GAVRILOV, N. I.

"The role of sanitary-hygienic measures in reducing the morbidity of workers and employees of the Podol'sk Mechanical Plant."

Report submitted at the 13th All-Union Congress of Hygienists, Epidemiologists and Infectionists. 1959

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Keeping records of morbidity with temporary disability at the M.I.Kalinin Machinery Plant in Podol'sk. Zdrav.Ros. Feder. 3 no.6:8-11 Je '59. (MIRA 12:6)
(PODOL'SK--INDUSTRIAL HYGIENE)

GAVRILOV, N.I.

Third Plenum of the Council on Medical and Prophylactic Assistance. Zdrav.Ros.Feder. 4 no.1:42-44 Ja '60. (MIRA 13:5)
(PUBLIC HEALTH)

GAVRILOV, M.I.

Registration of mistakes in medical diagnosis and disability evaluation at medical and prophylactic establishments. Vrach. delo no.2:181-183 F '60. (MIRA 13:6)

1. Mediko-sanitarnaya chast' Podol'skogo mekhanicheskogo zavoda imeni M.I. Kalinina.

(MEDICAL RECORDS)

GAVRILOV, N.I.

Utilization of latent factors in ambulatory polyclinic service for the population. Sov.med. 25 no.8:124-128 Ag '60. (MIRA 13:9)

1. Nachal'nik otdela meditsinskogo obslushivaniya gorodskogo naseleniya i rabochikh promyshlennykh predpriyatiy Ministerstva zdravookhraneniya RSFSR.

(PUBLIC HEALTH)

GAVRILOV, N.I., kand.ekonom.nauk

In friendly Guinea. Priroda 50 no.7:73-80 Jl '60. (MIRA 14:6)

1. Institut Afriki AN SSSR (Moskva).
(Guinea—Description and travel)

GAVRILOV, N.I.

In the Collegium of the Ministry of Public Health of the R.S.F.S.R.
Zdrav. Ros. Feder. 5 no. 2:43-44 F '61. (MIRA 14:2)
(LENINGRAD—PUBLIC HEALTH)

GAVRILOV, N.I.

"Organization and method of studying disease incidence among industrial workers" by V.A.Mozgliakova. Reviewed by N.I.Gavrilov. Zdrav. Ros. Feder. 5 no.6:40-41 Je '61. (MIRA 14:6)
(INDUSTRIAL HYGIENE) (DISEASES--REPORTING)
(MOZGLIAKOVA, V.A.)

GAVRILOV, N.I.

Some problems in the work of local organs of the public health system. Zdrav. Kos. Feder. 5 no.7:3-8 Jl '61. (MIRA 14:7)
(PUBLIC HEALTH)

GAVRILOV, N.I.

"Problems of therapy and prophylaxis in the village." Zdrav. Ros. Feder. 5 no.11:44-45 N '61. (MIRA 14:10)
(KALININ PROVINCE--PUBLIC HEALTH, RURAL)

GAVRILOV, N.I.

"For the worker's health." Reviewed by N.I.Gavrilov. Zdrav. Ros. Feder. 5 no.10:36-37 O '61. (MIRA 14:10)
(INDUSTRIAL HYGIENE)

GAVRILOV, N.I., kand.med.nauk (Moskva)

Measures for the further improvement of organized forms of medical service for the urban population. Sov. zdrav. 21 no.5:13-17 '62. (MIRA 15:5)

1. Iz otdela organizatsii zdravookhraneniya Instituta gigiyeny imeni F.F.Erismana (dir. A.P.Shitskova).
(PUBLIC HEALTH)

GAVRILOV, N.I., kand.med.nauk

Role of the medical nurse as regards different organizational forms of registration in ambulant polyclinical institutions. Med.sestra 21 no.10:33-36 O '62. (MIRA 16:4)

1. Iz otdela organizatsii zdravookhraneniya Moskovskogo nauchno-issledovatel'skogo instituta gigiyeny imeni F.F.Erismana. (CLINICS)

ZAKHAROV, Fedor Galaktionovich; GAVRILOV, N.I., red.; MATVEYEVA, M.M., tekhn. red.

[Medical care for workers of industrial enterprises] Meditsinskoe obsluzhivanie trudiashchikhsia promyshlennykh predpriiatii. Moskva, Medgiz, 1963. 233 p. (MIRA 16:5)
(LABOR AND LABORING CLASSES—MEDICAL CARE)

GAVRILOV, N. I.

"Concerning the Real Zeros of Analytical Functions." Thesis for degree of Cand. Physicomathematical Sci. Sub 1 Dec 49, State Astronomical Inst imeni P. K. Shternberg, Moscow Order of Lenin State U imeni M. V. Lomonosov.

Summary 82, 18 Dec 52, Dissertations Presented for Degrees in Science and Engineering in Moscow in 1949. From Vechernyaya Moskva. Jan-Dec 1949.

USSR/Mathematics - Stability of Lia- 21 May 52
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"Liapounoff Stability of Systems of Linear Differential Equations," N. I. Gavrilov, Odessa State U imeni I. I. Mechnikov

"Dok Ak Nauk SSSR" Vol LXXIV, No 3, pp 425-428

Considers the familiar system $dx_i/dt = P_{ik}(t)x_k$ (k-summed from 1 to n; i=1,2,..,n) where p are continuous (in general, complex) functions of a real variable t. Establishes an effective sufficient criterion for the Liapounoff stability of

225T45

the soln ($x_i=0$) of this system; this criterion discloses the stability for both pos characteristic number and also characteristic numbers equal to zero and corroborates certain results of Wintner, Weyl, V. A. Yakubovich, V. V. Stepanov, V. V. Khoroshilov, I. M. Rapoport, K. P. Persidskiy, B. P. Demidovich, and V. P. Basov. Submitted by Acad I. G. Petrovskiy 27 Mar 52.

225T45

GAVRILOV, N. I.

GAVRILOV, N. I.

USSR/Mathematics - Stability 1 Jun 52

"A Method in the Theory of Stability According to Liapounoff," N. I. Gavrilov, Odessa State U imeni I. I. Mechnikov

"Dok Ak Nauk SSSR" Vol 84, No 4, pp 657-660

Considers the usual system $dx_i/dt = P_{ik}(t)x_k$ (k-summed; $i = 1,2,\ldots n$), where $P_{ik}(t)$ are continuous complex functions of a real variable t. Discusses the method of generalized characteristic eq and the criterion of Persidskiy (I.

232T87

Persidskiy, "Iz Kazan Fiz-Matemat Obshch" 11, 1936). Submitted by Acad I. G. Petrovskiy 27 Mar 52.

232T87

GAVRILOV, N. I.

"A New Method of Investigating Nonlinear Differential Equations Which is Based on the Theory of Moments." Dr Phys-Math Sci, Inst of Mathematics, Acad Sci Ukrainian SSR, Kiev, 1954. (RZhMat, Jan 55)

Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (12)
SO: Sum. No. 556, 24 Jun 55

Gavrilov, N.I.

Transactions of the Third All-union Mathematical Congress (Cont.) Call Nr: AF 1108825
Jun-Jul '56, Trudy '56, V. 1, Sect. Rpts., Izdatel'stvo AN SSSR, Moscow, 1956, 237 pp.

Gabib-Zade, A. Sh. (Baku). Investigation of the Ramification Points of Non-linear Loaded Integral Equations With Various Parameters. 44-45

Gavrilov, N. I. (Odessa). New Method Based on the Theory of Moments, for Investigating Non-linear Differential Equations. 45-46

Gagua, M. B. (Tbilisi). On the Completeness of Systems of Harmonic Functions 46

Mention is made of Keldysh, M. V.

Gal'pern, S. A. (Moscow). Cauchy Problem for the Equations of S. L. Sobolev Type 47-48

There is mention of Petrovskiy, I. G.

There are 4 references, all of them USSR.

Gakhov, F. D. (Rostov-na-Donu). Chibrikova, L. I. (Kazan').
Card 15/80 "Some Types of Singular Integral Equations Solvable in Closed Form." 48-49

GAVRILOV, N. I

SUBJECT USSR/MATHEMATICS/Differential equations CARD 1/1 PG - 732
AUTHOR GAVRILOV N.I.
TITLE On the stability in the sense of Ljapunov for the existence of vanishing characteristic numbers.
PERIODICAL Mat.Sbornik,n.Ser. 41, 1, 7-22 (1957)
reviewed 5/1957

The present paper contains the proofs for the theorems which have been announced in earlier papers of the author (Doklady Akad.Nauk 84, 425-428 (1952); Doklady Akad.Nauk 84, 657-660 (1952)).

INSTITUTION: Odessa.

LEBEDEV, S.I., prof., doktor biolog.nauk, otv.red.; KOVBASYUK, S.M., dotsent, kand.istor.nauk, red.; PAZYUK, L.I., dotsent, kand.geologo-mineral. nauk, red.; KIRILLOV, Ye.A., prof., doktor fiziko-matemat.nauk, zasluzhennyy deyatel' nauki USSR, red.; TSESEVICH, V.P., prof., doktor fiziko-matemat.nauk, red.; LEONOV, I.G., dotsent, kand.istor. nauk, red.; VOROB'YEV, A.I., prof., doktor biolog.nauk, red.; GAVRILOV, N.I., prof., doktor fiziko-matemat.nauk, red.; MOROZOV, A.A., prof., doktor khim.nauk, red.; DANILENKO, K.Ye., dotsent, kand.filolog.nauk, red.; MIGAL', K.G., dotsent, kand.istor.nauk, red.; SMIRNOV, A.M., dotsent, kand.geograf.nauk, red.; BABICH, N.M., tekhn.red.

[Scientific yearbook for 1956] Nauchnyi ezhegodnik 1956 g. Odessa, 1957. 388 p. (MIRA 12:4)

1. Odessa. Universitet. 2. Deystvitel'nyy chlen Ukrainskoy Akademii sel'skokhoz.nauk, zaveduyushchiy kafedroy fiziologii rasteniy Odesskogo gosudarstvennogo universiteta im. I.I.Mechnikova (for Lebedev). 3. Zaveduyushchiy kafedroy istorii Ukrainskoy SSR Odesskogo gosudarstvennogo universiteta im. I.I.Mechnikova (for Kovbasyuk). 4. Zaveduyushchiy

(Continued on next card)

GAVRILOV, N.I.

PHASE I BOOK EXPLOITATION

Filosofskiye voprosy yestestvoznaniya, [illegible] filosofsko-teoreticheskiye voprosy [illegible] (Philosophic Problems of Natural [illegible] II: Philosophic and Theoretical [illegible] and Chemistry) [Moscow] Izd-vo [illegible] Errata slip inserted. 6,000 copies [illegible]

Editorial Board: K.A. Rybnikov, [illegible] Nis.: R.A. Aronov, and A.A. [illegible]

PURPOSE: This book is intended for [illegible] and philosophy of mathematics, physics, [illegible]

COVERAGE: This is a second collection of [illegible] of the Department of Dialectical [illegible] University. The first collection [illegible] problems of the biological [illegible] The present collection consists of 14 articles [illegible] physics, mathematics, and chemistry [illegible] the 50th anniversary of Lenin's book "Materialism and Empiriocriticism." The ideas are developed [illegible] materialism. Some of the articles [illegible] dical press. No personalities are mentioned. [illegible]

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AVAILABLE: Library of Congress (QH302.F5)

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GAVRILOV, N.I., prof., otv. red.; SHAFIROVICH, M.D., tekhn. red.

[Scientific yearbook of Odessa University] Nauchnyi ezhegodnik. Odessa. No.2.[Faculty of Physics and Mathematics and the Research Institute of Physics] Fiziko-matematicheskii fakul'tet i Nauchno-issledovatel'skii institut fiziki. 1961 197 p. (MIRA 16:10)
1. Odessa. Universytet.
(Odessa--Physics--Research)
(Odessa--Mathematics--Research)

GAVRILOV, N.I. [Havrylov, M.I.]

New method for investigating nonlinear differential equations based on the theory of moments. Dop.AN URSR no.4:429-433 '61.
(MIRA 14:6)

1. Odesskiy gosudarstvennyy universitet. Predstavleno akademikom AN USSR I.Z. Shtokalo.
(Differential equations)

GAVRILOV, N.I. [Havrylov, M.I.]

Moment method in the theory of nonlinear differential equations. Dop.AN URSR no.6:708-712 '61. (MIRA 14:6)

1. Odesskiy gosudarstvennyy universitet. Predstavleno akademikom AN USSR I. Z. Shtokalo.
(Differential equations)

GAVRILOV, N.I. [Havrylov, M.I.]

Method of moments in the theory of nonlinear differential equations. Dop. AN URSR no.8:1007-1012 '61. (MIRA 14:9)

1. Odesskiy gosudarstvennyy universitet. Predstavleno akademikom AN USSR I.Z. Shtokalo.
(Differential equations)

GAVRILOV, N.I.; AKIMOVA, L.N.; KHLUDOVA, M.S.

Amidine derivatives of aminoacyldioxopiperazines. Coll Cz Chem 27 no.9:2250 S '62.

1. Moscow State University, U.S.S.R. (for Gavrilov and Akimova).

L 2794-65 EWT(m)/T/EWP(t)/EWP(b)/EWA(c) JD

ACCESSION NR: AT5018033 UR/9031/63/000/002/0099/0103

AUTHOR: Baukin, I. S.; Gavrilov, N. I.; Kolomiets, B. T.

TITLE: Production of equilibrium solid solutions by slow crystallization of the

SOURCE: Baku. Azerbaydzhanskiy gosudarstvennyy universitet. Uchenyye zapiski. Seriya fiziko-matematicheskikh nauk, no. 2, 1963, 99-103

TOPIC TAGS: solid solution, phase equilibrium, crystallization, crystal growth, x-ray diffraction analysis

ABSTRACT: The article describes the equipment which was developed for the production of equilibrium solid solutions by slow crystallization from the melt. The equipment is applicable even for those compounds which undergo decomposition during [illegible]. The measuring apparatus of the [illegible] obtain high constancy of the phase diagram of the investigated alloys by removing the heating or [illegible] during slow crystallization the growing crystals are most of the [illegible] temperature which exceeds the [illegible] are in contact with the melt, in which the rate of diffusion is much greater than in the solid. Under

Card 1/1

these conditions the equilibrium between the solid and the liquid phase establishes much more rapidly than during annealing of the solid alloy. Thus, using a reason-

substance (A_{std}) and thermocouples were mounted on the furnace cover (K) (Fig. 1 of the Enclosure). To produce a more uniform temperature in the cavity of the furnace, a nickel cylinder (L) was placed inside the cavity. The article describes the cir-

polycrystalline and

indicated that they

L 62784-65
ACCESSION NR: AT5018033

2

consist of two phases. "The authors express their gratitude to V. I. Ivanov-Omskiy for a number of valuable suggestions." Orig. art. has: 4 figures.

ASSOCIATION: Azerbaydzhanskiy gosudarstvennyy universitet (Azerbaydzhan State

SUBMITTED: 00 ENCL: 01 SUB CODE: MM

OTHER:

Card 3/4

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ACCESSION NR: AT5018033

ENCLOSURE 01

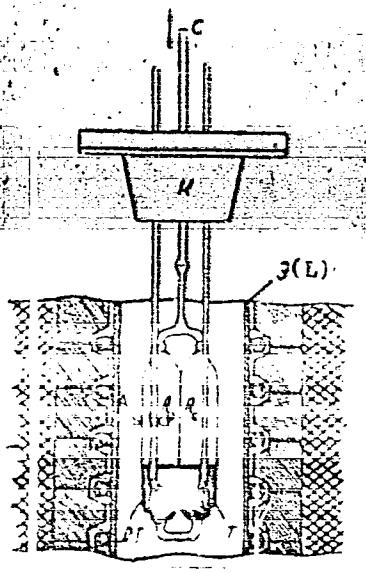


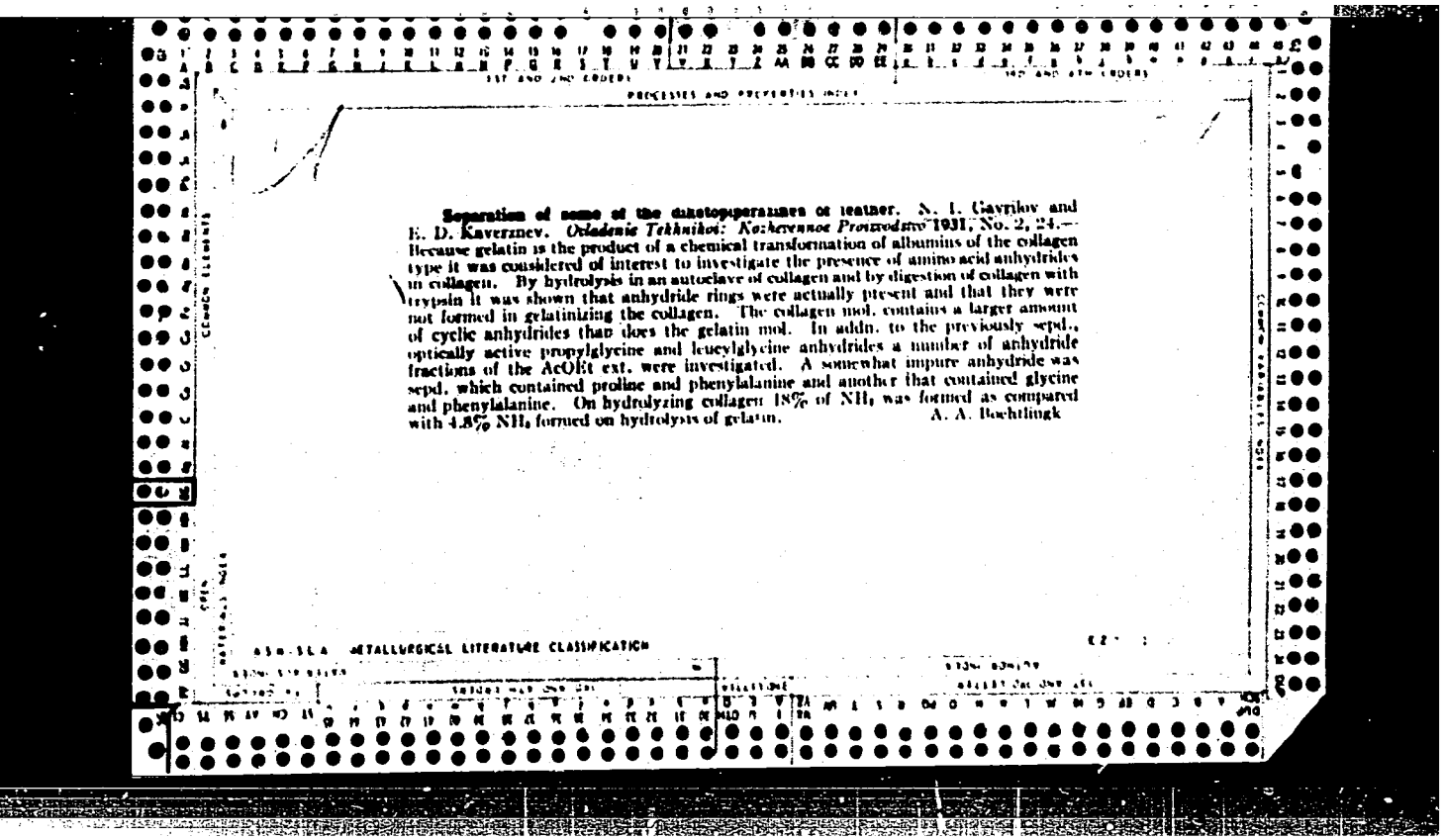
Fig. 1. Placement of ampules and thermocouples in the cavity of the furnace.
A--ampule with unknown; A std -- ampule with standard material; [illegible] thermocouple; [illegible] thermocouple; L--[illegible] K--cover; [illegible] to conduct oscillations to the ampules.

