of metal pegs 5 mm in diameter and 30 mm high, arranged to provide uniform exposure to the wind on all sides. Calibration was effected under constant conditions, with a dynamometer installed on the float's surface, with a displacement of 1 to 20 g/m². The device was set up at ground level near a point at which wind velocity is measured at altitudes of 0.15, 0.25, 0.5, 1.0, 2.0, 5.4, 9.0, and 16.0 m. Measurement was repeated twice at heights of 0.15—1.0 m. Data obtained included values of dynamic wind velocity computed from measurements made with the device, dynamic wind velocity computed from gradient observations, tangential wind stress measured with the device, and stratification characteristics. A diagram shows the correlation between dynamic wind-velocity values obtained with the device and those computed from gradient observations. The author concludes that tangential wind stresses measured with the device provide sufficiently accurate (±8%) data on dynamic wind velocity.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya,
Leningrad (Main Geophysical Observatory) [SP]

* Description and method and instrument originally developed and reported by Sheppard (1946), revised and improved by Pasquill (1950), Rider (1954), and by the author of this paper (1964).

WIND AND TURBULENT EXCHANGE IN FRONTAL ZONES

Laykhtman, D. L., and V. L. Shnaydman. *Wind and turbulent exchange near frontal interfaces*. IN: *Glavnaya geofizicheskaya observatoriya. Fizika pogranichnogo sloya atmosfery (Physics of the atmospheric boundary layer)*. Leningrad, 1965, 205-210. (ITS: *Trudy*, no. 167, 1965.)

A closed system of equations is derived to express wind profile and turbulent exchange, treating such dynamic characteristics of the atmosphere close to frontal interfaces as the wind-velocity component, vertical velocity, and the coefficient of turbulence as functions of wind gustiness, large temperature changes at the interface, and the thermal stratification of two different air masses. Two cases are examined: The first is a simple model in which the turbulence coefficients of the two air masses are identical and independent of altitude; in the second case, the turbulence coefficients differ because of differences in temperature stratification of cold and warm air masses. A nomogram is given for computing the turbulence characteristics, and data are presented on the dependence of the coefficient of turbulence of a cold air mass on the thermal stability of a warm air mass and on the distribution of the dynamic characteristics (wind velocity, angle of wind deviation from the geostrophic, vertical velocity, coefficient of turbulence) in a turbulent layer situated near a frontal interface. A formula is derived for use in calculating wind gustiness in the area of a front which is of interest to aviation.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya, Leningrad (Main Geophysical Observatory) [SP]

THE HOT-WIRE TURBULENCE SPECTRAL ANALYZER

Ma, Chen-hua (7456/2182/7520), Li, Hui-yun (2621/1920/0061), and Liu, Hsien-wan (0431/6343/5502). *The hot-wire turbulence spectral analyzer*. *Ch'i hsiang hsueh pao (Acta meteorologica sinica)*, v. 35, no. 4, 1965, 434-439.

A hot-wire turbulence spectral analyzer for measuring the power spectrum of wind tunnel fluctuation flow was designed and constructed, based on the principle of spectral analysis. In this paper the main parameters of the instrument and some experimental results are presented. Electronic workers of the Institute of Geophysics helped in the building of the analyzer.

ASSOCIATION: Chung-kuo k'o hsueh yuan Ti ch'iu wu li yen chiu so (Geophysics Institute, Chinese Academy of Sciences) [Ma, Li]; Chung-kuo k'o hsueh chi shu ta hsueh (Science and Technology University of China) [Liu]

[CR]

INFLUENCE OF NARROW WATER BODIES ON MICROCLIMATE

Nesina, L. V. Influence of narrow water bodies on the microclimate of a surrounding land mass. IN: Glavnaya geofizicheskaya observatoriya. Fizika pogranichnogo sloya atmosfery (Physics of the atmospheric boundary layer). Leningrad, 1965, 118-133. (ITS: Trudy, 167, 1965.)

Results are reported for an investigation carried out at the Main Geophysical Observatory to determine the influence exerted in nonfreezing weather by inland water bodies of various sizes and depths on the microclimate of the surrounding land. Multiyear observations of air temperature and humidity made at the Dzhusaly and Turgay Meteorological Stations (Kazakhstan) and the Syktyvkar and Ust'-Shchugar Stations (Komi ASSR) were the source of the basic data. It was assumed that near each of these stations there were water bodies with lengths of 1, 10, 50, and 100 km and depths of 5, 10, 15, and 20 m. Changes in air temperature and humidity produced by these water bodies were calculated by the formula

$$\begin{aligned} T &= T_0 + (T_w - T_0)(1 - F)z; \\ e &= e_0 + (e_w - e_0)(1 - F)z, \end{aligned}$$

where T' , e' are the air temperature and humidity at certain distances inland from the edge of the water body in the direction of the wind; T_1 , e_1 are the temperature and humidity of the land-mass area outside the area affected by the water body; T_s , e_s are the temperature of the surface waters of the water body and the maximum water-vapor pressure at the temperature of the water surface; and F and φ are functions allowing for characteristics of the turbulence above the reservoirs and land masses, and the reservoir sizes and distances inland from the shore.

Results of the study are presented graphically in the following figures. They are also tabulated in 2 appendixes.

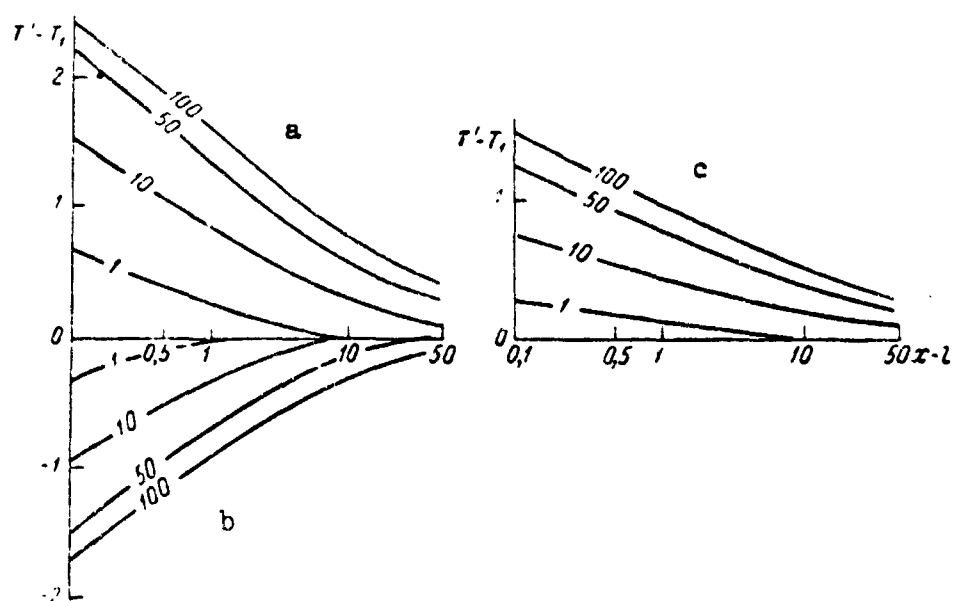


Fig. 1. Changes in air temperature on land caused by the presence of water bodies of different sizes

a - October ($h = 20$ m); b - May ($h = 20$ m);
c - October ($h = 5$ m).

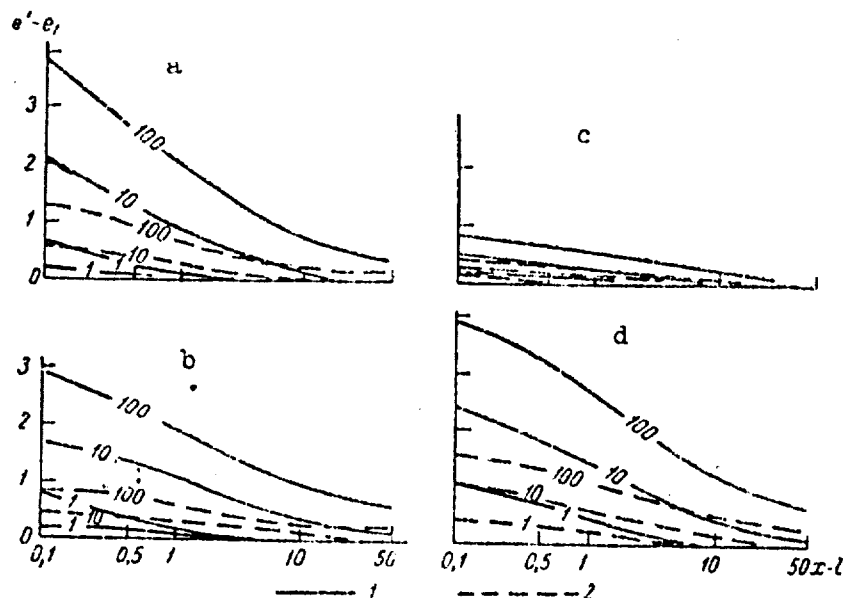


Fig. 2. Changes in air humidity on land caused by the effect of water bodies of different sizes

a - May ($h = 5$ m); b - October ($h = 5$ m); c - May ($h = 20$ m); d - October ($h = 20$ m); 1 - southern region; 2 - northern region.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya, Leningrad (Main Geophysical Observatory) [ER]

STOCHASTIC ERRORS IN ESTIMATING ATMOSPHERIC DROPLETS

Nikandrova, G. T. Stochastic errors in estimating the parameters of the drop distribution function in fogs, clouds, and precipitation. IN: Glavnaya geofizicheskaya observatoriya. Trudy, no. 156, 1964, 46-59. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B279.)