Card 4/4

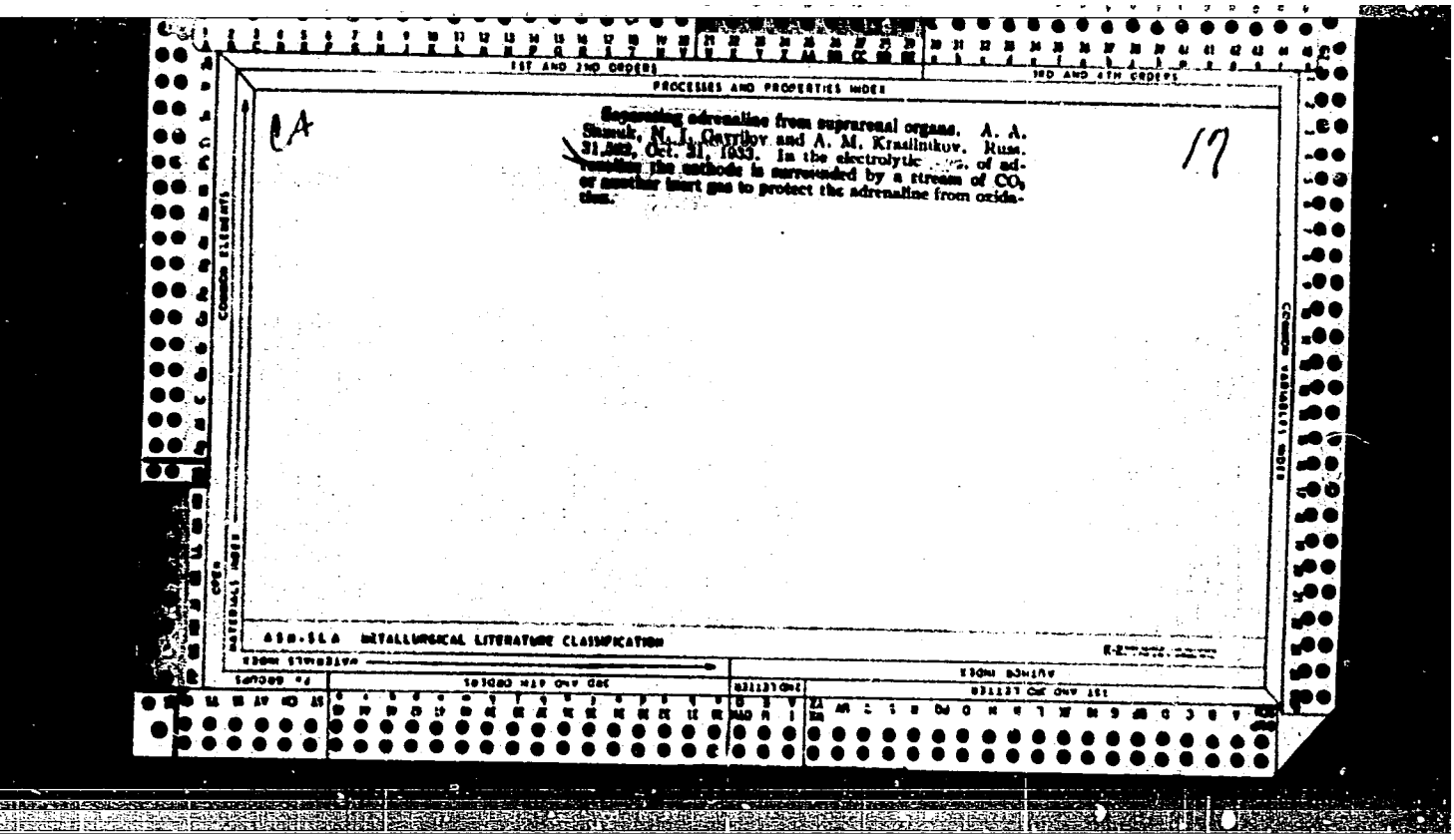
PROCESSES AND PROPERTIES INDEX

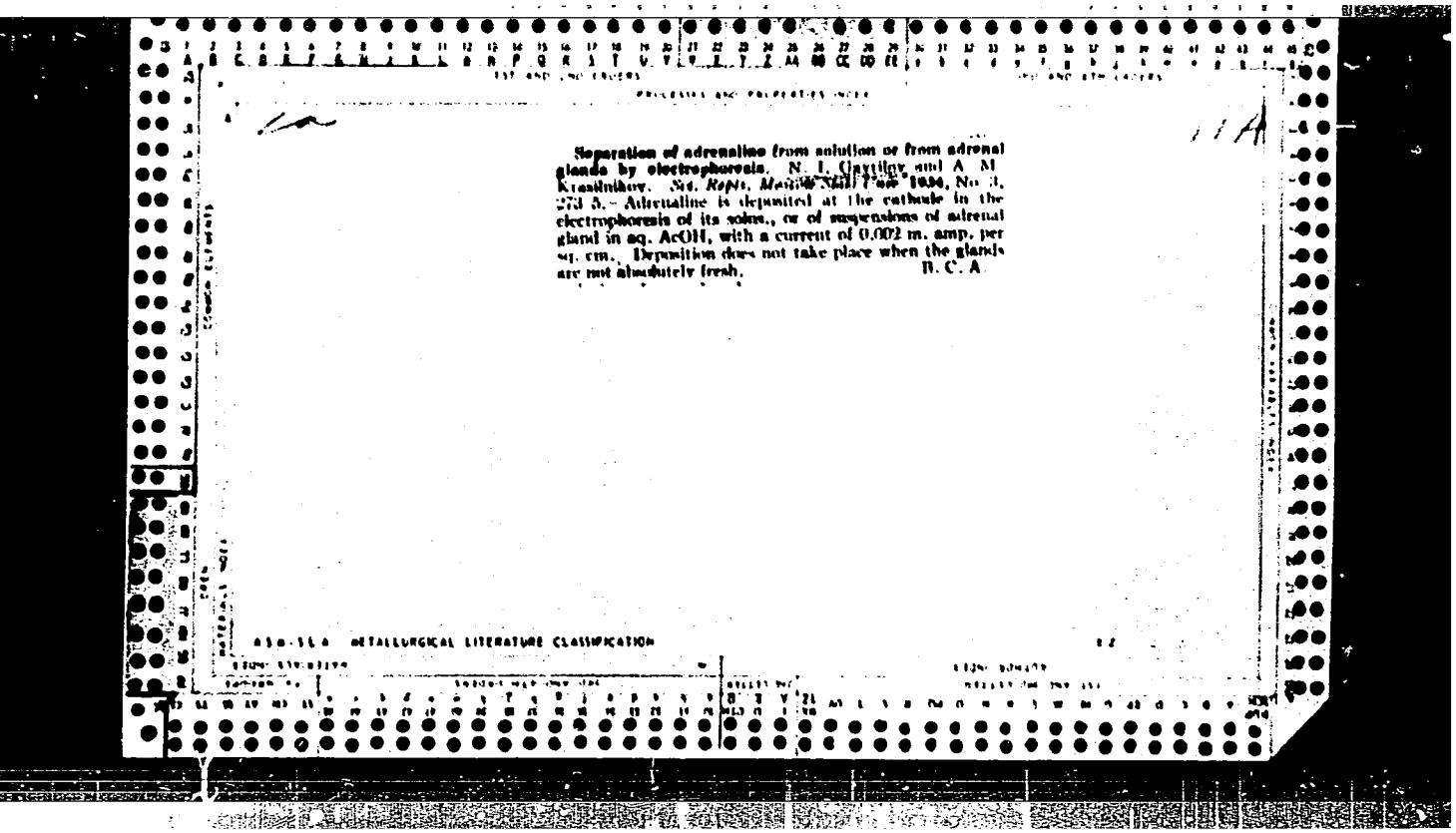
Change in the isoelectric point of collagen under the action of trypsin. N. I. Gavrilov and A. M. Suu-kaya. *Otladenie Tekhnikei: Kozhevennoe Proizvodstvo* 1931, No. 2, 23-4.—The object was to study the reactions that take place in leather under the influence of the enzyme during bating. The albumin mols. of the collagen may be converted from keto to the enol form and the latter may exist in two isomers: the α, which may be obtained by the transition of the unstable H from the N, and the β, which utilizes the unstable H of the adjacent C. Both enols have acidic functions. This explains the formation of the enol form from the neutral keto form, which must be accompanied by an increase in the acidity of the whole compd., *i. e.*, by a shift of the isoelec. point in the direction of acid. It was assumed that the isomerization of the peptide bond in the collagen from the keto to the enol form takes place under the influence of trypsin. The middle layer of a hide, consisting of almost pure collagen, was ground to powder. Detns. were made of the isoelec. point of the unlimed powder and of the powder after treatment with trypsin, oropon and water at p_H 7.8 8.1 and 8°. For the isoelec. point was selected a concn. of H ions at which the content of the Ca in collagen is lowest. The isoelec. point of collagen changed under the influence of trypsin in the acid direction from p_H 4.84 to p_H 3.7 and under the influence of oropon to p_H 3.4-4.2, depending upon the duration of bating. A. A. Bochtlingk

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

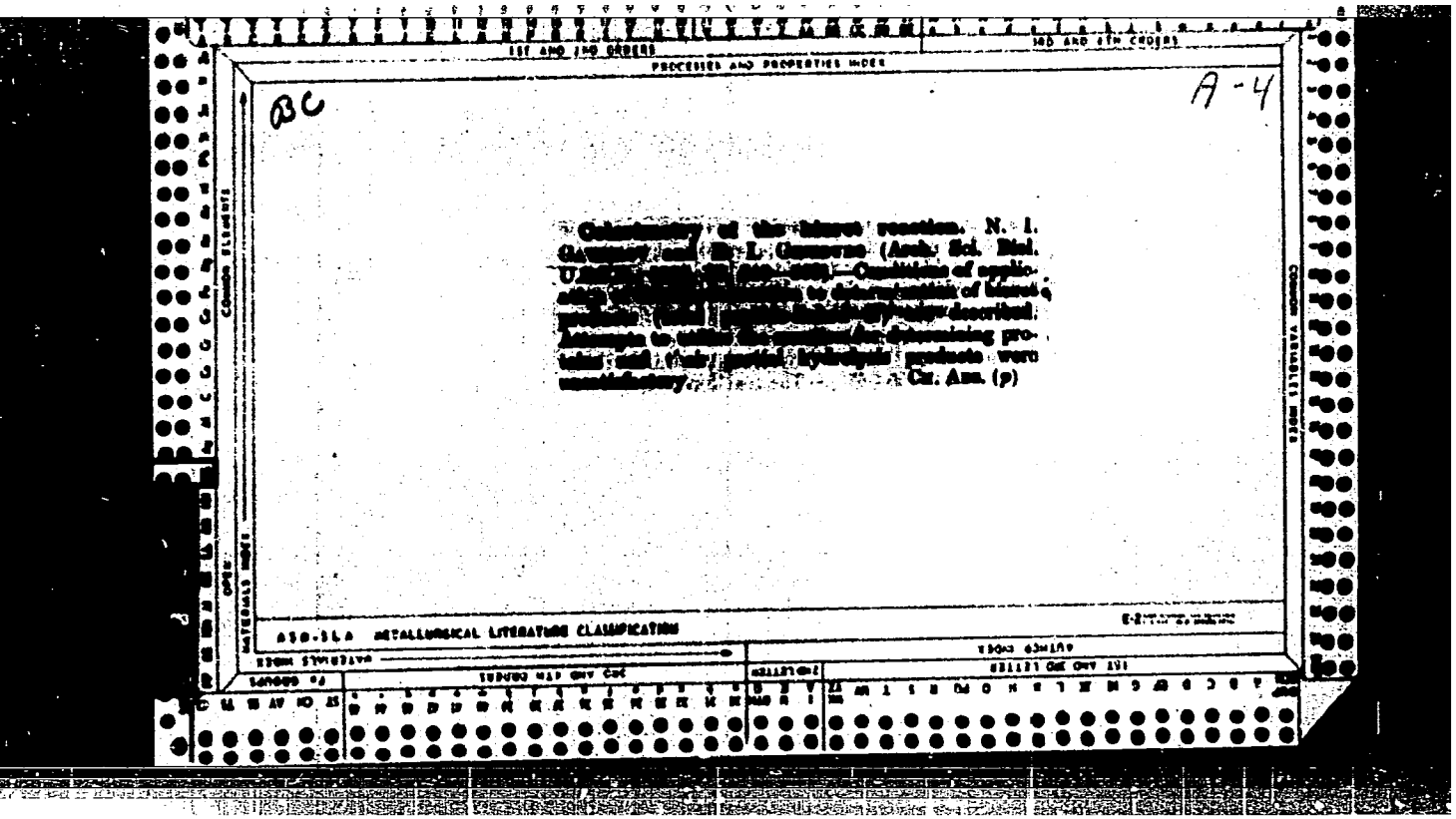


Separation of some of the diaminocarboxylic acids of leather. N. I. Gavrilov and E. D. Kaverznev. *Otdelenie Tekhnikoi: Kozhevennoe Proizvodstvo* 1931, No. 2, 24.—Because gelatin is the product of a chemical transformation of albumins of the collagen type it was considered of interest to investigate the presence of amino acid anhydrides in collagen. By hydrolysis in an autoclave of collagen and by digestion of collagen with trypsin it was shown that anhydride rings were actually present and that they were not formed in gelatinizing the collagen. The collagen mol. contains a larger amount of cyclic anhydrides than does the gelatin mol. In addn. to the previously sepd., optically active propylglycine and leucylglycine anhydrides a number of anhydride fractions of the AcOEt ext. were investigated. A somewhat impure anhydride was sepd. which contained proline and phenylalanine and another that contained glycine and phenylalanine. On hydrolyzing collagen 18% of NH_3 was formed as compared with 4.8% NH_3 formed on hydrolysis of gelatin. A. A. Bochtlingk





Separation of adrenaline from solution or from adrenal glands by electrophoresis. N. I. Gayttiny and A. M. Krasilnikov. *Sci. Repts. Moscow State Univ.* 1934, No. 3, 273-5.—Adrenaline is deposited at the cathode in the electrophoresis of its solns., or of suspensions of adrenal gland in aq. AcOH, with a current of 0.002 m. amp. per sq. cm. Deposition does not take place when the glands are not absolutely fresh. B. C. A



1A

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The chemical structure of wool keratine. I. Fractionation of keratine. C. Stakheeva-Kaverzneva and N. I. Gavrilov. *Bull. soc. chim.* [5], 4, 647-64; *Biokhimiya* 2, 19-27(1937).—Wool of 30-40 μ thickness was immersed for 24-48 hrs. in a 0.1% soda soln. A mixt. of toluene and pancreatin activated by enterokinase was added and digestion at 35-37° was continued for 8-23 days, the soln. being renewed every 3-6 days. The keratin was thus sepd. into 2 fractions, (1) the stable keratin of the cells which forms about 90% of the wool. It contains a higher percentage of N, S, arginine and cystine than wool; and (2) the intercellular substance which represents about 10% of the wool. This is disintegrated by pancreatin and is therefore not a typical keratin. It contains less N and S than wool and lacks the stability of keratine towards trypsin. Its compn. is characterized by a low content of diamino acids and a high content of monoamino acids. Bibliography. M. M. Flannery

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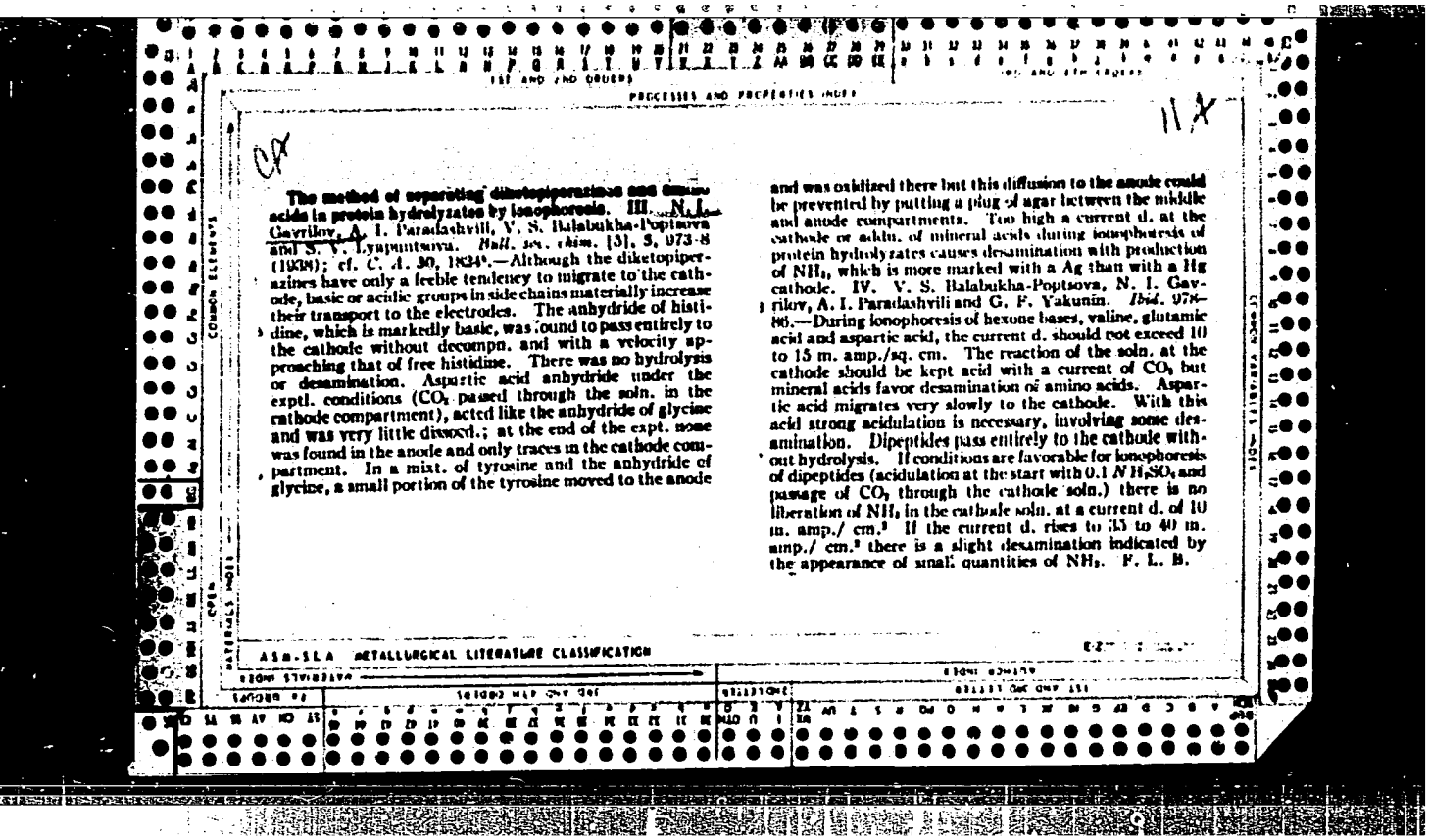


PROCESSES AND PROPERTIES INDEX

11A

CA

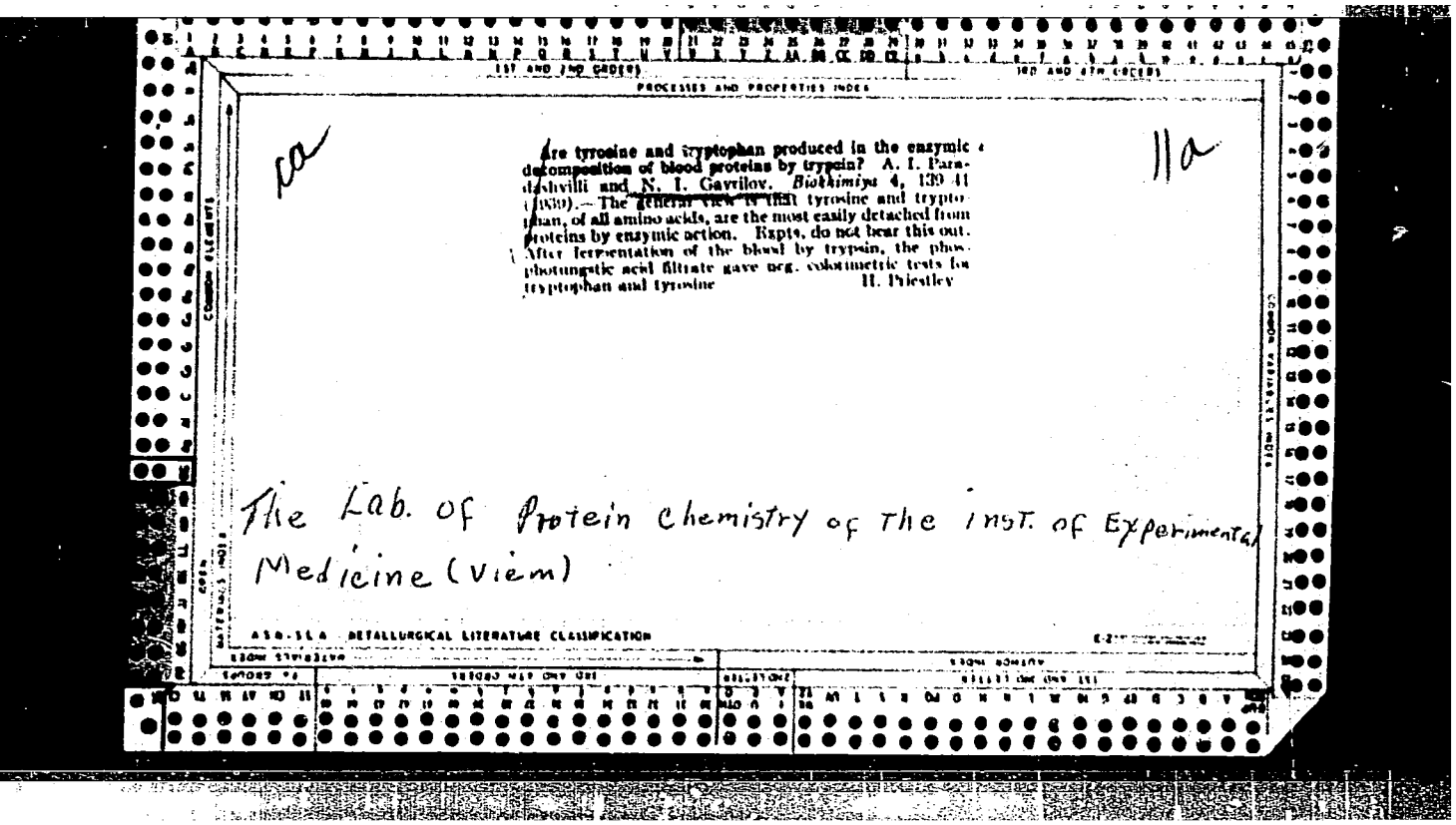
The method of separating diketopiperazines and amino acids in protein hydrolyzates by ionophoresis. III. N. I. Gavrilov, A. I. Paradashvili, V. S. Balabukha-Poptsova and S. V. Lyapuntsova. *Bull. soc. chim.* [5], 5, 973-8 (1938); cf. *C. A.* 30, 1824⁹.—Although the diketopiperazines have only a feeble tendency to migrate to the cathode, basic or acidic groups in side chains materially increase their transport to the electrodes. The anhydride of histidine, which is markedly basic, was found to pass entirely to the cathode without decompn. and with a velocity approaching that of free histidine. There was no hydrolysis or desamination. Aspartic acid anhydride under the exptl. conditions (CO_2 passed through the soln. in the cathode compartment), acted like the anhydride of glycine and was very little dissocd.; at the end of the expt. none was found in the anode and only traces in the cathode compartment. In a mixt. of tyrosine and the anhydride of glycine, a small portion of the tyrosine moved to the anode and was oxidized there but this diffusion to the anode could be prevented by putting a plug of agar between the middle and anode compartments. Too high a current d. at the cathode or addn. of mineral acids during ionophoresis of protein hydrolyzates causes desamination with production of NH_3, which is more marked with a Ag than with a Hg cathode. IV. V. S. Balabukha-Poptsova, N. I. Gavrilov, A. I. Paradashvili and G. F. Yakunin. *Ibid.* 978-86.—During ionophoresis of hexone bases, valine, glutamic acid and aspartic acid, the current d. should not exceed 10 to 15 m. amp./sq. cm. The reaction of the soln. at the cathode should be kept acid with a current of CO_2 but mineral acids favor desamination of amino acids. Aspartic acid migrates very slowly to the cathode. With this acid strong acidulation is necessary, involving some desamination. Dipeptides pass entirely to the cathode without hydrolysis. If conditions are favorable for ionophoresis of dipeptides (acidulation at the start with 0.1 *N* H_2SO_4 and passage of CO_2 through the cathode soln.) there is no liberation of NH_3 in the cathode soln. at a current d. of 10 m. amp./ cm.² If the current d. rises to 35 to 40 m. amp./ cm.² there is a slight desamination indicated by the appearance of small quantities of NH_3. F. L. B.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

GAVRILOV, N. I.

"Etude de la possibilite d'une determination quantative des formes cycliques des anhydrides d'aminoacides d'apres la methode de Blanchetier." Gavrilov, N. I. (p. 809)

SO: Journal of General Chemistry (Zhurnal Obshchei Khimii) 1938, Volume 8, No. 9



PROCESSES AND PROPERTIES INDEX

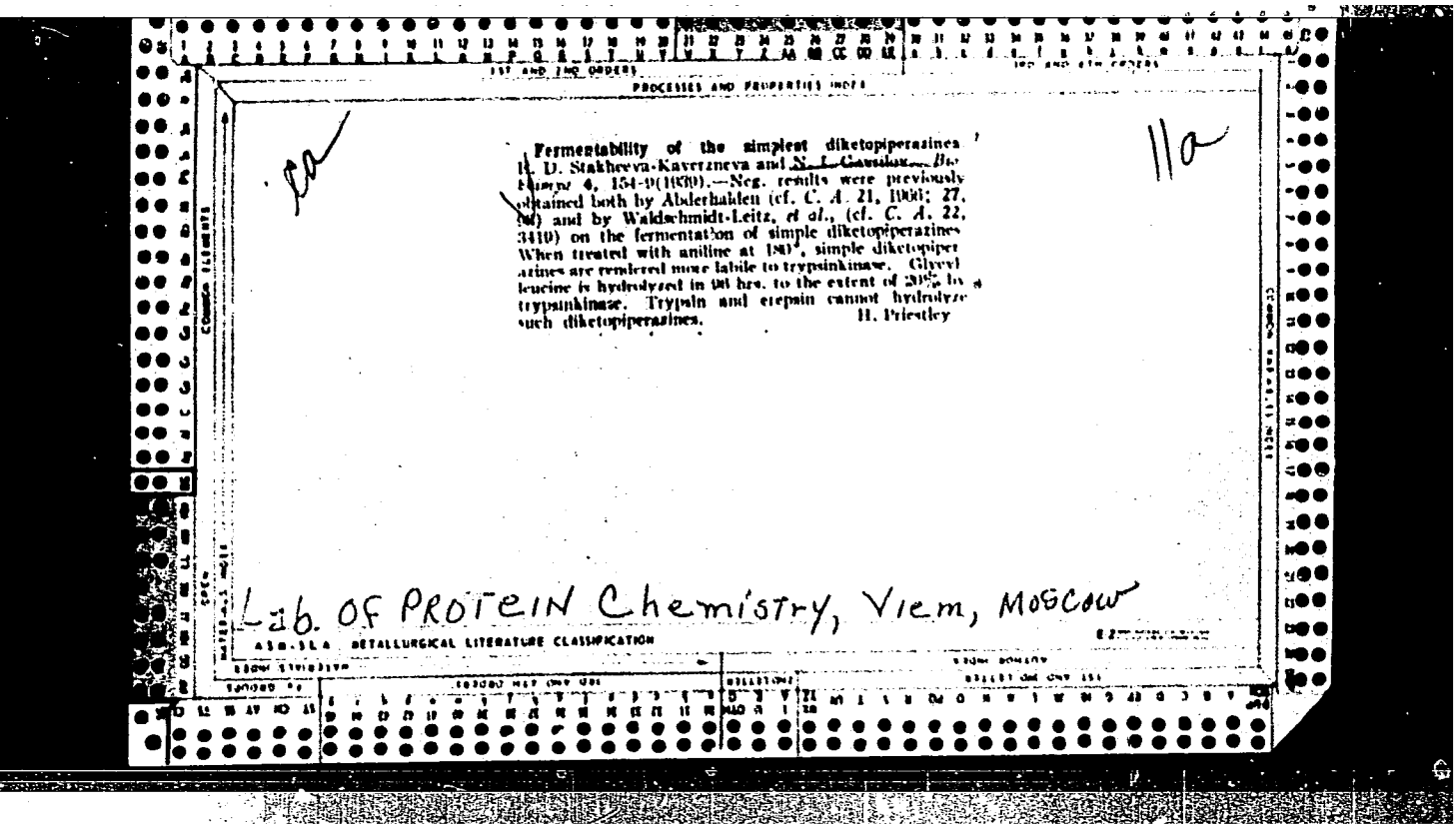
10a

11a

Are tyrosine and tryptophan produced in the enzymic decomposition of blood proteins by trypsin? A. I. Paradashvili and N. I. Gavrilov. *Biokhimiya* 4, 139-41 (1939).—The general view is that tyrosine and tryptophan, of all amino acids, are the most easily detached from proteins by enzymic action. Expts. do not bear this out. After fermentation of the blood by trypsin, the phosphotungstic acid filtrate gave neg. colorimetric tests for tryptophan and tyrosine H. Priestley

The Lab. of Protein Chemistry of the Inst. of Experimental Medicine (viem)

A56-51A METALLURGICAL LITERATURE CLASSIFICATION

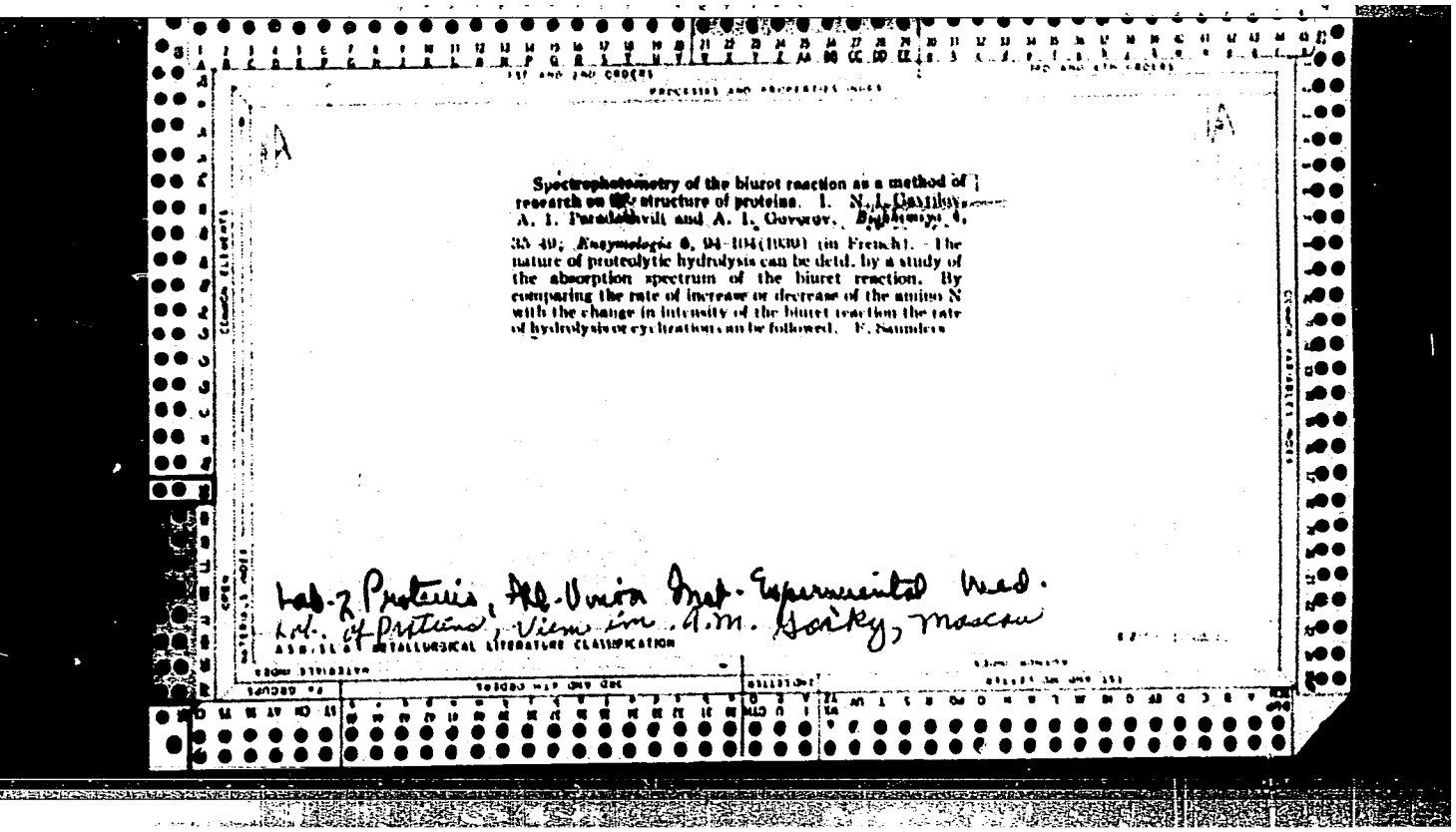


PROCESSES AND PROPERTIES INDEX

Fermentability of the simplest diketopiperazines. [illegible] D. Stakheeva-Kaverzneva and N. I. Gaurilov. *Biokhimiya* 4, 154-9(1939).—Neg. results were previously obtained both by Abderhalden (cf. *C. A.* 21, 1008; 27, 9d) and by Waldschmidt-Leitz, *et al.*, (cf. *C. A.* 22, 3410) on the fermentation of simple diketopiperazines. When treated with aniline at 180°, simple diketopiperazines are rendered more labile to trypsinkinase. Glycyl-leucine is hydrolyzed in 96 hrs. to the extent of 20% by trypsinkinase. Trypsin and erepsin cannot hydrolyze such diketopiperazines. H. Priestley

Lab. of PROTEIN Chemistry, Viem, Moscow

A58-31A METALLURGICAL LITERATURE CLASSIFICATION



Spectrophotometry of the biuret reaction as a method of research on the structure of proteins. I. N. I. Gavrilov, A. I. Paradakhvili and A. I. Gorovov. *Biokhimiya*, 4, 35-40; *Enzymologia* 6, 94-104(1939) (in French). - The nature of proteolytic hydrolysis can be detd. by a study of the absorption spectrum of the biuret reaction. By comparing the rate of increase or decrease of the amino N with the change in intensity of the biuret reaction the rate of hydrolysis or cyclization can be followed. F. Saunders

Lab. Proteins, All-Union Inst. Experimental Med.
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ASSIGNMENT METALLURGICAL LITERATURE CLASSIFICATION

GAVRILOV, N. I.