Many authors use gamma distribution curves, i.e.,

$$f(r) = \frac{\beta^\alpha}{\Gamma(\alpha)} r^{\alpha-1} e^{-\beta r}, \quad \alpha \geq 1, \quad \beta > 0,$$

to describe factual data on the distribution of drops in clouds, fogs, and precipitation by sizes. In this case, the distribution parameters α and β are determined by data from some limited sample of drops. On the basis of the sampling distribution theory, the author estimates the errors in determining the mean radii of drops $\bar{r}$, the parameters α and β , and a number of other characteristics caused by the restricted nature of the sample. A curve is obtained which permits finding α by the random value of the difference $\ln \bar{r}_1^* - \ln r^*$ (the difference between the logarithm of the mean value of the radius of a drop and the mean logarithm of the radii of drops in the given sample). The parameter β is found from the relationship $\beta = \alpha/\bar{r}_1^*$.

Cases are considered in which the parameter α is known and reliable intervals are found for the other parameter, as well as cases in which both parameters are unknown. The accuracy with which the distribution parameters are determined by the method of moments is analyzed. It is shown that this method is not too effective and can lead to important errors when the actual distribution is described by a curve of the gamma distribution class. A graphical method yields results close to the maximum likelihood method.

[EO]

RANDOM FUNCTIONS AND TURBULENCE

Pancev, S. *Sluchayni funktsii i turbulentnost. Sofia, B"lgarska Akademiya na Naukite, 1965. 351 p. (TAKEN FROM: Abstracts of Bulgarian scientific literature. Mathematics, physics, astronomy, geography, and geodesy, no. 1, 1965. Abstract no. 119.)*

A systematic treatment is given of the theory of random functions of one or more variables as applicable to the statistical theory of turbulence. The question of the functional transformations of the random variables is considered as well as the concept of the characteristic function and the calculation of the statistical moments, using this theory. The theory of random processes is given, stationary random processes are considered, and the correlation and spectral theories of homogeneous and isotropic random fields are demonstrated. The question of the transition from three-dimensional to two-dimensional and one-dimensional spectra is examined, and a study is made of the solenoidal and potential vector fields of the structural functions and their connection with correlative functions. Kolmogorov and Obukhov's theory of local isotropic turbulence is tested. On the basis of some of the theoretical and experimental results, one can say that the process of diminution of turbulent pulsations of velocity and temperature with the passage of time can be described by a simple exponential law, such as:

$$\sigma_p^2(t) \sim t^{-n_p}, \quad n_p > 0$$

with increasing n_p in the later periods. For space-time correlations of the temperature pulsations in a homogeneous, isotropic, stationary turbulent flux at very large Reynolds numbers, the equation

$$\frac{\partial^2 B_{rr}}{\partial r^2} - \left(r \frac{\partial}{\partial r} + 3 \right) \frac{1}{r} B - \frac{\partial B_{rr}}{\partial r}$$

is obtained which, together with the Chandrasekar equation

$$\frac{\partial^2 B}{\partial r \partial \tau} = B \frac{\partial}{\partial r} \left(\frac{\partial^2}{\partial r^2} + \frac{4}{r} \frac{\partial}{\partial r} \right) B,$$

forms a system of equations for the correlation functions of velocity $B(r, \tau)$ and temperature $B_{rr}(r, \tau)$, which could

be solved under certain conditions. In investigating the spatial correlation of the local fluctuations in temperature in the final period of diminution, the correlation coefficient

$$R_{mn} = \frac{\frac{\partial^m T}{\partial t^m} \frac{\partial^n T}{\partial t^n}}{\sqrt{\left(\frac{\partial^m T}{\partial t^m}\right)^2 \left(\frac{\partial^n T}{\partial t^n}\right)^2}} = (-1)^{m+n} \frac{[2(m+n)+3]!!}{\sqrt{(4m+3)!!(4n+3)!!}}$$

is obtained, which is suitable for experimental purposes. The theory of reciprocal correlation of pressure p and velocity u , in an isotropic turbulent flux is presented. The semiempirical theory of atmospheric turbulence is given, and the statistical theory of "pure" hydrodynamic turbulence is applied to the atmosphere. The basic theory of the movement of heavy particles in the turbulent flux and the influence of turbulence on the growth of cloud droplets is developed. The author's theory of the spatial correlation of the meteorological elements in synoptic-scale motions is presented. [MH]

WIND STRUCTURE BASED ON RAWINSONDE OBSERVATIONS AT TASHKENT

Patsayeva, V. A. Structure of the wind according to results of rawinsonde wind observations at Tashkent. IN: Tsentral'naya aerologicheskaya observatoriya. Trudy, no. 59, 1964, 74-83. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 4, 1965, 48181.)

A study was made of the statistical characteristics of actual wind deviations obtained by analytical processing of rawinsonde coordinates received at half-minute intervals from the mean wind values, computed in the usual manner at two-minute intervals.

ASSOCIATION: Tsentral'naya aerologicheskaya observatoriya (Central Aerological Observatory) [EO]

ORDERED VERTICAL MOTIONS IN THE FRICTION LAYER DURING THE DEVELOPMENT OF THICK CONVECTIVE CLOUDINESS AND STORMS

Peskov, B. Ye. Role of ordered vertical motions in the friction layer during the development of thick convective cloudiness and storms. IN: Tsentral'nyy institut prognozov. Trudy, no. 136, 1964, 61-68. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 3, 1965, 33204.)

This article deals with ordered vertical motions in the friction layer measured at three-hr intervals (from 0900 to 1200 hr and from 1200 to 1500 hr) in cases in which there were storms of varying duration, and in cases with showers, thick cumulus, and cumulus clouds. Conclusions are drawn concerning the dependence of these phenomena on the magnitude of vertical motions with different values for the energy of instability and for the dewpoint deficit at various heights. [EO]

ACCURACY OF PILOT BALLOON MEASUREMENTS OVER MOUNTAIN PASSES

Podrezov, O. A. On the accuracy of pilot balloon observations in the vicinity of mountain passes. Meteorologiya i gidrologiya, no. 11, 1964, 51-52. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5271.)

Figures are presented on the accuracy of pilot balloon data taken in the vicinity of mountain passes as a function of wind direction relative to mountain-range orientation. When air moves along mountain ranges, the errors in pilot balloon observations differ very little from the errors for a slightly dissected locality (the mean error in wind velocity is approximately 35%). If the flow of air is across mountain ranges, the errors in pilot balloon data in the lowest 100-m layer may be considerably larger because the balloons are blown beyond the pass by descending air currents.

ASSOCIATION: Frunzenskaya gidrometeorologicheskaya observatoriya (Frunze Hydrometeorological Observatory)

[EO]

DISTRIBUTION IN THE ATMOSPHERE OF HEAVY POLLUTANTS DISCHARGED BY A POINT SOURCE

Rabinovich, Ya. S. IN: *Akademiya nauk SSSR. Izvestiya. Fizika atmosfery i okeana*, v. 1, no. 3, 1965, 920-928.

An analytical solution is proposed to the problem of the scattering of heavy pollutants in a turbulent atmosphere. The vertical wind profile and the vertical diffusion coefficient are approximated by power functions of height.

The problem of the diffusion of pollutants settling in a turbulent atmosphere has attracted the attention of many investigators. It has been the subject of a large number of theoretical and experimental papers, a survey of which can be found in reference [1]. In recent years, the results have been published of numerical computations run on electronic computers of the field of concentrations of pollutants settling in the surface boundary layer of the atmosphere. However, these computations do not eliminate the need for discovering the general laws which can be found only in the process of an analytical solution of the problem. An analytical solution is proposed below. Turbulent diffusion of heavy pollutants discharged into the atmosphere from a stationary point source at a certain height h above the ground level is considered. It should be noted that the assumption of a point source is not particularly important since all results are readily extended to the cases of linear, plane, or three-dimensional sources. It is assumed, further, that the vertical wind profile $u(z)$ and the vertical turbulent diffusion coefficient $k(z)$ vary with height in accordance with a power law (see [2])

$$u(z) = u_1 \left(\frac{z}{z_1} \right)^m, \quad k(z) = k_1 \left(\frac{z}{z_1} \right)^{1-\alpha}, \quad z \geq 0. \quad (1)$$

The rate of fallout in the gravitational field w is not considered dependent on the coordinates (x, y, z) since it reaches critical values very rapidly, even at short distances from the source.