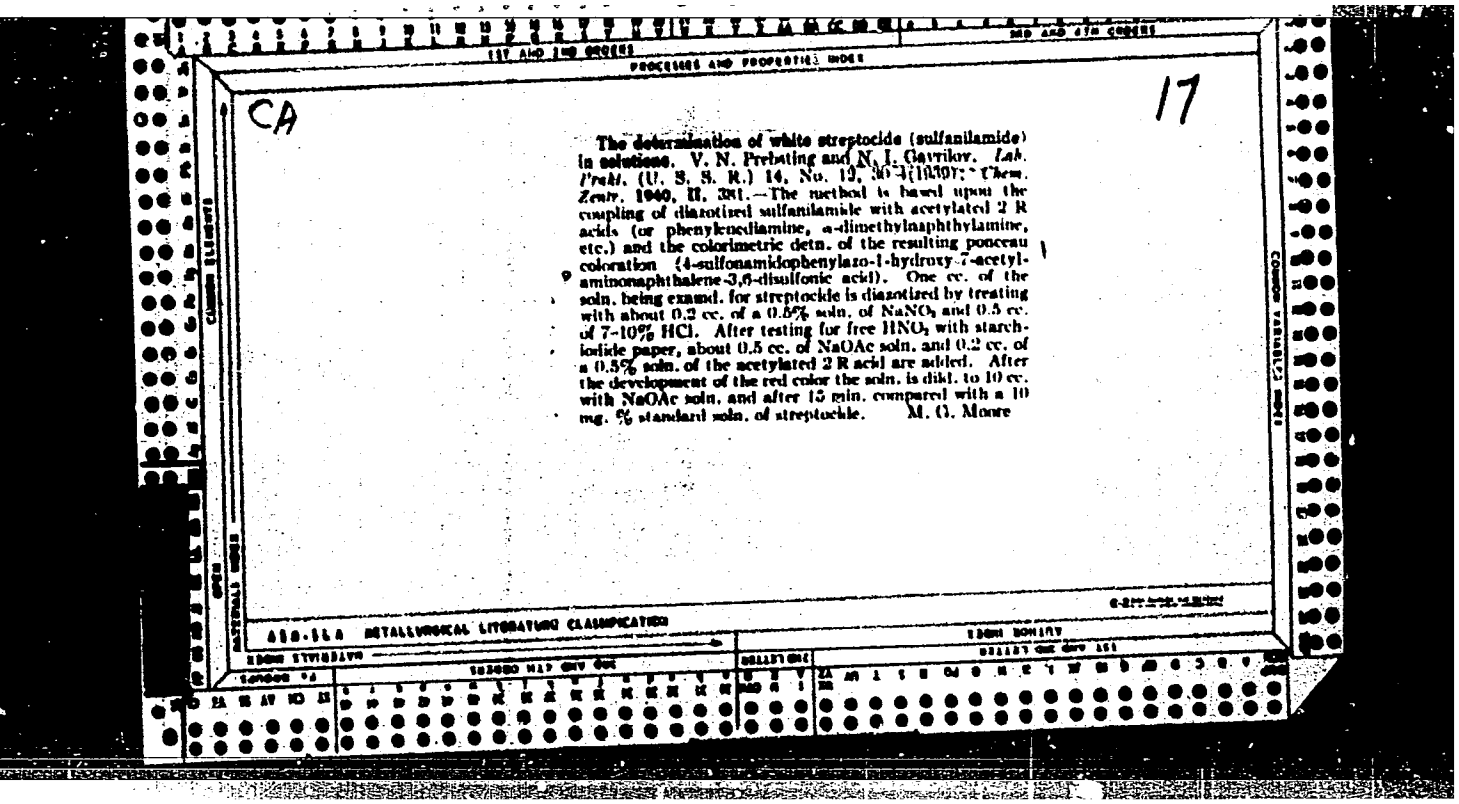
PROCESSES AND PROPERTIES INDEX

BC

A-3

Reduction of certain amides and substituted amides. I. Electroreduction of cyclopeptide and open [illegible]. N. I. GAVRILOV and A. V. K[illegible] (J. Gen. Chem. Russ., [illegible], [illegible], 1594—1601).—The CO group of amides of aromatic acids readily undergoes electroreduction. For the amides R·CO·NHR' or R·CO·NR'[illegible] reduction is possible when R = [illegible] and R' is H or Ph, but not when R contains [illegible]. The CO group of peptides does not, but that of [illegible] do, undergo reduction at a Pb cathode. R. T.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



CA

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The determination of white streptocide (sulfanilamide) in solutions. V. N. Prebating and N. I. Gavrilov. *Lab. Prakt.* (U. S. S. R.) 14, No. 12, 30-4(1940); *Chem. Zentr.* 1940, II, 381.—The method is based upon the coupling of diazotized sulfanilamide with acetylated 2 R acids (or phenylenediamine, α-dimethylnaphthylamine, etc.) and the colorimetric detn. of the resulting ponceau coloration (4-sulfonamidophenylazo-1-hydroxy-7-acetylaminonaphthalene-3,6-disulfonic acid). One cc. of the soln. being examd. for streptocide is diazotized by treating with about 0.2 cc. of a 0.5% soln. of $NaNO_2$ and 0.5 cc. of 7–10% HCl. After testing for free HNO_2 with starch-iodide paper, about 0.5 cc. of NaOAc soln. and 0.2 cc. of a 0.5% soln. of the acetylated 2 R acid are added. After the development of the red color the soln. is dild. to 10 cc. with NaOAc soln. and after 15 min. compared with a 10 mg. % standard soln. of streptocide. M. O. Moore

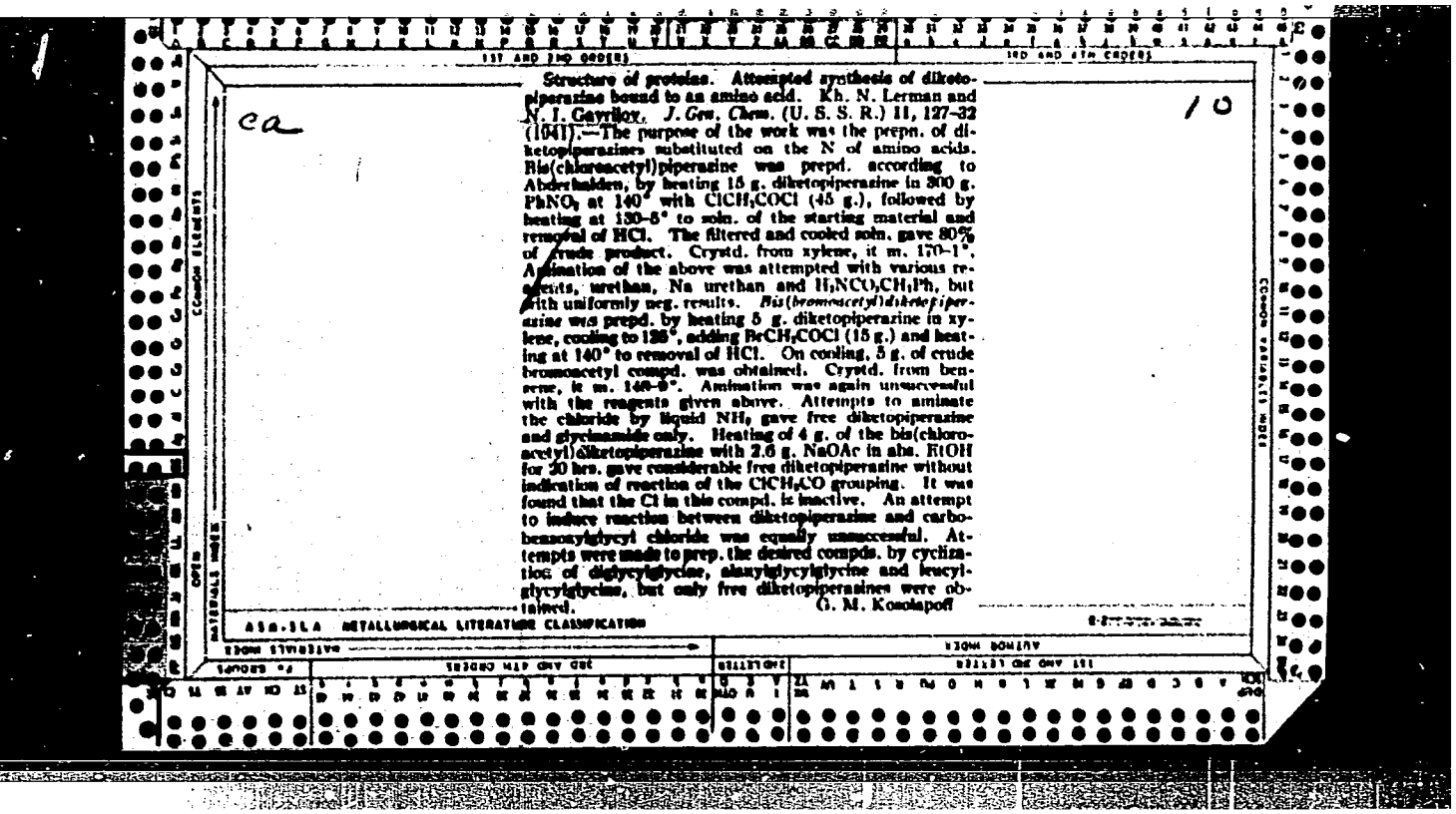
GAVRILOV, N.I.

"Device For Determining Leaves Area" Dok. AN., 24, No. 5, 1939.

GAVRILOV, N. I. and BALABUKHA-POPTSOVA, V. S.

"The Characteristic Autoclavic and Fermentative Hydrolyates of Gelatin" Zhur.Obshch. Khim. 10 No. 7, 1940. Dept.of Organic Chem. All-Union Inst. of Exptl. Med. imeni A. M. Gor'kiy. Received 17, June, 1939.

Report U-1627 11 Jan. 1952.



ca

10

Structure of proteins. Attempted synthesis of diketopiperazine bound to an amino acid. Kh. N. Lerman and N. I. Gavrilov, *J. Gen. Chem.* (U. S. S. R.) 11, 127–32 (1941).—The purpose of the work was the prepn. of diketopiperazines substituted on the N of amino acids. Bis(chloroacetyl)piperazine was prepd. according to Abderhalden, by heating 15 g. diketopiperazine in 300 g. $PhNO_2$ at 140° with $ClCH_2COCl$ (45 g.), followed by heating at 130–5° to soln. of the starting material and removal of HCl. The filtered and cooled soln. gave 80% of crude product. Crystd. from xylene, it m. 170–1°. Amination of the above was attempted with various reagents, urethan, Na urethan and $H_2NCO_2CH_2Ph$, but with uniformly neg. results. *Bis(bromoacetyl)diketopiperazine* was prepd. by heating 5 g. diketopiperazine in xylene, cooling to 125°, adding $BrCH_2COCl$ (15 g.) and heating at 140° to removal of HCl. On cooling, 5 g. of crude bromoacetyl compd. was obtained. Crystd. from benzene, it m. 148–9°. Amination was again unsuccessful with the reagents given above. Attempts to aminate the chloride by liquid NH_3 gave free diketopiperazine and glycinamide only. Heating of 4 g. of the bis(chloroacetyl)diketopiperazine with 2.6 g. NaOAc in abs. EtOH for 20 hrs. gave considerable free diketopiperazine without indication of reaction of the $ClCH_2CO$ grouping. It was found that the Cl in this compd. is inactive. An attempt to induce reaction between diketopiperazine and carbobenzoxyglycyl chloride was equally unsuccessful. Attempts were made to prep. the desired compds. by cyclization of diglycylglycine, alanylglycylglycine and leucylglycylglycine, but only free diketopiperazines were obtained.

G. M. Kosolapoff

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

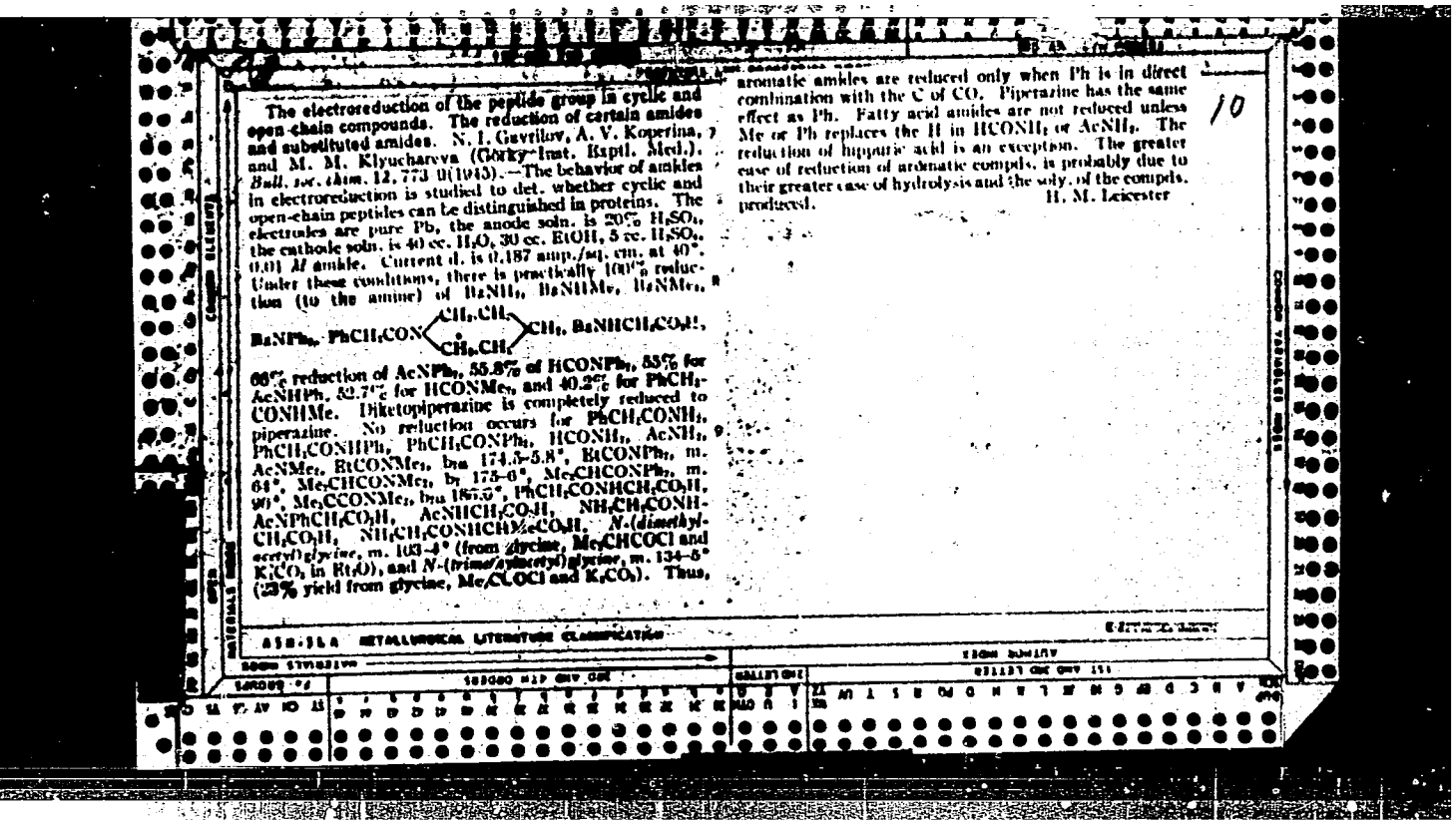
CA

11 A

A method for the separation of diketopiperazines and amino acids in protein hydrolyzates by iontophoresis. I. B. G. Antonovich and N. I. Gavrilov. *J. Gen. Chem.* (U.S.S.R.) 11, 783-4(1941); cf. C. A. 32, 8110.—During iontophoresis under the conditions previously described, it takes 70 hrs. for half the serine, cystine, proline and hydroxyproline in a soln. to reach the cathode, and 103 hrs. for half the tryptophan. This is about as long as for the dicarboxylic amino acids. Deamination may reach 8-10% of the total N.

H. M. Leicester

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



The electroreduction of the peptide group in cyclic and open-chain compounds. The reduction of certain amides and substituted amides. N. I. Gavrilov, A. V. Koperina, and M. M. Klyuchareva (Gorky Inst. Hygiene Med.). *Bull. soc. chim.* 12, 773–8(1945).—The behavior of amides in electroreduction is studied to det. whether cyclic and open-chain peptides can be distinguished in proteins. The electrodes are pure Pb, the anode soln. is 20% H_2SO_4, the cathode soln. is 40 cc. H_2O, 30 cc. EtOH, 5 cc. H_2SO_4. 0.01 *M* amide. Current d. is 0.187 amp./sq. cm. at 40°. Under these conditions, there is practically 100% reduction (to the amine) of $BzNH_2$, $BzNHMe$, $BzNMe_2$, $BzNPh_2$, $PhCH_2CON<\begin{matrix}CH_2.CH_2\\ \\ CH_2.CH_2\end{matrix}>CH_2$, $BzNHCH_2CO_2H$, 60% reduction of $AcNPh_2$, 55.8% of $HCONPh_2$, 55% for $AcNHPh$, 52.7% for $HCONMe_2$, and 40.2% for $PhCH_2CONHMe$. Diketopiperazine is completely reduced to piperazine. No reduction occurs for $PhCH_2CONH_2$, $PhCH_2CONHPh$, $PhCH_2CONPh_2$, $HCONH_2$, $AcNH_2$, $AcNMe_2$, $BzCONMe_2$, bis 174.5–5.8°, $BzCONPh_2$, m. 64°, $Me_2CHCONMe_2$, bp 175–6°, $Me_2CHCONPh_2$, m. 90°, $Me_2CCONMe_2$, bis 185.5°, $PhCH_2CONHCH_2CO_2H$, $AcNPhCH_2CO_2H$, $AcNHCH_2CO_2H$, $NH_2CH_2CONHCH_2CO_2H$, *N*-(*dimethylacetyl*)*glycine*, m. 103–4° (from glycine, $Me_2CHCOCl$ and K_2CO_3 in Et_2O), and *N*-(*trimethylacetyl*)*glycine*, m. 134–5° (23% yield from glycine, Me_3CCOCl and K_2CO_3). Thus, aromatic amides are reduced only when Ph is in direct combination with the C of CO. Piperazine has the same effect as Ph. Fatty acid amides are not reduced unless Me or Ph replaces the H in $HCONH_2$ or $AcNH_2$. The reduction of hippuric acid is an exception. The greater ease of reduction of aromatic compds. is probably due to their greater ease of hydrolysis and the solv. of the compds. produced.

H. M. Leicester

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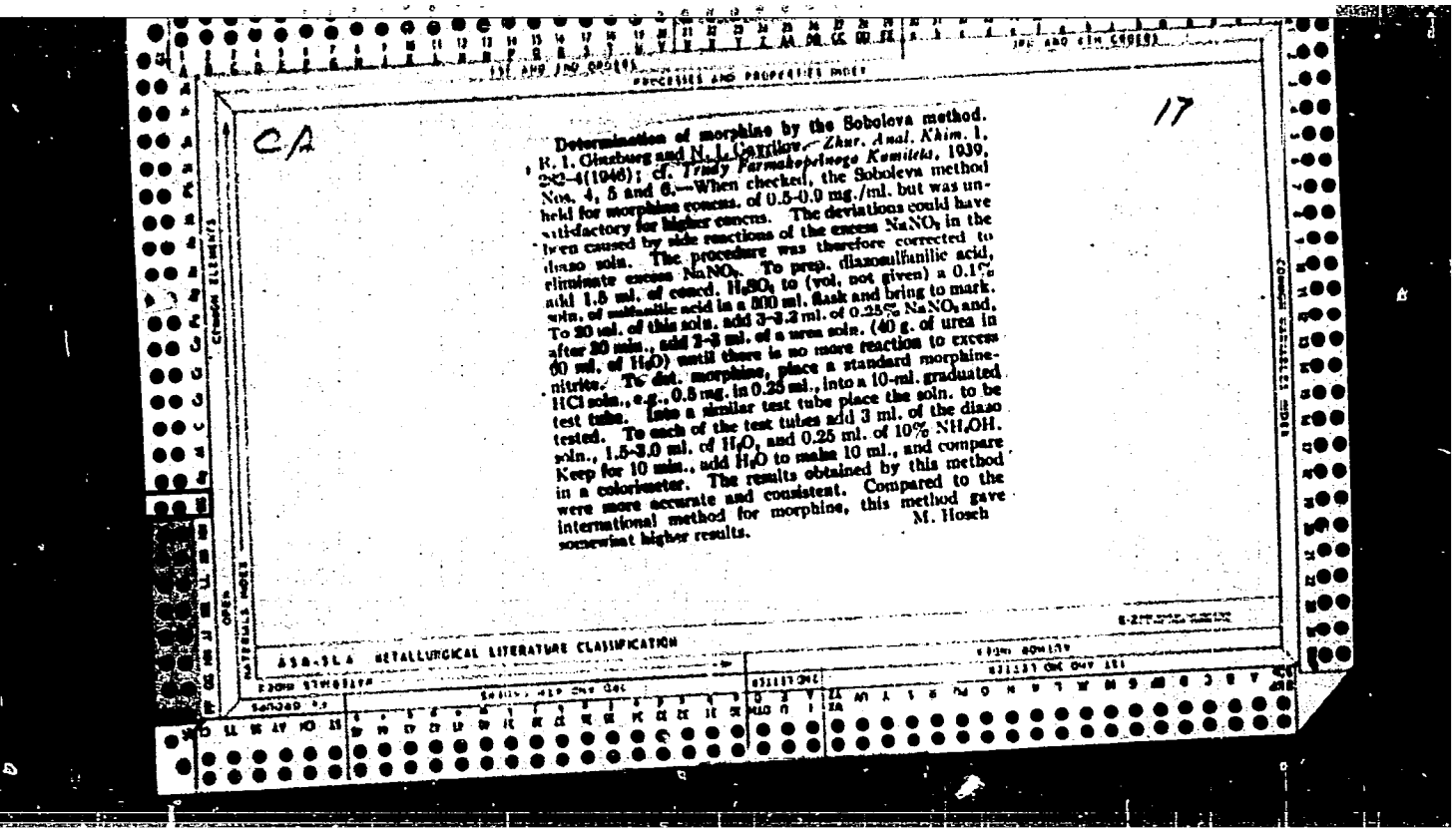


CA 17

Determination of morphine by the Soboleva method. R. I. Glezburg and N. I. Gerilov. *Zhur. Anal. Khim.* 1, 282-4(1946); cf. *Trudy Farmakopeinogo Komiteta*, 1939, Nos. 4, 5 and 6.—When checked, the Soboleva method held for morphine concns. of 0.5-0.9 mg./ml. but was unsatisfactory for higher concns. The deviations could have been caused by side reactions of the excess $NaNO_2$ in the diazo soln. The procedure was therefore corrected to eliminate excess $NaNO_2$. To prep. diazosulfanilic acid, add 1.5 ml. of concd. H_2SO_4 to (vol. not given) a 0.1% soln. of sulfanilic acid in a 200 ml. flask and bring to mark. To 20 ml. of this soln. add 3-3.2 ml. of 0.25% $NaNO_2$ and, after 20 min., add 2-3 ml. of a urea soln. (40 g. of urea in 60 ml. of H_2O) until there is no more reaction to excess nitrite. To det. morphine, place a standard morphine-HCl soln., e.g., 0.5 mg. in 0.25 ml., into a 10-ml. graduated test tube. Into a similar test tube place the soln. to be tested. To each of the test tubes add 3 ml. of the diazo soln., 1.5-3.0 ml. of H_2O, and 0.25 ml. of 10% NH_4OH. Keep for 10 min., add H_2O to make 10 ml., and compare in a colorimeter. The results obtained by this method were more accurate and consistent. Compared to the international method for morphine, this method gave somewhat higher results.

M. Hosch

GAVRILOV, N. I.

Moscow State Univ., (-1946-)

"Methods of the Estimation of Morphine according to Soboleva,"

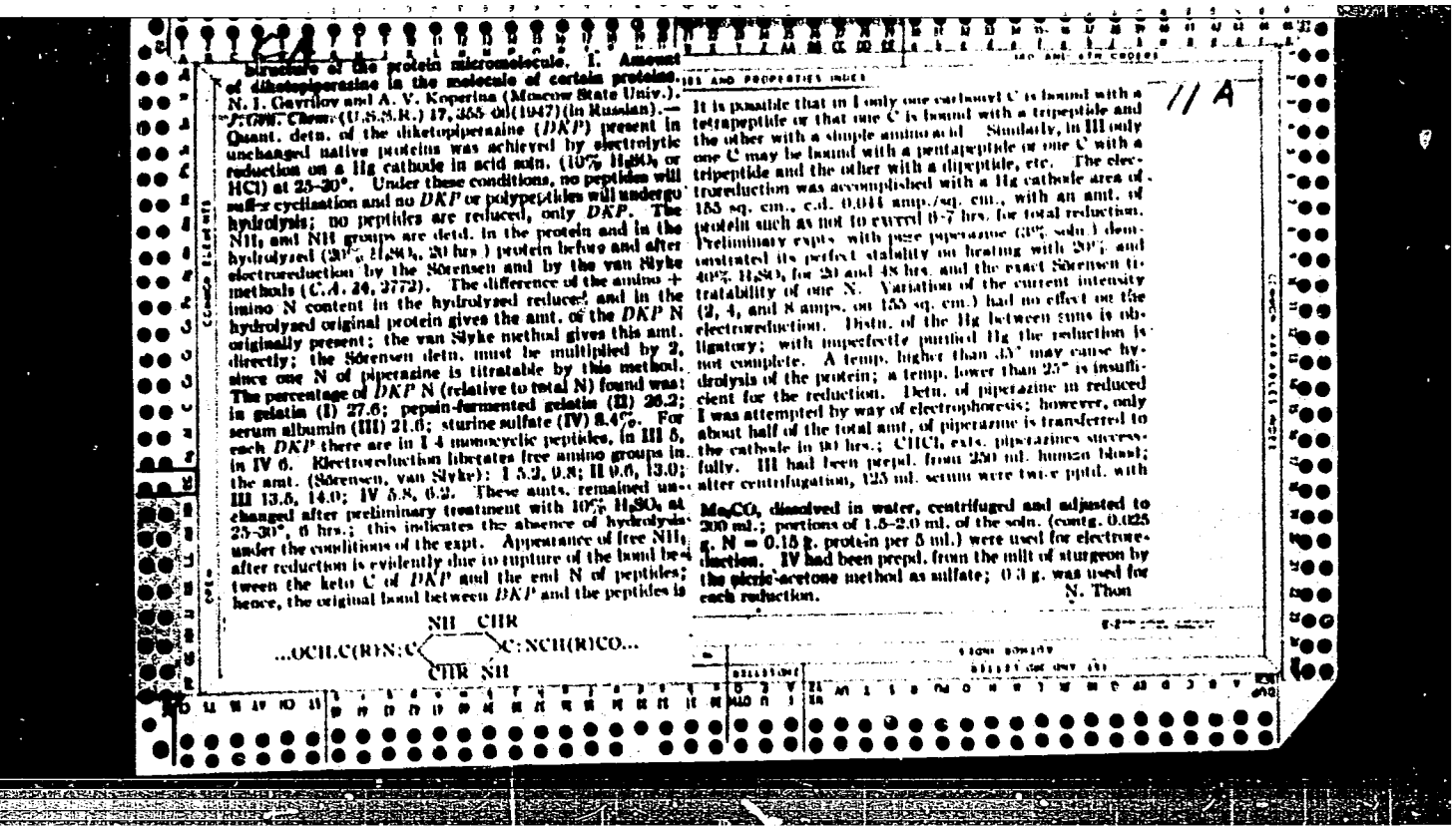
Zhur. Analit. Khim., No. 5-6, 1946.

GAVRILOV, N. I. Prof.

"Present-Day Status of the Problem of the Cyclic Nature of Amino Acid Bonds in the Albumin Molecule" 1947. Moscow State Univ., im. M. V. Lomonosov.

GAVRILOV, N. I.

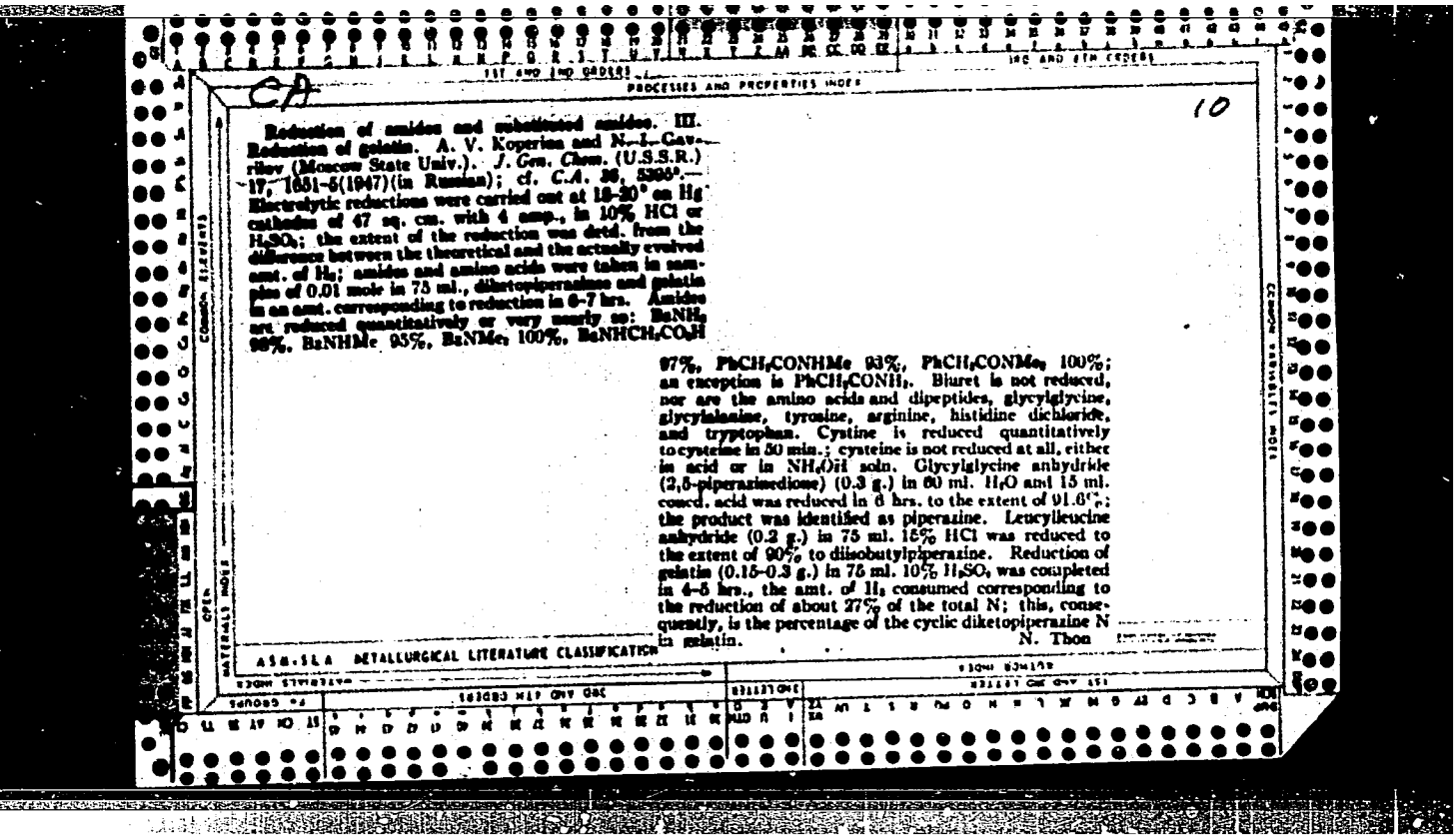
"The Present State of the Question of the Cyclical Nature of the Bonds of Amino Acid in Molecules of Albumin (Diketopiperazine Structure Theory)," Vest. Moskov. U. Ser. Obshch. Nauk No. 7, 1947.