Data on rates of settling of smoke particulates taken from reference [3] are as follows:

Diameter of particles, 10 ⁻⁴ cm	5	10	20	40	60	80	100
Rate of settling, cm/sec	0.15	0.58	2.4	9.0	19.0	30.0	43.0

Statement of the problem and the notation. Let Oz be the vertical axis, the Ox axis coincides with the direction of the wind speed u , and the second horizontal axis Oy is perpendicular to the wind direction.

On the basis of symmetry considerations [2] the spatial distribution of the pollutants $q(x, y, z)$ can be represented as a product of Gaussian distribution and some function which is independent of the y -coordinate

$$q(x, y, z) = \frac{e^{-y^2/2\bar{y}^2(x, z)}}{\sqrt{2\pi}\bar{y}^2(x, z)} \varphi(x, z). \quad (2)$$

Here $\bar{y}^2(x, z)$ is the mean square scattering of the pollutants in the direction of the perpendicular axis Oy. A specific formula for the mean square scattering in the case of a continuous point source, at the point $\{x = 0, y = 0, z = h\}$ in the surface boundary layer of the atmosphere, was proposed in reference [3] on the basis of experimental data. The second factor in formula (2) — the function $\varphi(x, z)$ — is found as the solution of the stationary two-dimensional diffusion equation.

The considerations presented here were developed previously to be applied to the scattering of weightless pollutants in the atmosphere. However, the inclusion of gravitational forces in the process of turbulent spatial diffusion does not qualitatively change the nature of particulate scattering in the direction of the horizontal perpendicular axis Oy. In the case of heavy particles, as is the case of gases, the spatial distribution of concentrations of pollutants can be represented in the form of (2), where the function $\varphi(x, z)$ is a solution of the two-dimensional equation

$$u(z) \frac{\partial \varphi}{\partial x} + w \frac{\partial \varphi}{\partial z} = \frac{\partial}{\partial z} k(z) \frac{\partial \varphi}{\partial z} \quad (3)$$

with limiting conditions

$$\varphi(0, z) = \frac{\gamma}{u(h)} \delta(z - h). \quad (4)$$

where γ is the intensity of the source, and $u(h)$ is

the wind speed at the height of the source,

$$\left[\varphi(x, z), k(z) \frac{\partial \varphi}{\partial z} \right] \rightarrow 0 \quad \text{when } (x, z) \rightarrow \infty, \quad (5)$$

$$p(x, 0) = \left[k(z) \frac{\partial \varphi}{\partial z} + w\varphi \right]_{z=0} = \beta \varphi(x, 0), \quad (6)$$

$p(x, 0)$ is the flow of pollutants across the underlying surface. The point type of source, relative to the y-coordinate in the formula for the spatial distribution of concentrations (2), is characterized by the fact that when $x = 0$, the mean square scattering becomes an infinitely small quantity on the order of x^α . The numerical value of the exponent α is directly connected with atmospheric stratification parameters.

The general solution. The following substitutions of variables are made in equation (3) and the limiting conditions (4)–(6):

$$\xi = \frac{u(z)}{k(z)} \left(\frac{z}{m + e + 1} \right)^2, \quad \xi_h = \frac{u(h)}{k(h)} \left(\frac{h}{m + e + 1} \right)^2.$$

Then,

$$\varphi(0, h) = \varphi(0, \xi_h) = \frac{\gamma h}{k(h)(m + e + 1)} \delta(\xi - \xi_h), \quad (7)$$

$$\left\{ \varphi(x, \xi), \xi^{1+\nu} \frac{\partial \varphi}{\partial \xi} \right\} \rightarrow 0 \quad \text{when } (x, \xi) \rightarrow \infty, \quad (8)$$

$$p(x, 0) = \left[M \xi^{1+\nu} \frac{\partial \varphi}{\partial \xi} + u\varphi \right]_{z=0} = \beta \varphi|_{z=0}, \quad (9)$$

$$\frac{\partial \varphi}{\partial x} = \xi \frac{\partial^2 \varphi}{\partial \xi^2} + (1 + \nu) \frac{\partial \varphi}{\partial \xi} + N \frac{W}{\xi^\nu} \frac{\partial \varphi}{\partial \xi}, \quad (10)$$

where

$$\nu = -\frac{e}{m + e + 1}, \quad M = \frac{u_1 a^{-(1+\nu)}}{z_1^m (m + e + 1)}, \quad W = \frac{w}{u(h)},$$

$$a = \frac{L_1}{k_1 z^{m-n} (m+e+1)^2}, \quad N = (m+e+1) h^m a^{1+v}. \quad (11)$$

The solution of equation (10) is sought in the form of an expansion in powers of the small parameter W :

$$\varphi = \varphi_0 + W\varphi_1 + W^2\varphi_2 + \dots \quad (12)$$

The function φ_0 should satisfy all the limiting conditions which have been imposed on the functions φ_k ($k = 1, 2, 3, \dots$) conditions (8), (9), and the condition $\varphi_k(0, \xi) = 0$. After making the substitutions in (10) and equating all terms on the right and left that contain equal powers of W , we obtain a sequence of equations for φ_k .

$$\frac{\partial \varphi_0}{\partial x} = \xi \frac{\partial^2 \varphi_0}{\partial \xi^2} + (1+v) \frac{\partial \varphi_0}{\partial \xi}, \quad (13)$$

$$\frac{\partial \varphi_{k+1}}{\partial x} = \xi \frac{\partial^2 \varphi_{k+1}}{\partial \xi^2} + (1+v) \frac{\partial \varphi_{k+1}}{\partial \xi} + \frac{N}{\xi^v} \frac{\partial \varphi_k}{\partial \xi}, \quad (14)$$

$$k = 0, 1, 2, \dots$$

A solution of the diffusion equation (10) for a weightless gas is known [2, 5, 6]

$$\varphi_0 = \frac{\gamma h}{k(h)(m+e+1)} \left(\frac{\xi_0}{\xi} \right)^{v/2} \frac{1}{x} e^{-(\xi+\xi_0)x} \times$$

$$\times \left[AI_v \left(\frac{2\sqrt{\xi\xi_0}}{x} \right) + BI_{-v} \left(\frac{2\sqrt{\xi\xi_0}}{x} \right) \right] \quad (15)$$

We shall write

$$v = \left(\frac{\xi_0}{\xi} \right)^{v/2} \frac{\xi_0}{x-x_0} e^{-(\xi+\xi_0)(x-x_0)/2}$$

$$\times \left[AI_v \left(\frac{2\sqrt{\xi\xi_0}}{x-x_0} \right) + BI_{-v} \left(\frac{2\sqrt{\xi\xi_0}}{x-x_0} \right) \right]. \quad (16)$$

The function v with arguments (x, ξ) satisfies equation (13), and the function

$$\varphi_{k+1}(x, \xi) = N \int_0^x dx_0 \int_0^\infty \frac{v}{\xi_0^{1+v}} \frac{\partial \varphi_k(x_0, \xi_0)}{\partial \xi_0} d\xi_0 \quad (17)$$

satisfies equation (14) and all conditions that have been imposed. Moreover, one can be sure of direct substitution. We shall merely point out that after substituting φ_{k+1} in equation (14) and making obvious cancellations, we obtain

$$N \int_0^\infty \frac{v(\xi, \xi_0; x, x_0)}{\xi^{1+\nu}} \frac{\partial \varphi_k}{\partial \xi_0} \Big|_{x=x_0} d\xi_0 = \frac{N}{\xi^\nu} \frac{\partial \varphi_k(x, \xi)}{\partial \xi}. \quad (18)$$

The identity of this equality is proved by substituting the following variables into the integral:

$$u = -\frac{\sqrt{\xi} - \sqrt{\xi_0}}{\sqrt{x - x_0}}, \quad \xi_0 = (\sqrt{\xi} + u\sqrt{x - x_0})^2,$$

$$\begin{aligned} N \int_0^\infty \frac{v}{\xi_0^{1+\nu}} \frac{\partial \varphi_k}{\partial \xi_0} \Big|_{x \rightarrow x_0} d\xi_0 &= (A + B) \frac{N}{\sqrt{\pi}} \int_{\frac{\sqrt{\xi}}{\sqrt{x-x_0}}}^\infty \left(\frac{\xi_0}{\xi} \right)^{(2\nu+1)/4} \frac{1}{\xi_0^\nu} \frac{\partial \varphi_k}{\partial \xi_0} e^{-u^2} du \xrightarrow{x \rightarrow x_0} \\ &\rightarrow (A + B) \frac{N}{\xi^\nu} \frac{\partial \varphi_k(x, \xi)}{\partial \xi}. \end{aligned} \quad (19)$$