Structure of the protein micromolecule. I. Amount of diketopiperazine in the molecule of certain proteins. N. I. Gavrilov and A. V. Koperina (Moscow State Univ.). *J. Gen. Chem. (U.S.S.R.)* 17, 355–60 (1947) (in Russian).—Quant. detn. of the diketopiperazine (*DKP*) present in unchanged native proteins was achieved by electrolytic reduction on a Hg cathode in acid soln. (10% H_2SO_4 or HCl) at 25–30°. Under these conditions, no peptides will suffer cyclization and no *DKP* or polypeptides will undergo hydrolysis; no peptides are reduced, only *DKP*. The NH_2 and NH groups are detd. in the protein and in the hydrolyzed (20% H_2SO_4, 20 hrs.) protein before and after electroreduction by the Sörensen and by the van Slyke methods (*C.A.* 24, 2772). The difference of the amino + imino N content in the hydrolyzed reduced and in the hydrolyzed original protein gives the amt. of the *DKP* N originally present; the van Slyke method gives this amt. directly; the Sörensen detn. must be multiplied by 2, since one N of piperazine is titratable by this method. The percentage of *DKP* N (relative to total N) found was: in gelatin (I) 27.6; pepsin-fermented gelatin (II) 26.2; serum albumin (III) 21.6; sturine sulfate (IV) 8.4%. For each *DKP* there are in I 4 monocyclic peptides, in III 5, in IV 6. Electroreduction liberates free amino groups in the amt. (Sörensen, van Slyke): I 5.2, 9.8; II 9.6, 13.0; III 13.5, 14.0; IV 5.8, 6.2. These amts. remained unchanged after preliminary treatment with 10% H_2SO_4 at 25–30°, 6 hrs.; this indicates the absence of hydrolysis under the conditions of the expt. Appearance of free NH_2 after reduction is evidently due to rupture of the bond between the keto C of *DKP* and the end N of peptides; hence, the original bond between *DKP* and the peptides is

It is possible that in I only one carboxyl C is bound with a tetrapeptide or that one C is bound with a tripeptide and the other with a simple amino acid. Similarly, in III only one C may be found with a pentapeptide or one C with a tripeptide and the other with a dipeptide, etc. The electroreduction was accomplished with a Hg cathode area of 185 sq. cm., c.d. 0.044 amp./sq. cm., with an amt. of protein such as not to exceed 0.7 hrs. for total reduction. Preliminary expts. with pure piperazine (3% soln.) demonstrated its perfect stability on heating with 20% and 40% H_2SO_4, for 20 and 48 hrs. and the exact Sörensen titratability of one N. Variation of the current intensity (2, 4, and 8 amps. on 155 sq. cm.) had no effect on the electroreduction. Distn. of the Hg between runs is obligatory; with imperfectly purified Hg the reduction is not complete. A temp. higher than 35° may cause hydrolysis of the protein; a temp. lower than 25° is insufficient for the reduction. Detn. of piperazine in reduced I was attempted by way of electrophoresis; however, only about half of the total amt. of piperazine is transferred to the cathode in 30 hrs.; $CHCl_3$ exts. piperazines successfully. III had been prepd. from 250 ml. human blood; after centrifugation, 125 ml. serum were twice ppd. with $MeCO_2$, dissolved in water, centrifuged and adjusted to 200 ml.; portions of 1.5–2.0 ml. of the soln. (contg. 0.025 g. N = 0.15 g. protein per 5 ml.) were used for electroreduction. IV had been prepd. from the milt of sturgeon by the picric-acetone method as sulfate; 0.3 g. was used for each reduction.

N. Thon



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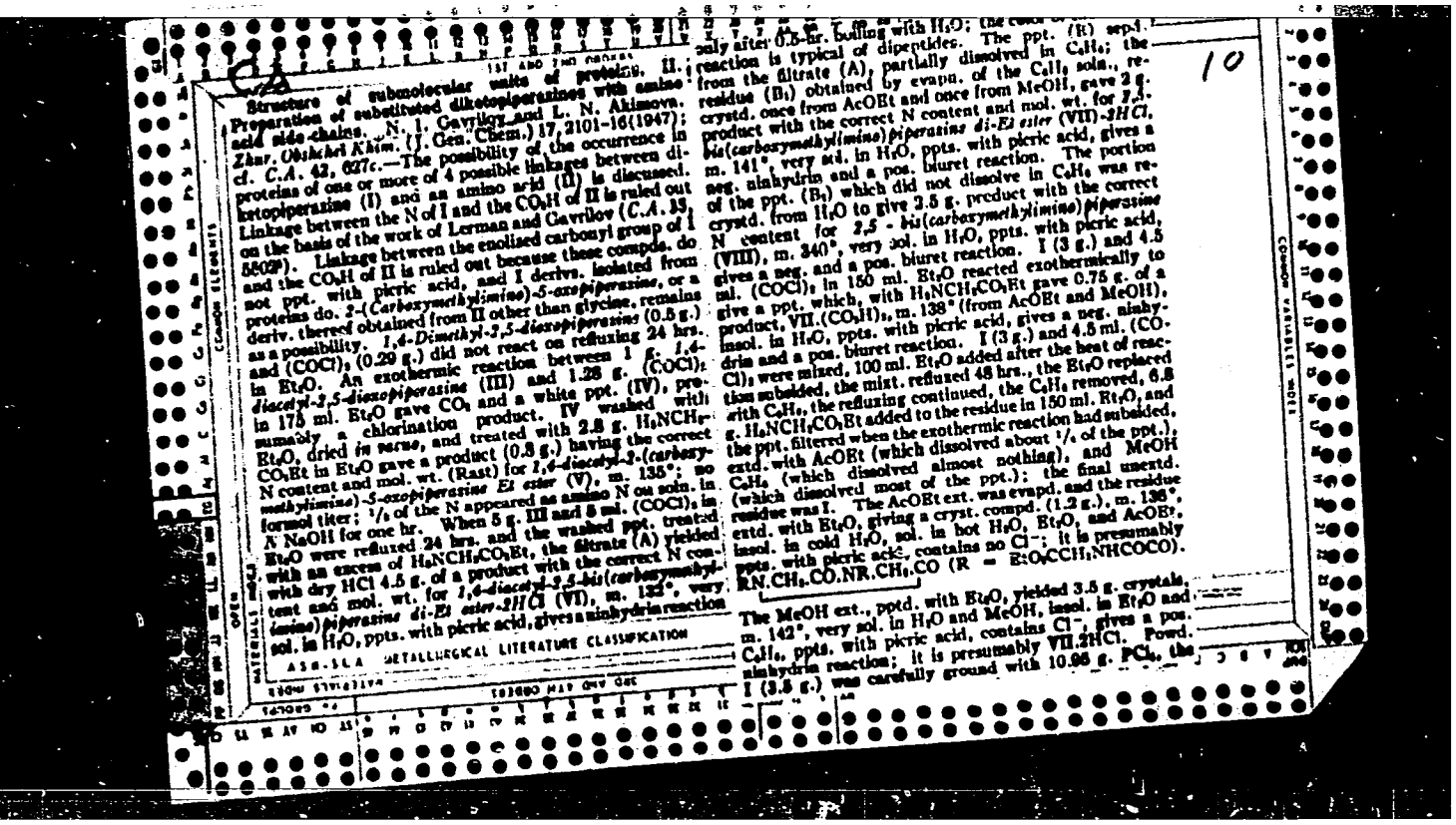
Reduction of amides and substituted amides. III. Reduction of gelatin. A. V. Koperina and N. I. Gavrilov (Moscow State Univ.). *J. Gen. Chem. (U.S.S.R.)* 17, 1651-6(1947)(in Russian); cf. *C.A.* 36, 5306⁹.—Electrolytic reductions were carried out at 18-20° on Hg cathodes of 47 sq. cm. with 4 amp., in 10% HCl or H_2SO_4; the extent of the reduction was detd. from the difference between the theoretical and the actually evolved amt. of H_2; amides and amino acids were taken in amts. of 0.01 mole in 75 ml., diketopiperazines and gelatin in an amt. corresponding to reduction in 6-7 hrs. Amides are reduced quantitatively or very nearly so: $BzNH_2$ 98%, BzNHMe 95%, $BzNMe_2$ 100%, $BzNHCH_2CO_2H$ 97%, $PhCH_2CONHMe$ 93%, $PhCH_2CONMe_2$ 100%; an exception is $PhCH_2CONH_2$. Biuret is not reduced, nor are the amino acids and dipeptides, glycylglycine, glycylalanine, tyrosine, arginine, histidine dichloride, and tryptophan. Cystine is reduced quantitatively to cysteine in 50 min.; cysteine is not reduced at all, either in acid or in NH_4OH soln. Glycylglycine anhydride (2,5-piperazinedione) (0.3 g.) in 60 ml. H_2O and 15 ml. concd. acid was reduced in 6 hrs. to the extent of 91.6%; the product was identified as piperazine. Leucylleucine anhydride (0.2 g.) in 75 ml. 15% HCl was reduced to the extent of 90% to diisobutylpiperazine. Reduction of gelatin (0.15-0.3 g.) in 75 ml. 10% H_2SO_4 was completed in 4-5 hrs., the amt. of H_2 consumed corresponding to the reduction of about 27% of the total N; this, consequently, is the percentage of the cyclic diketopiperazine N in gelatin.

N. Thon

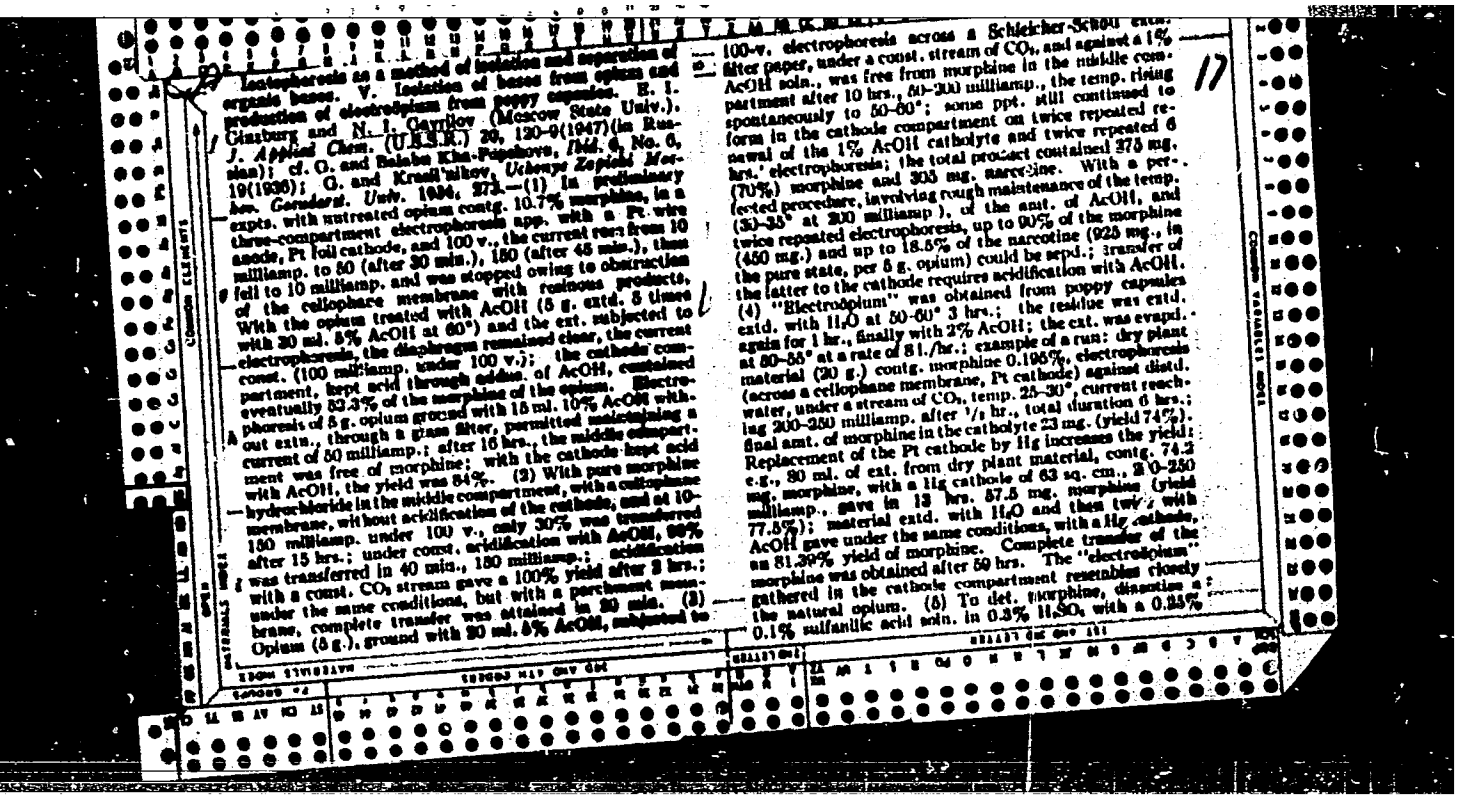
ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



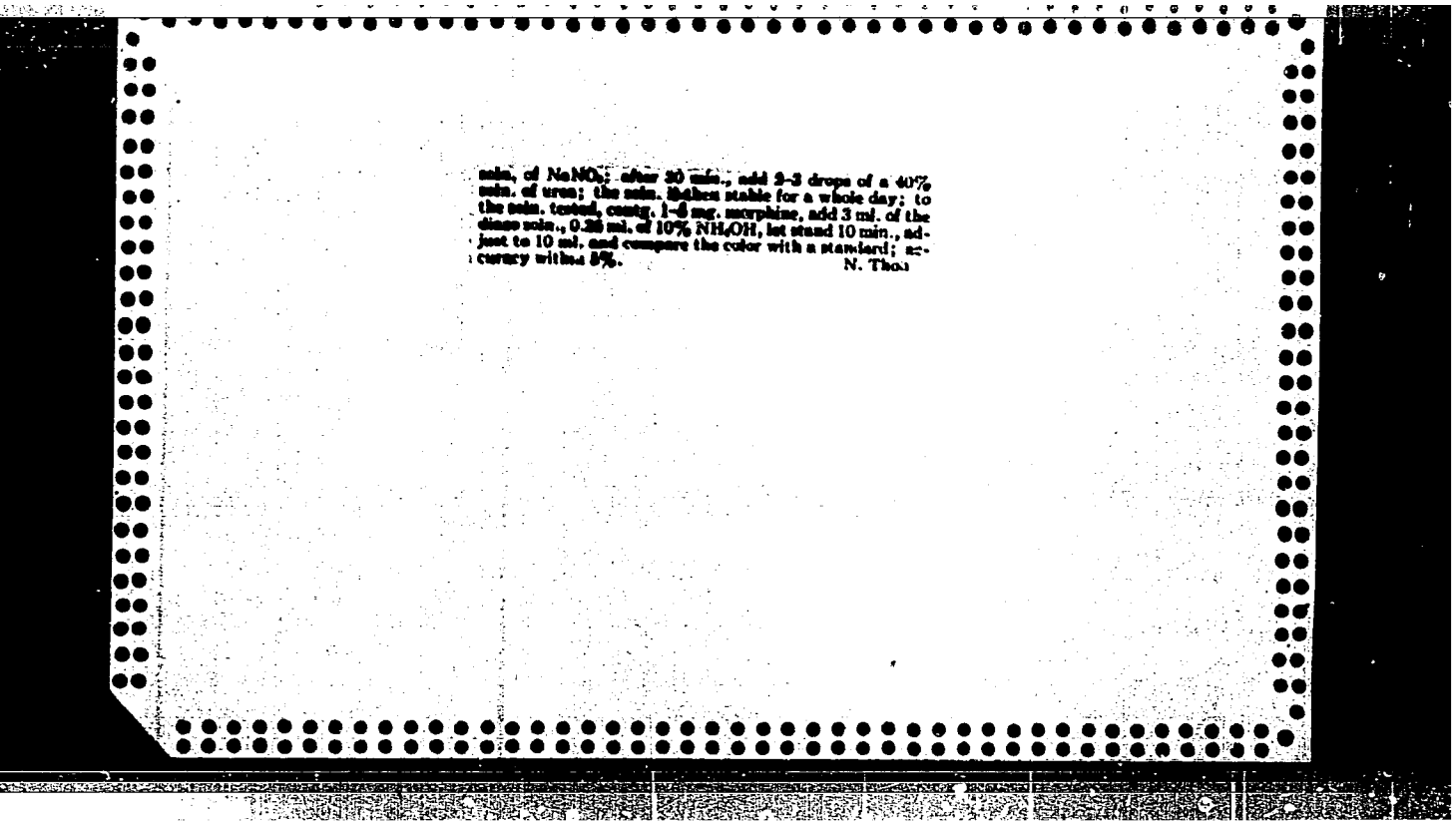
Structure of submolecular units of proteins. II. Preparation of substituted diketopiperazines with amino acid side-chains. N. I. Gavrilov and L. N. Akimova. *Zhur. Obshchei Khim.* (J. Gen. Chem.) 17, 2101–16(1947); cf. *C.A.* 42, 627c.—The possibility of the occurrence in proteins of one or more of 4 possible linkages between diketopiperazine (I) and an amino acid (II) is discussed. Linkage between the N of I and the CO_2H of II is ruled out on the basis of the work of Lerman and Gavrilov (*C.A.* 35, 5602). Linkage between the enolized carbonyl group of I and the CO_2H of II is ruled out because these compds. do not ppt. with picric acid, and I derivs. isolated from proteins do. *2-(Carboxymethylimino)-5-oxopiperazine*, or a deriv. thereof obtained from II other than glycine, remains as a possibility. *1,4-Dimethyl-2,5-dioxopiperazine* (0.5 g.) and $(COCl)_2$ (0.29 g.) did not react on refluxing 24 hrs. in Et_2O. An exothermic reaction between 1 g. *1,4-diacetyl-2,5-dioxopiperazine* (III) and 1.28 g. $(COCl)_2$ in 175 ml. Et_2O gave CO_2 and a white ppt. (IV), presumably a chlorination product. IV washed with Et_2O, dried *in vacuo*, and treated with 2.8 g. $H_2NCH_2CO_2Et$ in Et_2O gave a product (0.8 g.) having the correct N content and mol. wt. (Rast) for *1,4-diacetyl-2-(carboxymethylimino)-5-oxopiperazine Et ester* (V), m. 135°; no formol titer; 1/6 of the N appeared as amino N on soln. in *N* NaOH for one hr. When 5 g. III and 5 ml. $(COCl)_2$ in Et_2O were refluxed 24 hrs. and the washed ppt. treated with an excess of $H_2NCH_2CO_2Et$, the filtrate (A) yielded with dry HCl 4.5 g. of a product with the correct N content and mol. wt. for *1,4-diacetyl-2,5-bis(carboxymethylimino)piperazine di-Et ester-2HCl* (VI), m. 122°, very sol. in H_2O, ppts. with picric acid, gives a ninhydrin reaction only after 0.5-hr. boiling with H_2O; the [illegible] reaction is typical of dipeptides. The ppt. (B) sepd. from the filtrate (A), partially dissolved in C_6H_6; the residue (B_1) obtained by evapn. of the C_6H_6 soln., recrystd. once from AcOEt and once from MeOH, gave 2 g. product with the correct N content and mol. wt. for *2,5-bis(carboxymethylimino)piperazine di-Et ester* (VII)-*2HCl*, m. 141°, very sol. in H_2O, ppts. with picric acid, gives a neg. ninhydrin and a pos. biuret reaction. The portion of the ppt. (B_2) which did not dissolve in C_6H_6 was recrystd. from H_2O to give 2.5 g. product with the correct N content for *2,5 - bis(carboxymethylimino)piperazine* (VIII), m. 340°, very sol. in H_2O, ppts. with picric acid, gives a neg. and a pos. biuret reaction. I (3 g.) and 4.5 ml. $(COCl)_2$ in 150 ml. Et_2O reacted exothermically to give a ppt. which, with $H_2NCH_2CO_2Et$ gave 0.75 g. of a product, VII.$(CO_2H)_2$, m. 138° (from AcOEt and MeOH), insol. in H_2O, ppts. with picric acid, gives a neg. ninhydrin and a pos. biuret reaction. I (3 g.) and 4.5 ml. $(COCl)_2$ were mixed, 100 ml. Et_2O added after the heat of reaction subsided, the mixt. refluxed 48 hrs., the Et_2O replaced with C_6H_6, the refluxing continued, the C_6H_6 removed, 6.8 g. $H_2NCH_2CO_2Et$ added to the residue in 150 ml. Et_2O, and the ppt. filtered when the exothermic reaction had subsided, extd. with AcOEt (which dissolved about 1/4 of the ppt.), C_6H_6 (which dissolved most of the ppt.); the final unextd. residue was I. The AcOEt ext. was evapd. and the residue extd. with Et_2O, giving a cryst. compd. (1.2 g.), m. 136°, insol. in cold H_2O, sol. in hot H_2O, Et_2O, and AcOEt, ppts. with picric acid, contains no Cl^-; it is presumably $RN.CH_2.CO.NR.CH_2.CO$ (R = $Et_2OCCH_2NHCOCO$). The MeOH ext., pptd. with Et_2O, yielded 3.5 g. crystals, m. 142°, very sol. in H_2O and MeOH, insol. in Et_2O and C_6H_6, ppts. with picric acid, contains Cl^-, gives a pos. ninhydrin reaction; it is presumably VII.2HCl. Powd. I (3.5 g.) was carefully ground with 10.96 g. PCl_5, the

liquid, partially resinified mass dild. after 2 days with 5 ml. $POCl_3$, and the 2,5-dihydro-3,6-dichlorotopyrazine (IX) pptd. with Et_2O. IX in Me_2CO gave VII.2HCl with $H_2NCH_2CO_2Et$. The prepn. of IX proceeds with less resinification in CCl_4. III. Synthesis and properties of some amino acid derivatives of piperazine and dihydropyrazine. L. N. Akimova, N. I. Gavrilov, and N. D. Zelinskiĭ. *Ibid.* 18, 948–59(1948).—The prepn. of IX from I and PCl_5 is described in great detail. CCl_4 is the best solvent; $CHCl_3$ and $C_2H_4Cl_2$ give less satisfactory results. It is important that the PCl_5 contains a trace of $POCl_3$ initially. While some *2,3,5,6-tetrachloropiperazine* is formed its greater soly. in CCl_4 and Et_2O helps to eliminate it from IX. IX, micro monoclinic prisms, m. 80°, decomp. on heating, sol. in Me_2CO, slightly sol. in Et_2O, slowly decomp. with MeOH and EtOH, does not give amino N with H_2O, gives a neg. reaction with picric acid, and a pos. biuret reaction, forms with gaseous Cl an oil from which glycylglycine (X)-HCl can be recrystd. Since alk. hydrolysis of IX could give either glycine or X or both, the development of color in an alk. soln. (*N* NaOH) of $CuCl_2$ was compared with that in a similar soln. contg. pure X. After 5, 30, and 120 min. 15.5, 20.6, and 22.6% X were formed. Amino N detns. after 24 hrs. hydrolysis of IX in *N* NaOH at room temp. showed 62% glycine formed; after 8 hrs. hydrolysis in 10% HCl at 100°, 79.9% glycine. An attempt to sep. the products of aq. hydrolysis by subjecting an aq. soln. of IX to electrolysis in a 3-compartment cell for 60 hrs. was unsuccessful. $H_2NCH_2CO_2Et$.HCl (5.5 g.) in 20 ml. MeOH mixed with 3 g. IX and the soln. concd. *in vacuo* and pptd. with Et_2O gave 91% VII.2HCl, m. 142°. Attempts at deesterification failed to give the dibasic acid (VIII). VII.2HCl after several months is transformed to the tautomeric dihydropyrazine compd., m. 126°. Heating at 100° does not accelerate the transformation. Similarly, 6.1 g. alanine ethyl ester-HCl in 30 ml. EtOH and 2 g. IX gave 30% *2,5-bis(1-carboxyethylimino)piperazine di-Et ester*-2HCl, m. 50°, recrystd. from β-dioxane, m. 55°, sol. in H_2O and EtOH, slightly sol. in β-dioxane. Di-Et aspartate-HCl (7 g.) in 20 ml. MeOH with 2.5 g. IX gave 57.5% *2,5-bis(1,2-dicarboxyethylimino)piperazine tetra-Et ester* (XI)-2HCl, m. 76°, sol. in MeOH and EtOH, insol. in AcOEt, Me_2CO, C_6H_6, and Et_2O. Diglycylglycine Me ester-HCl (0.88 g.) in MeOH and 0.28 g. IX gave 58% of the triglycyl deriv., m. 175°, very sol. in H_2O, MeOH, and EtOH, insol. in camphor, Et_2O, C_6H_6, Me_2CO, $CHCl_3$, and hydrocarbons. The extinction coeffs. of the biuret complexes of some of the above compds. are plotted as functions of λ. IV. Enzymic hydrolysis of the amidine bond with pepsin and intestinal juice. N. D. Zelinskiĭ, N. I. Gavrilov, and L. N. Akimova. *Ibid.* 960–71.—VII.2HCl in 0.7% aq. soln. at pH 6–7 was not hydrolyzed by a glycerol ext. of canine intestinal mucosa (XII). A similar soln., contg. 0.1% pepsin, was hydrolyzed to the extent of 23 and 26% after 6 and 24 hrs. in 0.5% HCl, 53.7% after 24 hrs. in 1% HCl. XI.2HCl in 0.7% aq. soln. at pH 7 was hydrolyzed by XII to the extent of 75.9% in 32 hrs. and the pH fell to 3. The hydrolyzate gave only weak tests for I or dipeptides. In phosphate buffer at pH 8 hydrolysis was 64.5% complete in 15 hrs. XI.2HCl, treated with 0.1% pepsin in 1% HCl for 14 hrs., was 50% hydrolyzed; the hydrolyzate gave a strong test for I and a completely neg. biuret test. Thus, pepsin seems to have an "amidinase" activity, optimal in 1% HCl, almost negligible in 0.1% HCl, which splits off the amino-acid side chains, leaving the I ring intact. XII lacks this "amidinase" activity but has a specificity for hydrolyzing XI to a dipeptide, which is further hydrolyzed by dipeptidase in XII. Data on the enzymic hydrolysis of silk fibroin and gelatin are interpreted as indicating the presence of amidine compds. in the intact proteins.

J. P. Danehy



Isotachophoresis as a method of isolation and separation of organic bases. V. Isolation of bases from opium and production of electrodipium from poppy capsules. E. I. Ginzburg and N. I. Gavrilov (Moscow State Univ.). *J. Applied Chem.* (U.S.S.R.) 20, 120–9(1947)(in Russian); cf. G. and Bahaba Kha-Papahova, *Ibid.* 6, No. 6, 19(1936); G. and Krasil'nikov, *Uchenye Zapiski Moskov. Gosudarst. Univ.* 1936, 272.—(1) In preliminary expts. with untreated opium contg. 10.7% morphine, in a three-compartment electrophoresis app. with a Pt wire anode, Pt foil cathode, and 100 v., the current rose from 10 milliamp. to 80 (after 30 min.), 150 (after 45 min.), then fell to 10 milliamp. and was stopped owing to obstruction of the cellophane membrane with resinous products. With the opium treated with AcOH (5 g. extd. 5 times with 30 ml. 5% AcOH at 60°) and the ext. subjected to electrophoresis, the diaphragms remained clear, the current const. (100 milliamp. under 100 v.); the cathode compartment, kept acid through addn. of AcOH, contained eventually 52.3% of the morphine of the opium. Electrophoresis of 5 g. opium ground with 15 ml. 10% AcOH without extn., through a glass filter, permitted maintaining a current of 50 milliamp.; after 15 hrs., the middle compartment was free of morphine; with the cathode kept acid with AcOH, the yield was 84%. (2) With pure morphine hydrochloride in the middle compartment, with a cellophane membrane, without acidification of the cathode, and at 10–150 milliamp. under 100 v., only 30% was transferred after 15 hrs.; under const. acidification with AcOH, 98% was transferred in 40 min., 150 milliamp.; acidification with a const. CO_2 stream gave a 100% yield after 3 hrs.; under the same conditions, but with a parchment membrane, complete transfer was obtained in 30 min. (3) Opium (5 g.), ground with 30 ml. 5% AcOH, subjected to 100-v. electrophoresis across a Schleicher-Schüll extn. filter paper, under a const. stream of CO_2, and against a 1% AcOH soln., was free from morphine in the middle compartment after 10 hrs., 50–300 milliamp., the temp. rising spontaneously to 50–60°; some ppt. still continued to form in the cathode compartment on twice repeated renewal of the 1% AcOH catholyte and twice repeated 6 hrs.' electrophoresis; the total product contained 375 mg. (70%) morphine and 305 mg. narcotine. With a perfected procedure, involving rough maintenance of the temp. (35–35° at 200 milliamp.), of the amt. of AcOH, and twice repeated electrophoresis, up to 90% of the morphine (450 mg.) and up to 18.5% of the narcotine (925 mg., in the pure state, per 5 g. opium) could be sepd.; transfer of the latter to the cathode requires acidification with AcOH. (4) "Electrodipium" was obtained from poppy capsules extd. with H_2O at 50–60° 3 hrs.; the residue was extd. again for 1 hr., finally with 2% AcOH; the ext. was evapd. at 50–55° at a rate of 81./hr.; example of a run: dry plant material (20 g.) contg. morphine 0.196%, electrophoresis (across a cellophane membrane, Pt cathode) against distd. water, under a stream of CO_2, temp. 25–30°, current reaching 200–250 milliamp. after 1/2 hr., total duration 6 hrs.; final amt. of morphine in the catholyte 23 mg. (yield 74%). Replacement of the Pt cathode by Hg increases the yield: e.g., 80 ml. of ext. from dry plant material, contg. 74.2 mg. morphine, with a Hg cathode of 63 sq. cm., 200–250 milliamp., gave in 13 hrs. 57.5 mg. morphine (yield 77.5%); material extd. with H_2O and then twice with AcOH gave under the same conditions, with a Hg cathode, an 81.39% yield of morphine. Complete transfer of the morphine was obtained after 59 hrs. The "electrodipium" gathered in the cathode compartment resembles closely the natural opium. (5) To det. morphine, dissolve a 0.1% sulfanilic acid soln. in 0.3% H_2SO_4 with a 0.25%



soln., of $NaNO_2$; after 30 min., add 2-3 drops of a 40% soln. of urea; the soln. thus obtained is stable for a whole day; to the soln. treated, contg. 1-6 mg. morphine, add 3 ml. of the diazo soln., 0.25 ml. of 10% NH_4OH, let stand 10 min., adjust to 10 ml. and compare the color with a standard; accuracy within 5%.

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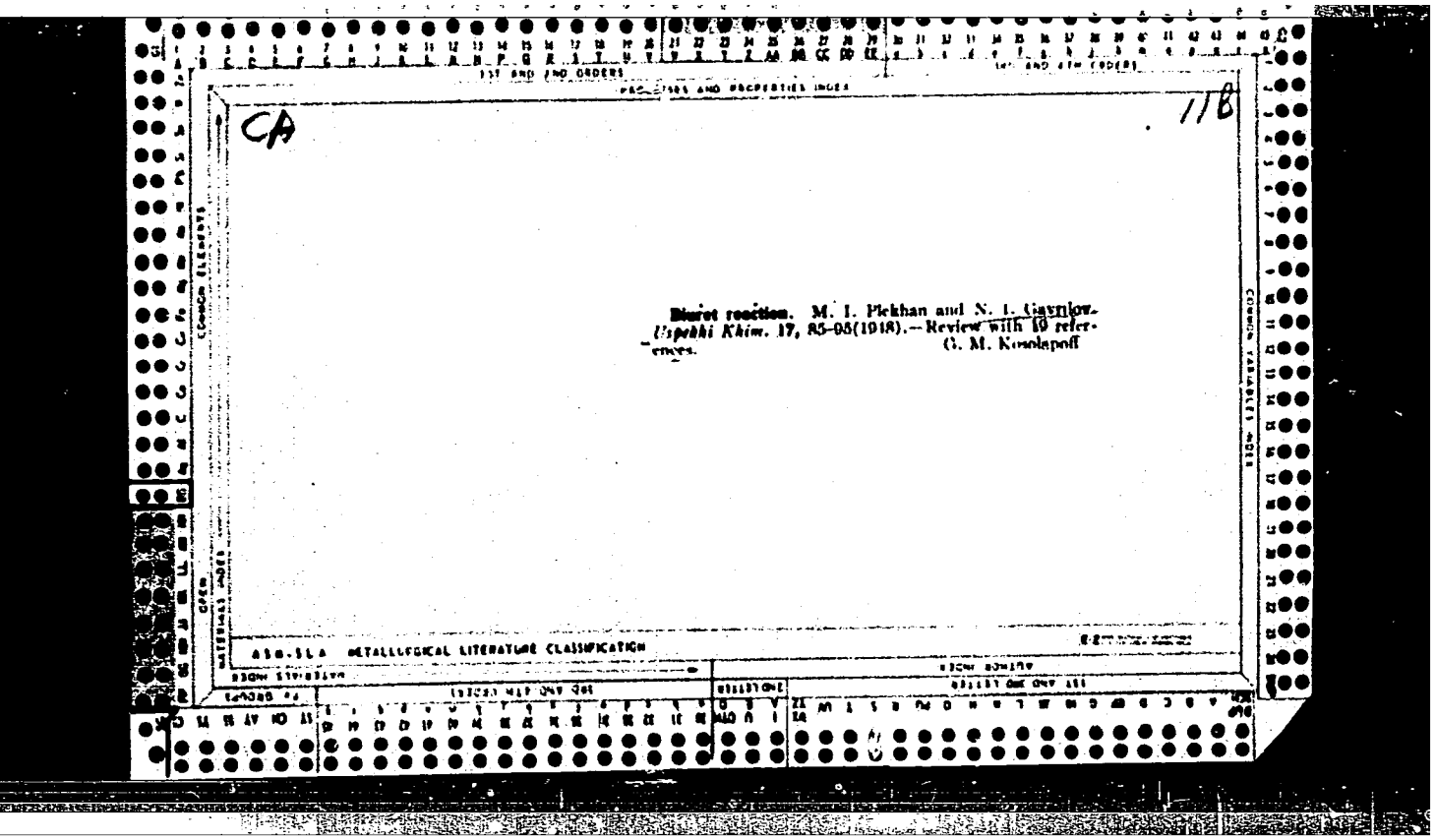


Diuret reaction. M. I. Plekhan and N. I. Gavrilov. *Uspekhi Khim.* 17, 85–95(1948).—Review with 10 references.
G. M. Kosolapoff

USSR/Chemistry - Albumin
Chemistry - Synthesis

May 48

"The Structure of the Micro-Molecule of Albumin, III," L. N. Akimova, N. I. Gavrilov, N. D. Zelinskiy, Lab Chem of Albumin imeni Acad N. D. Zelinskiy, Moscow State U, 11 3/4 pp

"Zhur Obshch Khim" Vol XVIII (LXXX), No 5

Describes synthesis and properties of 2, 5- dichlordihydropyrazine. This was consensed with the esters of glycol, alanine, aminosuccinic acid and diglycolglycine. The adsorption spectrum of the copper complex of the dihydropyazine-bisdiglycol-glycine ester had a maximum, corresponding to the free diglycol-glycine ester, but it was four times greater. Develops a working hypothesis on further possiblities of transforming the micro-molecule model of albumin into a macro-molecule model.
Submitted 13 Apr 1947

PA 8/49T69

GAVRILOV, N. I.