Consequently, the equality (18) holds when $A + B = 1$. The second equation for the constants A and B is determined from the conditions of (9). In particular, when $A = 0$, formula (17) yields a solution which satisfies the condition on the underlying surface $\varphi(x, 0) = G$ ($\beta = \infty$). It is acceptable practice to simplify the complete condition of (9) by considering that there is no diffusion flow across the underlying surface, and the total flow is equal to the gravitational precipitation of particles into the ground

$$k(z) \frac{\partial \varphi_k}{\partial z} = M \xi^{1+\nu} \frac{\partial \varphi_k}{\partial \xi} \Big|_{\xi=0} = 0, \quad p_k(x, 0) = w \varphi_k(x, 0), \quad k = 0, 1, 2, \dots \quad (20)$$

In order not to complicate the discussion by including cumbersome computations, we shall also adhere to this practice and, satisfying condition (20), we shall set $B = 0$ and $A = 1$ in formulas (15)–(17) (even though it is not difficult to write out all subsequent results for the total boundary condition (9))

$$\varphi_0 = \frac{\gamma h}{k(h)(m + \epsilon + 1)} \left(\frac{\xi_h}{\xi} \right)^{\nu/2} \frac{1}{x} e^{-(\alpha + \xi_h \nu x)} I_\nu \left(\frac{2\sqrt{\xi \xi_h}}{x} \right). \quad (21)$$

$$v = \left(\frac{\xi_0}{\xi}\right)^{v/2} \frac{\xi_0}{x-x_0} e^{-(\xi+\xi_0)(x-x_0)} I_v\left(\frac{2\sqrt{\xi\xi_0}}{x-x_0}\right), \quad (22)$$

$$\begin{aligned} \varphi_{k+1}(x, \xi) = N \int_0^x dx_0 \int_0^\infty \left(\frac{\xi_0}{\xi}\right)^{v/2} \frac{1}{x-x_0} e^{-(\xi+\xi_0)(x-x_0)} \times \\ \times I_v\left(\frac{2\sqrt{\xi\xi_0}}{x-x_0}\right) \frac{1}{\xi_0^v} \frac{\partial \varphi_k(x_0, \xi_0)}{\partial \xi_0} d\xi_0, \end{aligned} \quad (23)$$

$k = 0, 1, 2, \dots$

The integral of (23) can be given a specific physical interpretation. For this purpose, it is sufficient to compare formula (23) with the formulas for the case of a point source (21). Bearing in mind that

$$\frac{w}{u(k)} \frac{N}{\xi_0^v} \frac{\partial \varphi_k}{\partial \xi_0} d\xi_0 dx_0 = \frac{w}{k(z_0)} \frac{z}{m+e+1} \frac{\partial \varphi_k}{\partial z_0} dz_0 dx_0, \quad (24)$$

the comparison yields the conclusion that the integrand in formula (23) includes the source function with the intensity $w(\partial \varphi_k / \partial \xi_0) d\xi_0 dx_0 = w(\partial \varphi_k / \partial z_0) dz_0 dx_0$ acting at the point (x_0, ξ_0) , and the double integral itself (with accuracy to a constant factor $w/u(k)$) expresses the summary concentration at the point (x, ξ) from sources arranged in a strip $(0 \leq x_0 \leq x, 0 \leq \xi_0)$.

The integral (23) is evaluated on the basis of the theorem on evaluating the Stieltjes integral [7], which is easily extended to the case being investigated. Even though the function in the integrand has a singularity at the point $x = x_0$ and $\xi = \xi_0$, the double integral converges uniformly at this point (refer to (19) and (24)).

Estimating ground concentrations φ_{k+1} (when $\xi = 0$) is one of the greatest interest

$$\begin{aligned} \varphi_{k+1}(x, 0) = \frac{N}{\Gamma(1+v)} \int_0^x dx_0 \int_0^\infty \frac{e^{-\xi_0(x-x_0)}}{(x-x_0)^{1+v}} \frac{\partial \varphi_k}{\partial \xi_0} d\xi_0 = \\ = -\frac{N}{\Gamma(1+v)} \int_0^x \frac{\varphi_k(x_0, 0)}{(x-x_0)^{1+v}} e^{-\xi_0(x-x_0)} dx_0, \end{aligned} \quad (25)$$

where ξ_0^* is some average fixed (for given values of x and x_0) value of the argument ξ_0 .

The physical sense of this averaging operation is that the effect of the entire set of sources continuously distributed along a vertical $0 < \xi_0 < \infty$, as expressed by the inside integral, is replaced by an equivalent point source at $\xi_0 = \xi_0^*$ with the combined intensity. Repeated averaging of the integral (25) where $\varphi_k(x, 0)$ is replaced by some average value $\varphi_k(x_0^*, 0)$ yields

$$\varphi_{k+1}(x, 0) = - \frac{N}{\Gamma(1+\nu)} \varphi_k(x_0^*, 0) \int_0^x e^{-\xi_0^*/(x-x_0)} \frac{dx_0}{(x-x_0)^{1+\nu}}, \quad (26)$$

where $0 < x_0^* < x$.

After simple transformations, the substitution of the variables $u = \xi_0^*/(x - x_0)$ into formula (26) leads to the expression

$$\begin{aligned} \varphi_{k+1}(x, 0) &= \frac{N}{\nu \Gamma(1+\nu)} \frac{\varphi_k(x_0^*, 0)}{x^\nu} e^{-\xi_0^*/x} \times \\ &\times \left\{ 1 - e^{-\xi_0^*/x} \left(\frac{\xi_0^*}{x} \right)^{-\nu} \Gamma\left(1+\nu, \frac{\xi_0^*}{x}\right) \right\}, \end{aligned} \quad (27)$$

which permits one to obtain relatively simple estimates for φ_{k+1} .

The quantity ξ_0^* is obviously of the same order of magnitude as the height of the source ξ_h . Turning to the moduli, an estimate of φ_{k+1} can be written. For small x ($\nu \neq 0$)

$$\left| \frac{\varphi_{k+1}(x, 0)}{\varphi_k(x_0^*, 0)} \right| \sim \left| \frac{N}{\Gamma(1+\nu)} \frac{e^{-\xi_0^*/x}}{x^\nu} \left(\frac{\xi_0^*}{x} \right)^{-1} \right|. \quad (28)$$

For large x ($\nu \neq 0$)

$$\left| \frac{\varphi_{k+1}(x, 0)}{\varphi_k(x_0^*, 0)} \right| \sim \left| \frac{N}{\nu \Gamma(1+\nu)} \frac{e^{-\xi_0^*/x}}{x^\nu} \left[1 - e^{-\xi_0^*/x} \left(\frac{\xi_0^*}{x} \right)^{-\nu} \Gamma(1+\nu) \right] \right|. \quad (29)$$

When $\nu = 0$

$$\left| \frac{\varphi_{k+1}(x, 0)}{\varphi_k(x_0^*, 0)} \right| \sim \frac{\xi_h}{h} (m+1) \text{Ei}\left(-\frac{\xi_0^*}{x}\right). \quad (30)$$

Because $W = w/u(h)$ is small, the first two terms of the series (12) are sufficient for practical computational purposes. Therefore, it is interesting to set up a computational formula for $\varphi_1(x, \xi)$ on the basis of the integral (22). After introducing φ_0 into (22), as a result of a series of transformations, we obtain

$$\begin{aligned} \varphi_1(x, \xi) = & \frac{\pi}{2 \sin v\pi} \frac{NA_0}{\Gamma^2(1+v)} \frac{L_v\left(\frac{\xi_h}{x}, \frac{\xi}{\xi_h}\right)}{x^{1+v}} + \\ & + \frac{NA_0}{2v} \left[\frac{1}{\xi^v} - \frac{1}{\xi_h^v} \right] \left(\frac{\xi_h}{\xi} \right)^{v/2} \frac{1}{x} e^{-(1+\xi_h)/x} I_v \left(\frac{2\sqrt{\xi\xi_h}}{x} \right), \end{aligned} \quad (31)$$

where

$$\begin{aligned} A_0 = & \frac{\gamma h}{k(h)(m+\varepsilon+1)}, \\ L_v\left(\frac{\xi_h}{x}, \frac{\xi}{\xi_h}\right) = & \frac{2 \cos v\pi}{\Gamma(1+v)} \left(\frac{\xi_h}{x} \right)^v \times \\ & \times \sum_{m=0}^{\infty} \frac{\Gamma(m+2v+1)}{m! \Gamma(m+v+1)} \left(-\frac{\xi_h}{x} \right)^m F\left(-m; -v-m; v+1; \frac{\xi}{\xi_h}\right) - \\ & - \frac{1}{\Gamma(1-v)} \left(\frac{\xi_h}{\xi} \right)^v \sum_{m=0}^{\infty} \frac{1}{m!} \left(-\frac{\xi_h}{x} \right)^m F\left(-m; -v-m; 1-v; \frac{\xi}{\xi_h}\right) - \\ & - \frac{1}{\Gamma(1+v)} \sum_{m=0}^{\infty} \frac{\Gamma(m+v+1)}{m! \Gamma(m-v+1)} \left(-\frac{\xi_h}{x} \right)^m F\left(-m; v-m; v+1; \frac{\xi}{\xi_h}\right). \end{aligned} \quad (32)$$

The symbol F is the hypergeometric function.

The case of equilibrium stratification ($v = 0$, $\varepsilon = 0$) follows from formula (24) as the limiting case when $v \rightarrow 0$

$$\varphi_1(x, \xi) = -NA_0 \frac{e^{-(1+\xi_h)/x}}{x} \left[K_0\left(\frac{2\sqrt{\xi\xi_h}}{x}\right) + \ln \sqrt{\frac{\xi}{\xi_h}} I_0\left(\frac{2\sqrt{\xi\xi_h}}{x}\right) \right]. \quad (33)$$

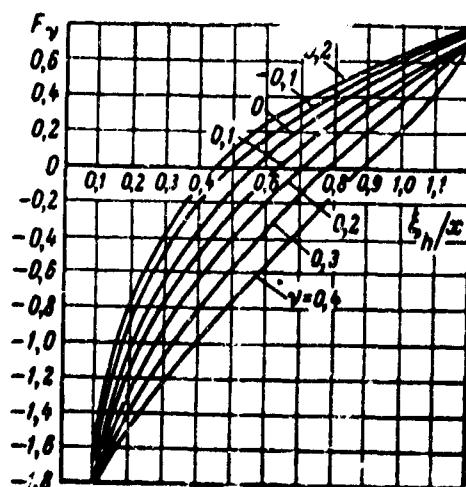


Fig. 1

The formulas for ground concentrations ($\xi = 0$) are of a more compact form

$$\begin{aligned} \varphi_1(x, 0) = & \frac{NA_0}{2v\Gamma(1+v)} \frac{e^{-\xi_h/x}}{x^{1+v}} \times \\ & \times \left\{ 2 \cos v\pi \frac{\Gamma(1-v)\Gamma(1+2v)}{\Gamma^2(1+v)} \times \right. \\ & \times \left(\frac{\xi_h}{x} \right)^v {}_1F_1 \left(-v; v+1; \frac{\xi_h}{x} \right) - \\ & \left. - {}_1F_1 \left(-2v; 1-v; \frac{\xi_h}{x} \right) - 1 \right\}, \\ & v \neq 0 \quad (\varepsilon \neq 0), \end{aligned} \quad (34)$$

$$\begin{aligned} \varphi_1(x, 0) = & NA_0 \frac{e^{-\xi_h/x}}{x} \left[C + \ln \frac{\xi_h}{x} \right], \\ & v = 0 \quad (\varepsilon = 0), \quad C = 0.5772, \end{aligned} \quad (35)$$

where ${}_1F_1$ is the degenerate hypergeometric function. These formulas permit the use of the following relationship as the point of departure in computations:

$$\begin{aligned} F_v \left(\frac{\xi_h}{x} \right) = & \frac{\xi_h^v}{N} \frac{\varphi_1(x, 0)}{\varphi_0(x, 0)} = \frac{1}{2v} \left[2 \cos v\pi \frac{\Gamma(1-v)\Gamma(1+2v)}{\Gamma^2(1+v)} \times \right. \\ & \times \left(\frac{\xi_h}{x} \right)^v {}_1F_1 \left(-v; v+1; \frac{\xi_h}{x} \right) - {}_1F_1 \left(-2v; 1-v; \frac{\xi_h}{x} \right) - 1 \Big], \end{aligned} \quad (36)$$

$$F_0 \left(\frac{\xi_h}{x} \right) = C + \ln \frac{\xi_h}{x}. \quad (37)$$

The asymptotic formula with large ξ_h/x is

$$F_v\left(\frac{\xi_h}{x}\right) \sim \frac{1}{2v} \left\{ \frac{\Gamma(1-v)}{\Gamma(1+v)} \left(\frac{\xi_h}{x}\right)^{2v} G\left(-v; -2v; -\frac{x}{\xi_h}\right) - 1 \right\},$$

$$G(\alpha, \beta, z) = 1 + \frac{\alpha\beta}{1!}z + \frac{\alpha(\alpha+1)\beta(\beta+1)}{2!}z^2 + \dots \quad (38)$$

Graphs of the function $F_v(\xi_h/x)$ for two ranges of values of the argument and for different v are presented in Fig. 1 and 2.

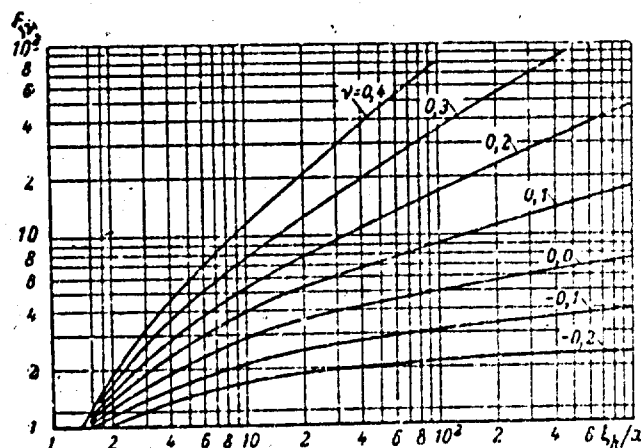


Fig. 2

The ground concentration of heavy pollutants is determined with an accuracy to the linear term in $w/u(h)$ the concentration of a weightless gas with the aid of the function F_v on the basis of the elementary relationship

$$\varphi(x, 0) = \varphi_0(x, 0) \left[1 + \frac{w}{u(h)} N_0 F_v\left(\frac{\xi_h}{x}\right) \right], \quad (39)$$

where

$$N_0 = \frac{N}{\xi_h^v} = \frac{\xi_h}{h} (m + e + 1) = \frac{u(h)}{k(h)} \frac{h}{(m + e + 1)}. \quad (40)$$

Thus, formula (39) can be written in another way

$$\varphi(x, 0) = \varphi_0(x, 0) \left[1 + \frac{w}{k(h)} \times \frac{h}{m + e + 1} F_v\left(\frac{\xi_h}{x}\right) \right]. \quad (41)$$

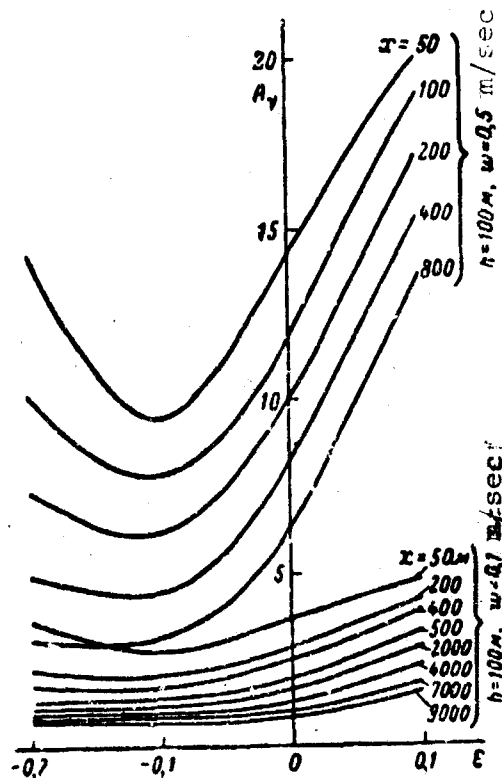


Fig. 3

The magnitudes of the relative corrections (in respect to the case of a weightless gas)

$$A_y = \frac{\varphi(x, 0)}{\varphi_0(x, 0)} = 1 + \frac{w}{k(h)} \frac{h}{m + \varepsilon + 1} F_v\left(\frac{\xi h}{x}\right) \quad (42)$$

are shown graphically in Figs. 3 and 4 for a number of velocities and distances as a function of the parameter ε characterizing the stratification.

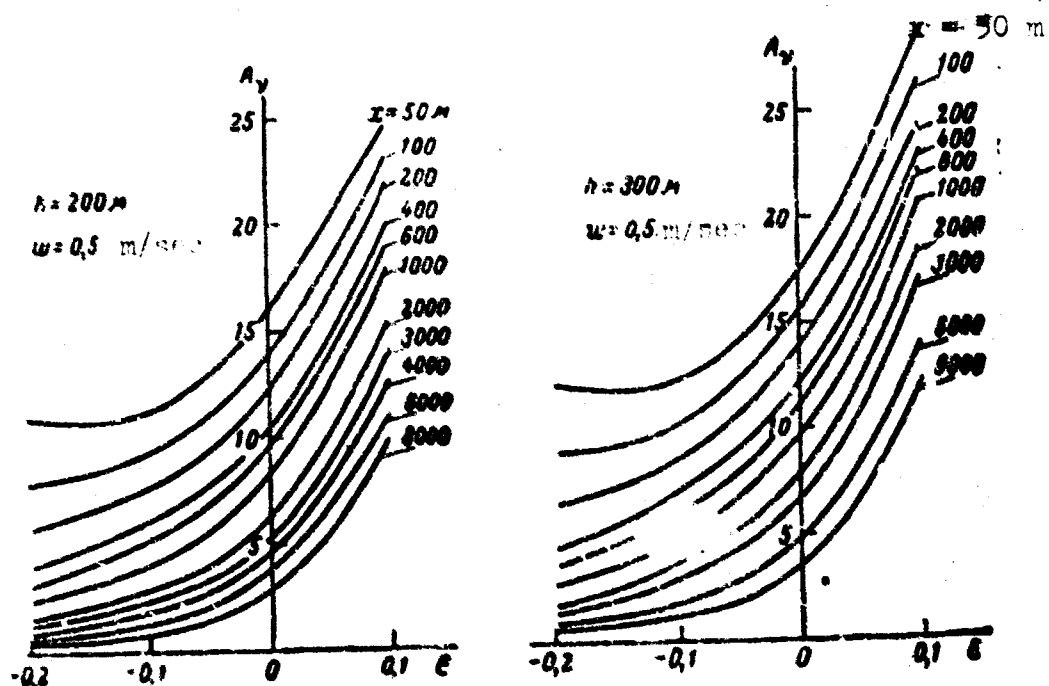


Fig. 4

It can be seen from the correction graph that gravitational forces have a smoothing effect on the dependence of ground concentrations on weather conditions. In the range of ϵ values from -0.1 to 0.1 and higher during a period of transition from unstable stratification to stable stratification, the absolute values of $A\gamma$ increase as turbulent mixing in the atmosphere increases and the density of concentration close to the ground decreases. If we digress from secondary reciprocity of weightlessness with turbulence, then the relative contribution of weightlessness as a stable factor in the total concentration naturally grows with decreasing absolute values of the surface boundary-layer concentration of pollutants. However, with increasing intensity of turbulent mixing from the level characterized by the parameter $\epsilon = -0.1$ toward smaller ϵ values ($\epsilon = -0.2$), the relative contribution made by weightlessness to the magnitude of ground concentrations begins to increase again because a new factor appears—the increase in concentration gradients close to the ground caused by the weightlessness of particles when a large transfer ratio is transferred to the ground by the diffusion process itself. Calculations of concentrations made with formula (42) showed that the following features are characteristic of heavy pollutants:

1) The approach to the source of the maximum concentration relative to the maximum for weightless gas along the x -coordinate (for a source 100 m high, this shift amounts to 25%, and is still greater for higher sources);

2) The presence of a critical coordinate x_{cr} is such that for $x < x_{cr}$, the concentration of heavy pollutants is greater, while for $x > x_{cr}$, it is less than the concentration of gas. The magnitude of x_{cr} decreases as the rate of settling of particles is increased or the height of stacks is reduced (i.e., as h is decreased). The same can be said of the effect of atmospheric stratification on the position of the critical point. Thus, for example, when $w = 0.3$ m/sec, $h = 100$ m, and with unstable stratification, x_{cr} is 3–3.5 km away from the source; with neutral stratification, $x_{cr} = 6$ km; and with an inversion ($\epsilon = 0.1$), the critical point is 8 km away from the source.

Leningrad Hydrometeorological Institute Submitted 12 February 1965

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EFFECT OF MOUNTAIN RANGES ON AIR CURRENTS

Romov, A. I. *The effect of mountain ranges on air currents.* IN: *Ukrainskiy nauchno-issledovatel'skiy gidrometeorologicheskii institut. Trudy*, no. 43, 1964, 80-94. (TAKEN FROM: *Referativnyy zhurnal. Geofizika*, no. 5, 1965, 5B411.)

A method for calculating deviations of winds from the geostrophic near a mountain range is discussed, and the effect of mountains on large-scale air currents is analyzed. The components of orographic deviation of winds for known fields $u_h(x, y)$, $v_h(x, y)$ and for the required characteristics of the ground^h-surface profile are computed (the subscript means that the quantity is taken on mountain surfaces).

The computations are performed with a square or triangular grid. The formulas derived show the deviation of the winds near a mountain massif as a function of a number of characteristics of the ground-surface profile. These formulas can be used to estimate the nature of the effect of various mountainous regions on different air currents. In the case of an elongated mountain range whose axis is almost a straight line, it is convenient to orient the x- and y-axes so that one of them is directed along the range. Simplifications for solving the problem are given ($u_h = \text{const.}$, $v_h = 0$, the mountains have the same profile over their entire length, etc.). A closely spaced grid with lines 75 km apart was used in these computations. Values of the influence function $M^k(r, \xi)$ were computed on a Kiev electronic computer.

Since orographic wind deviations reach considerable magnitudes, mountains play an important role in forming synoptic processes, and the deviations are proportional to the velocity of the transverse surface boundary-layer flow over the range, increasing with the size of the area over which the current flows. The effect of low- and average-height ranges on the wind velocity at a distance of more than 300—400 km is also small. Orographic deformation of an air current is expressed in strengthening of the wind immediately above the mountain massif, particularly above the summits. The current is slowed over valleys adjoining mountains, most of all near the foothills and diminishing with distance from the mountains; the retardational effect of the range may extend for several hundred kilometers on each side of the range. The intensity and the areal effect of a mountain range on air currents increase with increased width of the mountain massif.

The higher and wider the range, the thicker the layer involved in orographic disturbances and the more intense their effect on atmospheric processes will be. The role played by the steepness of slopes is particularly significant.

The following pattern of the distribution of horizontal divergence of orographic wind deviation was obtained: the region of negative divergence (convergence), which diminishes with distance, extends from the foothills on the windward side in the direction opposite the flow, while positive divergence (convergence) exists over the valley extending from the lee side. The sign of the divergence immediately above the slopes of the mountain range is opposite the divergence above the foothills, for there is divergence of the orographic wind deviation above the windward slopes and convergence above the lee slopes. The absolute values of the divergence of orographic wind deviation exceed the usual divergence values caused by ordinary thermodynamic factors; the values obtained over the slopes were one order of magnitude higher. Orographic wind deviation decreases with height and reverses its direction at some level above the plain; the divergence of the wind deviation also changes sign accordingly. The corresponding evolution of fronts may take place not only directly over mountain slopes, but also several hundreds of kilometers away from the slopes; the regions of orographic rise and drop in pressures, which also extend for considerable distances from the slopes, can be explained in part by segmentation of cyclones. A characteristic disturbance of the velocity field forms above a mountain range; in the pressure field, this obviously corresponds to an increase on the windward and a decrease on the leeward sides of the mountain range. A flow chart for computing wind deviations for actual mountain ranges and synoptic situations on an electronic computer is presented in the original article.

[E]

ENERGY DISSIPATION IN NONISOTROPIC TURBULENCE

Rusin, M. I. Dissipation of energy in nonisotropic turbulence. IN: *Glavnaya geofizicheskaya observatoriya. Fizika pogranichnogo sloya atmosfery (Physics of the atmospheric boundary layer)*. Leningrad, 1965, 201-204. (ITS: *Trudy*, no. 167, 1965.)

The author develops a generalization of Taylors's formula for the rate of energy dissipation ϵ in an arbitrary isotropic turbulent flow per unit mass of a noncompressible fluid, where

$$D = 15\nu \frac{\overline{(u')^2}}{\lambda^2},$$

where D is rate of dissipation, ν is the kinematic coefficient of molecular viscosity, $\overline{(u')^2} = \frac{2}{3}\epsilon$ is the mean square fluctuation in wind velocity, and λ is the so-called microscale turbulence having linear dimensionality. It is demonstrated that the dissipation, irrespective of the degree and form of anisotropy of the turbulence, is the same in isotropic and nonisotropic flows, provided the values of the correlation coefficients, $\overline{(c')^2}$ and $\overline{R_r^s}$, are identical.

ASSOCIATION: Glavnaya geofizicheskaya observatoriya, Leningrad (Main Geophysical Observatory) [SP]

FORECAST OF FOG OVER THE MU-TAN RIVER IN AUGUST AND SEPTEMBER

She, Shao-ming (0152/1421/2494). Forecast of fog over the Mu-tan River in August and September. *Ch'i hsiang hsueh pao (Acta meteorologica sinica)*, v. 35, no. 4, 1965, 531-532.

Fog often appears over the Mu-tan River from 4 or 5 a.m. till 8, 9, or even 11 a.m. during clear weather in August and September. According to statistics for August and September 1958—1962, visibility was less than 4 kilometers

on 104 out of 305 days. On 70 of the 104 days, the weather was clear. This paper presents a method of fog forecasting based on these data. (Abstracter's note: The coordinates of the Mu-tan River are 46 18 N; 129 31 E).

[CR]

LARGE LAPSE RATES IN THE FREE ATMOSPHERE

Stancev, K. Khidrologiya i meteorologiya, v. 14, no. 2, 1965, 21-28. (TAKEN FROM: Abstracts of Bulgarian scientific literature. Mathematics, physics, astronomy, geography, and geodesy, no. 1, 1965. Abstract no. 121.)

Under study are the large lapse rates which occur in the layers of the free atmosphere up to 500 mb during the warm half of the year. The possible effect of extraneous factors on the registration accuracy of these gradients is discounted, and it is concluded that most, if not all, of them are real. In tabular form, the author shows the significance of advection in these gradients. Distribution by baric level and layer thickness is given, and the length of time during which these gradients are retained is estimated. A table is given showing the distribution by month and type of advection. The connection is shown between the large lapse rates and the possibility of cloud formation in the atmospheric layers under consideration.

[MH]

TAPE REGISTRATION OF WIND MEASUREMENTS

Torochkov, V. Yu. IN: Nauchno-issledovatel'skiy institut gidrometeorologicheskogo priborostroyeniye. Trudy, no. 12, 1964, 72-77. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B101.)

The possibility of recording wind parameters with a single pen on a single tape is justified. For this purpose, statistical distributions of wind velocities and directions are examined.

ASSOCIATION: Nauchno-issledovatel'skiy institut gidrometeorologicheskogo priborostroyeniye (Scientific Research Institute for Hydrometeorological Instrument Building)

[EO]

FREQUENCY ANALYSIS OF WIND-VANE OPERATING CHARACTERISTICS

Torochkov, V. Yu., D. Ya. Surazhskiy, and A. A. Syyko. Chastotnyy analiz raboty priyemnikov vetroizmeritel'nykh priborov (Frequency analysis of the operation of wind-vane indicators). Moskva, Gidrometeoizdat, 1964, 61 p. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B102K.)

This monograph is devoted to an investigation of the dynamics of the most widely used wind vanes and their interaction with environment. Spectral characteristics of the horizontal component of the wind and a procedure for recording and processing transient processes in the receivers of the instruments are presented. The book consists of the following sections: Introduction, Principles of frequency analysis, Spectral characteristics of the horizontal component of the wind, Wind vanes, Procedure for recording and processing transient processes by wind vanes, Results of aerodynamic investigations of wind vanes, Results of aerodynamic investigations of wind speed indicators, and Comparative tests of wind speed indicators under natural conditions.

[EO]

AEROSOL CAPTURE BY VARIOUSLY SHAPED OBSTACLES

Voloshchuk, V. M. The approximate calculation of coefficients of aerosol particle capture by obstacles of various shapes. Fizika atmosfery i okeana, v. 2, no. 2, 1966, 164-173.

Approximate analytical formulas are derived for computing the coefficients (ϵ) of aerosol particle capture by obstacles of various shapes. It is assumed that the velocity field of the medium and the force of interaction of aerosol particles with the obstacles are known. The motion of a certain aggregate of particles (aerosol liquid), not an individual particle, is considered. The aerosol liquid is assumed to obey the Stokes laws, have inertia, be undiffused, ideal (interactions between aerosol particles are neglected), and to be steady. Systems of motion of the aerosol liquid are derived, with the inertial resistance of the medium being neglected. A theorem is presented for the asymptotic behavior of capture coefficients for large Stokes numbers (k). Formulas are given for several specific cases: potential and Stokes flows around spheres, potential flow around a circular cylinder, and for continuous potential and Kirchhoff flows around a plate (see Table 1). Values of capture coefficients computed for these examples and some values obtained by other authors (L. M. Levin, I. Langmuir, and I. P. Mazin) are given in tables. Comparison of these results shows them to be in general agreement.

Table 1.

No. of cases	Example	$e^{(0)}(z)$	β	Order of $\Delta(q)$ when $k \rightarrow \infty$
1	Auxiliary problem $1: 0 \leq x \leq a$ $u_x = -1, u_y = 0$ $u_x = 0, u_y = -1$ $u_x = 0, u_y = 0$ $u_x = 0, u_y = 0$ $u_x = 0, u_y = 0$	$e^{(0)} = \frac{\pi}{4} (1 - e^{-\frac{4}{\pi}})$ $\pi = \frac{k}{k_{sp}} \geq 1$	$\beta > 1$	k^{-2}
2	Potential flow around a sphere $u_x = -1, u_y = 0$ $u_x = 0, u_y = -1$ $u_x = 0, u_y = 0$ $u_x = 0, u_y = 0$ $u_x = 0, u_y = 0$	$e^{(0)}(y) = \frac{3}{k^2} \exp\left(-\frac{V}{k}\right) \sum_{n=0}^{\infty} \frac{B_n(y/k)}{n!} \Gamma(-3-n, \frac{1}{k})$ $e^{(0)}(0) = 1 - \frac{1}{2k} + \frac{1}{2k^2} + \frac{1}{2k^3} e^{1/k} Ei(-1/k)$ $e^{(0)}(1) = 1 + \frac{\pi}{2} \frac{1}{k^2} \left\{ N_1(1/k) + H_{-1}(1/k) \right\}$	3	k^{-2}
3	Stokes flow around a sphere $u_x = -0.5, u_y = 0$ $u_x = 0, u_y = -1$ $u_x = 0, u_y = 0$ $u_x = 0, u_y = 0$ $u_x = 0, u_y = 0$	$e^{(0)}(y) = \frac{3}{2k} \exp\left(-\frac{V}{k}\right) \sum_{n=0}^{\infty} \frac{B_n(y/k)}{n!} \left\{ \Gamma(-1-n, \frac{1}{k}) - \frac{1}{k^2} \Gamma(-3-n, \frac{1}{k}) \right\}$ $e^{(0)}(0) = 1 + \frac{1}{4k} - \frac{1}{4k^2} + \frac{6k^2-1}{4k^3} e^{1/k} Ei(-1/k)$ $e^{(0)}(1) = 1 - \frac{\pi}{4k^2} \left\{ N_1(1/k) + H_{-1}(1/k) \right\} - \frac{3\pi}{4k} \left\{ H_0(1/k) - N_0(1/k) \right\}$	1	$k^{-2} \ln^2 k$

Table 1. (Cont.)

$\frac{u_x}{u_\infty}$	Example	$e^{(0)}(z)$	β	Order of $\Delta(\sigma)$ When $k \rightarrow \infty$
4	Potential flow around a circular cylinder $u_x = 2 \frac{xy}{r^3}, r^2 = x^2 + y^2$ $-x < r < \sqrt{1-y^2}, -1 \leq y < 1$	$e^{(0)}(y) = \frac{2}{k^2} \exp\left(\frac{\sqrt{1-y^2}}{k}\right) \sum_{(n \geq 0)} \frac{B_n(y/k)}{n!} \Gamma(-2-n, 1/k)$ $e^{(0)}(0) = 1 - \frac{1}{k} - \frac{1}{k^2} e^{1/k} Ei(-1/k)$ $e^{(0)}(1) = 1 - \frac{1}{k} \left\{ \operatorname{ci} \frac{1}{k} \sin \frac{1}{k} - \operatorname{si} \frac{1}{k} \cos \frac{1}{k} \right\}$	2	k^{-2}
5	Potential flow around a plate $u = u_x - iu_y = -\frac{z}{\sqrt{1-z^2}}$ $z = x + iy$ $-\infty < x \leq 0, -1 \leq y \leq 1$	$e^{(0)}(y) = \frac{k}{y} \sin \frac{y}{k} e^{(0)}(0) + \sum_{n=1}^{\infty} \sum_{m=0}^{n-1} \frac{y^{2n}}{(2n+1)! k^{2n-m}} \frac{d^{2m}}{dz^{2m}} \frac{z}{\sqrt{1+z^2}} \Big _{z=0}$ $e^{(0)}(0) = \frac{\pi}{2k} \left\{ H_1(1/k) - N_1(1/k) \right\} - \frac{1}{k}$ $e^{(0)}(1) = -\frac{\pi}{2} \left\{ J_1(1/k) \cos \frac{1}{k} + N_1(1/k) \sin \frac{1}{k} \right\}$	2	k^{-2}
6	Kirchhoff flow around a plate, in the vicinity of the line of symmetry $u_x _{y=0} = \xi,$ $z = 0, \operatorname{Re} \left\{ \frac{\xi(\xi^2-3)}{(1-\xi^2)^2} + \frac{1}{2} \ln \frac{1-\xi}{1+\xi} \right\}$	$e^{(0)}(0) \approx \exp\left(\frac{0.048-0.140 \ln k}{k}\right) \left\{ \Gamma\left(1 - \frac{0.140}{k}, \frac{1.122}{k}\right) - \right.$ $\left. - \left(0.529 - \frac{0.207}{k}\right) \frac{1}{\sqrt{k}} \Gamma\left(0.5 - \frac{0.140}{k}, \frac{1.122}{k}\right) - \right.$ $\left. - \left(0.010 - \frac{0.044}{k}\right) \frac{1}{k} \Gamma\left(-\frac{0.140}{k}, \frac{1.122}{k}\right) \right\}$	0.5	k^{-1}

Notation: k - Stokes number; k_{kp} - critical Stokes number; Γ - the surface on which inertial particles settle; y - that part of the surface under study [EO]

TREATISE ON AEROLOGY OF THE ATMOSPHERIC BOUNDARY LAYER

Vorontsov, P. A. *Aerologicheskiye issledovaniya pogranichnogo sloya atmosfery (Aerological investigation of the boundary layer of the atmosphere.)* Leningrad, Gidro-meteoizdat. 1960, 451 p. L.C. Call no.: QC861.V65.

Field (expedition) investigations carried out by the Main Geophysical Observatory in several regions of the USSR [especially in the mountain-valley regions of Central Asia] formed the basis of the analyses of the structure of the atmospheric boundary layer presented in this very useful reference book. Detailed analyses are presented on the temperatures, wind, and humidity in the lower 500-km layer (results of studies of turbulence, vertical fluxes, and air-mass transformation), and the aerological conditions for fog formation. Data are also given on the structure of local winds. Chapter headings of this book are as follows.

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[ER]

POINT-SOURCE POLLUTANT DIFFUSION UNDER UNSTABLE CONDITIONS

Yordanov, D., and M. Kovacheva. Diffusion from a point source in the surface boundary layer of the atmosphere during unstable stratification. IN: Bolgarska akademiya na naukite. Doklady, v. 17, no. 10, 1964, 897-899. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 53473.)

The selection of the parameter of a profile described by a power function in solving the problem of the diffusion of pollutants in the atmosphere is analyzed by means of the Laykhtman method and the similarity theory of Obukhov and Monin. It is shown that when the source is at comparatively low heights, one can neglect the effect of the thermal sublayer; however, it is necessary to use a linear increase of the diffusion coefficient, and the power of the wind velocity is assumed to be 1/7. When sources are comparatively tall, however, one can neglect the effect of the dynamic sublayer and consider that the wind velocity is independent of height. The authors express the value of the latter through the scale of length in the similarity theory.

[EO]

PASSIVE POLLUTANT DIFFUSION UNDER FREE CONVECTION CONDITIONS

Yordanov, D., and M. Kovacheva. Diffusion of passive pollutants from a point source during free convection in the surface boundary layer of the atmosphere. IN: Bolgarska akademiya na naukite. Doklady, v. 17, no. 9, 809-812. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B472.)

Vertical diffusion of passive pollutants during free convection is considered. The horizontal distribution of the pollutants is assumed to be Gaussian. A solution was obtained for the case of total reflection from the ground surface and the point source. [EO]

TURBULENT EXCHANGE UNDER FREE CONVECTION CONDITIONS

Yordanov, D., and M. Kovacheva. The turbulent exchange coefficient during free convection. IN: Geofizichni institut, Bolgarska akademiya na naukite. Izvestiya, v. 5, no. 2, 1964, 17-21. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B422.)

This article is a continuation of an article by Yordanov (Izv. BAN, v. 16, no. 4, 1963). A method is presented for determining the horizontal exchange coefficient. For this purpose, the authors use the diffusion equation for a continuously acting ground source with height-dependent variable coefficients of vertical and horizontal exchange during free convection obtained in the preceding work

$$x(x, y, z) = A_1 \left[\frac{z^{m-n+1}}{(m-n+2)^2 A_1} + \frac{x^2}{4A_2} + \frac{y^2}{4A_3} \right]^{\frac{m-n+1}{2}}, \quad (1)$$

where

$$A_1 = \frac{Q}{4\pi(m-n+2)^{\frac{m-n+1}{2}} A_2^{\frac{m-n+1}{2}} A_3^{\frac{m-n+1}{2}}}$$

The exchange coefficients depend on height in accordance with the formulas

$$K_z = K_1 \left(\frac{z}{z_0} \right)^n, \quad K_x = K_2 \left(\frac{z}{z_0} \right)^m, \quad K_y = K_3 \left(\frac{z}{z_0} \right)^m,$$

here κ is the main concentration, n a constant characterizing stability, m an unknown constant, Q the output of the source, $z_0 = 1$ cm the height of the roughness, and K_1 , K_2 , and K_3 are constants. The method for determining the exchange coefficient is based on the idea that the total density of smoke particles along the x -axis is determined by the formula

$$\begin{aligned} \kappa(y, z) &= \int_{-\infty}^{\infty} \kappa(x, y, z) dx = \\ &= 2\sqrt{\pi} K^{1/2} A_2 \left(\frac{z^{m-n+2}}{(m-n+2)^2 K_1} + \frac{y^2}{4K_3} \right)^{\frac{m+n}{2(m-n+2)}} \times \\ &\quad \times \frac{\Gamma \left[\frac{m+n}{2(m-n+2)} \right]}{\Gamma \left[\frac{m+1}{m-n+2} \right]}, \end{aligned}$$

where Γ is the gamma function, and also on the assumption that the visible edge of a photographed dispersing cloud is a minimum-concentration isoline. The principle result of the work consists in the working formulas derived for $K(5, 6)$ and m when $K_x = K(z/z_0)^m$. A solution is obtained for a continuously acting point source in the presence of wind, based on solution of the diffusion equation for an instantaneous point source during free convection and $K_z = K(z/z_0)^n$ and $K_x = \text{const.}$, $K_y = \text{const.}$, which coincides completely with the solution obtained by Monin.

[EO]

CALCULATION OF THE RI NUMBER AND TURBULENCE PROBABILITY

Zavarina, M. V. On the accuracy of computation of the Richardson number and the probability of zones of increased turbulence. IN: Glavnaya geofizicheskaya observatoriya. Trudy, no. 161, 1964, 46-59. (TAKEN FROM: Referativnyy zhurnal. Geofizika, no. 5, 1965, 5B449.)

Errors in computing the Richardson number, depending on the accuracy of measurement of meteorological elements at different heights, and errors in calculating the probability for a number $Ri \leq 1$ determined essentially by inaccuracies in wind measurements, are discussed.

[EO]

THE ILI RIVER DAM AND RESERVOIR [KAZAKHSTAN]

Route to the mountains. Gudok, 1 April 1966, p. 3, cols. 6-7.

The new five-year plan of the Communist Party of the Soviet Union calls for implementation of work on the Ili River Dam north of Alma-Ata. Waters impounded behind the dam will form the Kapchagay Reservoir. Electricity generated by turbines at the dam will supply power to factories, transport, and agriculture.

[ER]

HYDROMETEOROLOGICAL CONFERENCES IN THE USSR

Meteorologiya i gidrologiya, no. 3, 1966, p. 67.

Young specialists at the Kazakh and Ukrainian Hydrometeorological Institutes held conferences in December 1965. The 21 papers delivered at the meeting at the Kazakh Institute dealt with problems of seley, synoptic meteorology and physics of the atmosphere, agricultural and medical meteorology, hydrology and climatology. At the conference at the Ukrainian Institute, 11 papers dealt with the theory of cloud formation, cloud and fog modification, water evaporation, etc. Of the 19 agrometeoro-

logical papers presented, 12 dealt with heat and moisture budgets. Eleven papers presented at the hydrology session dealt with problems of reservoir feeders, the formation and forecasting of flash floods, snow depths, etc.

[ER]

APPENDIX I

AVAILABLE TRANSLATIONS: CHEMICAL FACTORS

OXYGEN ISOTOPE EXCHANGE BETWEEN HEAVY OXYGEN WATER AND SOME TUNGSTATES. Spitsyn, V. I., and R. E. Aistova. Dok Ak Nauk SSSR, v. 104, 1955, 741-743. AEC IS-Trans-28

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APPENDIX II

AVAILABLE TRANSLATIONS: BIOLOGICAL FACTORS

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