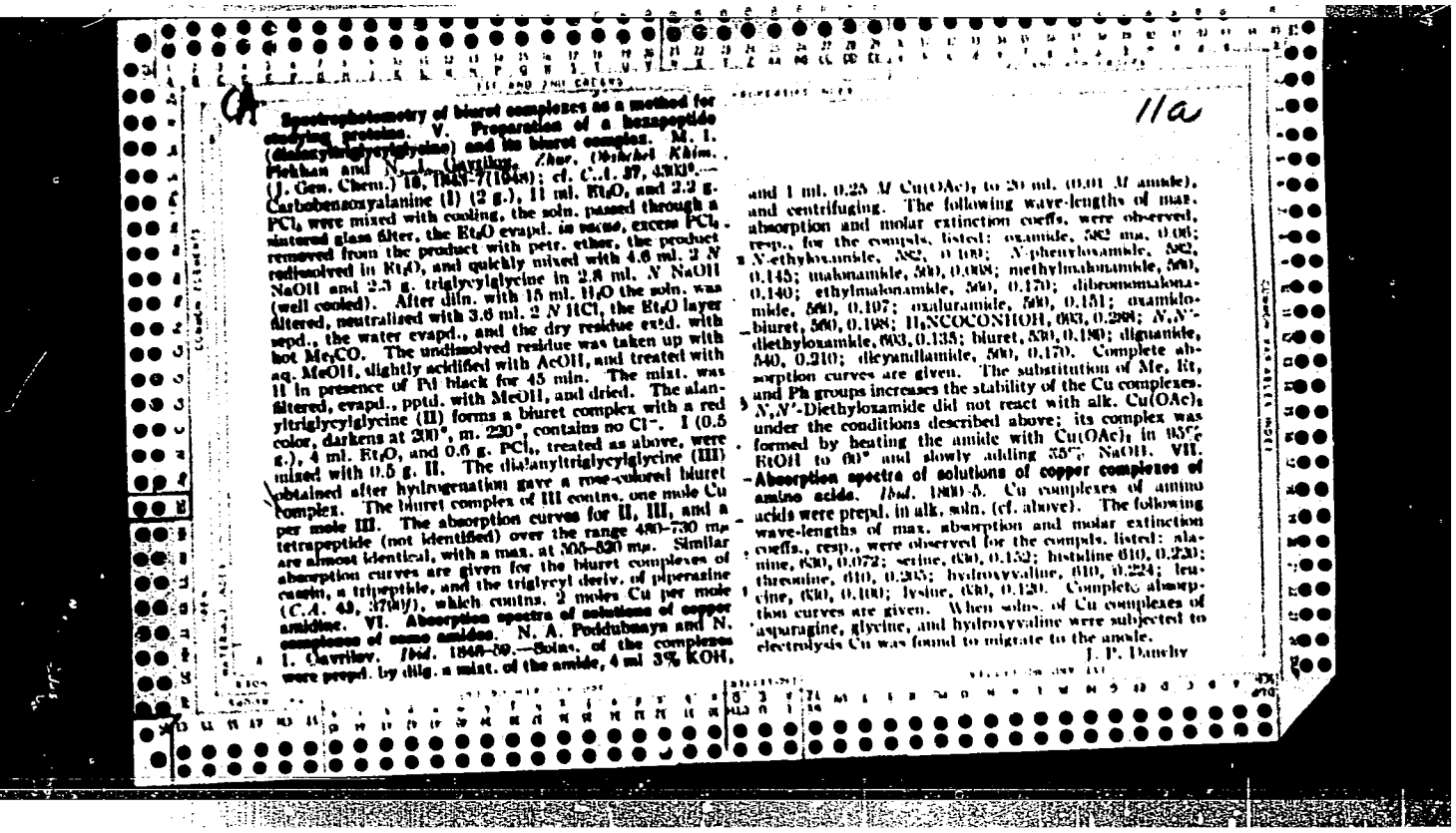
USSR/Chemistry - Albumin, Molecular Structure May 48
Chemistry - Fermentation

"The Structure of the Micro-Molecule of Albumin, IV," N. D. Zelinskiy, N. I. Gavrilov and L. N. Akimova, Lab of Chem of Albumin imeni N. D. Zelinskiy, Moscow State U, 11½ pp

"Zhur Obshch Khim" Vol XVIII (LXXX), No 5

Describes fermentation of amidine bond by pepsin and intestine juice. Submitted 13 Jun 1947

PA 8/49T70



CA

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Spectrophotometry of biuret complexes as a method for studying proteins. V. Preparation of a hexapeptide (dialanyltriglycylglycine) and its biuret complex. M. I. Plekhan and N. [illegible] Gavrilov. *Zhur. Obshchei Khim.* (J. Gen. Chem.) 18, 1845-7(1948); cf. C.A. 37, 4810⁹.—Carbobenzoxyalanine (I) (2 g.), 11 ml. Et_2O, and 2.2 g. PCl_5 were mixed with cooling, the soln. passed through a sintered glass filter, the Et_2O evapd. *in vacuo*, excess PCl_5 removed from the product with petr. ether, the product redissolved in Et_2O, and quickly mixed with 4.6 ml. 2 *N* NaOH and 2.3 g. triglycylglycine in 2.8 ml. *N* NaOH (well cooled). After dilu. with 15 ml. H_2O the soln. was filtered, neutralized with 3.6 ml. 2 *N* HCl, the Et_2O layer sepd., the water evapd., and the dry residue extd. with hot Me_2CO. The undissolved residue was taken up with aq. MeOH, slightly acidified with AcOH, and treated with H in presence of Pd black for 45 min. The mixt. was filtered, evapd., pptd. with MeOH, and dried. The alanyltriglycylglycine (II) forms a biuret complex with a red color, darkens at 200°, m. 220°, contains no Cl^-. I (0.5 g.), 4 ml. Et_2O, and 0.6 g. PCl_5, treated as above, were mixed with 0.5 g. II. The dialanyltriglycylglycine (III) obtained after hydrogenation gave a rose-colored biuret complex. The biuret complex of III contns. one mole Cu per mole III. The absorption curves for II, III, and a tetrapeptide (not identified) over the range 480–730 mμ are almost identical, with a max. at 505–520 mμ. Similar absorption curves are given for the biuret complexes of cuscin, a tripeptide, and the triglycyl deriv. of piperazine (*C.A.* 43, 3704*f*), which contns. 2 moles Cu per mole amidine. VI. **Absorption spectra of solutions of copper complexes of amino acids.** N. A. Poddubnaya and N. I. Gavrilov. *Ibid.* 1868–69.—Solns. of the complexes were prepd. by dilg. a mixt. of the amide, 4 ml 3% KOH, and 1 ml. 0.25 *M* $Cu(OAc)_2$ to 20 ml. (0.01 *M* amide), and centrifuging. The following wave-lengths of max. absorption and molar extinction coeffs. were observed, resp., for the compds. listed: oxamide, 582 mμ, 0.08; *N*-ethyloxamide, 582, 0.109; *N*-phenyloxamide, 582, 0.145; malonamide, 580, 0.098; methylmalonamide, 580, 0.140; ethylmalonamide, 580, 0.170; dibromomalonamide, 580, 0.107; oxaluramide, 580, 0.151; oxamidobiuret, 560, 0.198; $H_2NCOCONHOH$, 603, 0.208; *N,N'*-diethyloxamide, 603, 0.135; biuret, 530, 0.180; diguanide, 540, 0.210; dicyandiamide, 590, 0.170. Complete absorption curves are given. The substitution of Me, Et, and Ph groups increases the stability of the Cu complexes. *N,N'*-Diethyloxamide did not react with alk. $Cu(OAc)_2$ under the conditions described above; its complex was formed by heating the amide with $Cu(OAc)_2$ in 85% EtOH to 60° and slowly adding 35% NaOH. VII. **Absorption spectra of solutions of copper complexes of amino acids.** *Ibid.* 1869-5. Cu complexes of amino acids were prepd. in alk. soln. (cf. above). The following wave-lengths of max. absorption and molar extinction coeffs., resp., were observed for the compds. listed: alanine, 630, 0.072; serine, 630, 0.152; histidine 610, 0.220; threonine, 610, 0.205; hydroxyvaline, 610, 0.224; leucine, 630, 0.100; lysine, 630, 0.120. Complete absorption curves are given. When solns. of Cu complexes of asparagine, glycine, and hydroxyvaline were subjected to electrolysis Cu was found to migrate to the anode.

J. P. Danehy

GAVRILOV, N. I.

USSR/Chemistry - Spectrophotometry, Proteins Oct 48

" Spectrophotometry of Biuretic Complexes as a Method of Research on Proteins: VI, Absorption Spectra of Solutions of Cupric Complexes of Several Amides," N.A. Poddubnaya, N. I. Gavrilov, Lab of Albumin Chem, Moscow State U, 11 1/4 pp

"Zhur Obshch Khim" Vol XVIII, No 10

Investigated absorption spectra of blue-violet Cu complexes of oxamide derivatives, violet Cu complexes of malonamide derivatives, and red Cu complexes of biuret derivatives. Submitted 18 Sep 47.

PA 2/50T60

GAVRILOV, N. I.

N. A. Poddubnaia and N. I. Gavrilov, Spectro-photometry of "Biuretic" complexes as method of investigation of albumen. VIII. Absorption spectra of solutions of copper complexes of amino-acids. p. 1860

The amino-acids form copper complexes with a maximum absorption 610-630m.u. It is proved by electrolysis that copper enters into to the anion part of the copper complex.

Lab. of Chemistry of Albumen, Moscow State University, Holder of the Lenin Order September 18, 1947

SO: Journal of General Chemistry (USSR) 28, (SO) No. 10 (1948):

GAVRILOV, N. I., Prof.

"Deionization of H_2 at Low Pressure," Dok. AN, 71, No. 2, 1950; Lab. Protein Chemistry im. N. D. Zelinskiy, Moscow State Univ Mbr. Mil. Air Engineering Acad. im. N. Ye. Zhukovskiy.

CA

Some reactions of diacyldiketopiperazines. L. N. Akimova and N. I. Gavrilov (M. V. Lomonosov State Univ., Moscow). *Doklady Akad. Nauk S.S.S.R.* 73, 1189–92 (1950).—Investigation of the chem. behavior of acylated diketopiperazines indicates a mode of formation of the peptide link that is not equiv. to the reverse reaction of hydrolytic cleavage. Diacetyldiketopiperazine, thus, reacts with $H_2NCH_2CO_2Et$, probably with intermediate formation of the corresponding adduct of NH_2 groups to the CO groups, which rearranges to the isomeric *O,O*-diAc deriv. by transfer of Ac groups from N to the OH groups; the rearrangement product then spontaneously cleaves either into diketopiperazine and $AcNHCH_2CO_2Et$ or into EtOH and I. In abs. Et_2O the latter reaction occurs; I with alc. HCl yields EtOAc and $H_2NCH_2CONHCH_2CO_2Et$. A similar reaction with tyrosine Me ester gives a

CH_2—NH.C(OH)NAcCH$_2$CO$_2$Et

EtO$_2$CCH$_2$NAcC(OH).NH.CH$_2$

(I)

product analogous to I but much more stable, since neither in Et_2O nor in EtOH does it split off ROH; the small amts. of the diketopiperazine obtained as a by-product, however, indicate that the reaction course is similar to that pursued by the glycine deriv. The tyrosine analog of I with alc. HCl rapidly underwent a 100% cleavage to EtOAc and glycyltyrosine Et ester (isolated as the HCl salt). *N,N'*-Bis(chloroacetyl)diketopiperazine with glycine esters yielded the corresponding analog of I, which was not cleaved by soln. in Et_2O or EtOH. *N,N'*-Bis(chloroglycolyl)diketopiperazine with amino acid esters yields *cyclized analogs* of I, which with excess amino acid ester yield analogs of I without oxalyl groups on the N atoms, with formation of EtO_2C-$CONHCH_2CO_2Et$.

G. M. Kosolapoff

CA

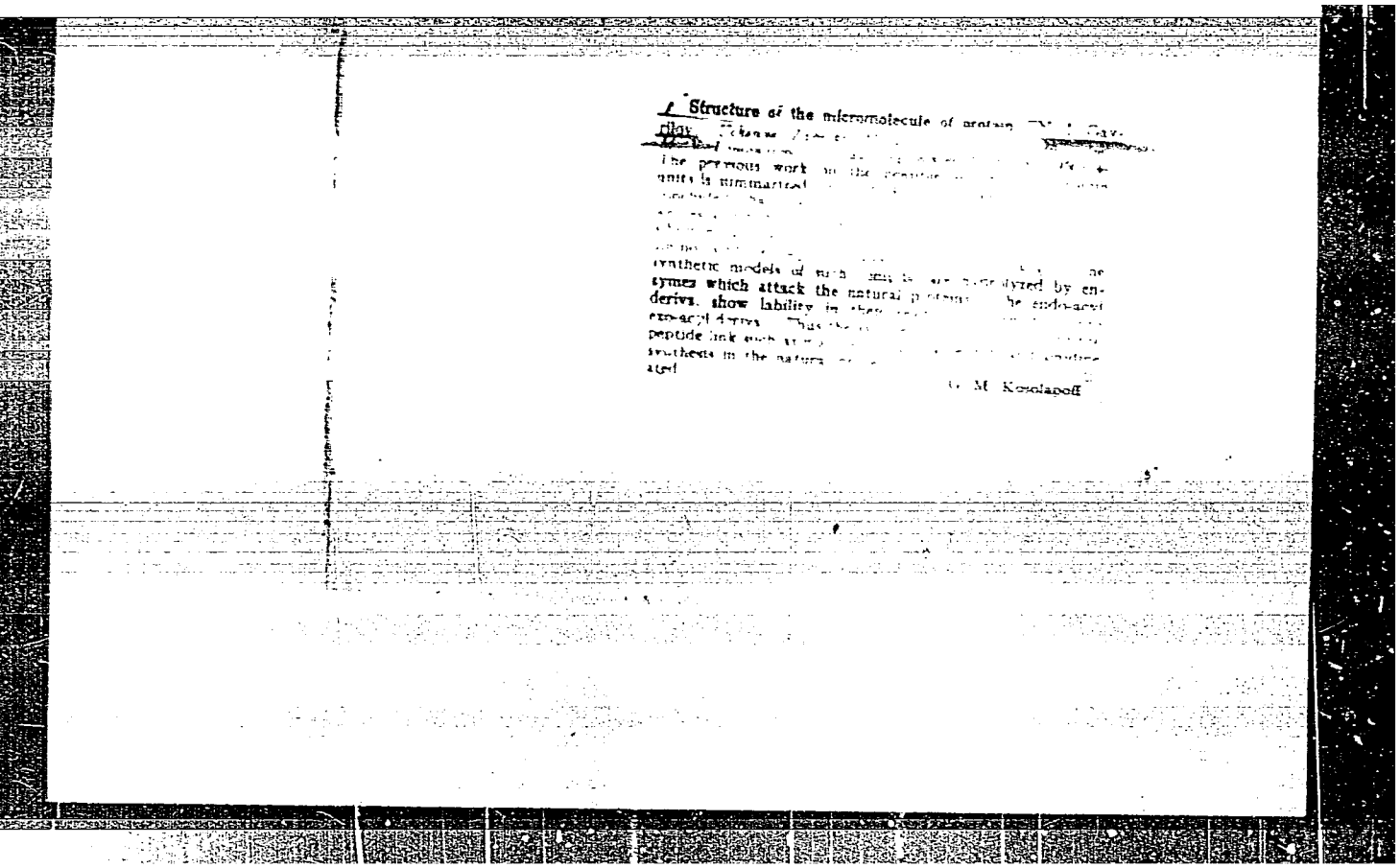
Connection between diketopiperazines and amino acids. L. N. Akimova and N. I. Gavrilov. *Doklady Akad. Nauk S.S.S.R.* 74, 251-4(1950).—1,4-Diacylated diketopiperazines were prepd. by acylation of glycine after suitable blocking. The [o-$C_6H_4(CO)_2NCH_2CO$] group in *1,4-bis(N-phthaloylglycyl)-2,5-diketopiperazine* (I) is mobile, yielding with $EtO_2CCH_2NH_2$ exo-acetyl(phthalylglycyl)glycine amidine of dihydropyrazine (II), the synthesis of which shows the possibility of existence of the protein mol. structure proposed by G., *et al.* (*Vestnik Moskov Univ.* 1947, No. 7, 57-84; following abstr.), contg. diketopiperazine units forming crosslinks between long polypeptide chains. The ready transfer of these *N*-acyl groups into exo-positions when the CO carries an aminoacyl group may be the key to the synthesis of the peptide chain, with diketopiperazine being the intermediate agency. Heating 1.9 g. *N*-phthaloylglycyl chloride and 0.48 g. diketopiperazine in xylene 20 min. on a water bath, then 5 hrs. at 142°, gave 83% I, decomp. 385° after washing with H_2O, EtOH, and Et_2O. p-$MeC_6H_4SO_2NHCH_2COCl$ similarly gave the *1-(N-p-tolylsulfonylglycyl)-2,5-diketopiperazine*, m. 230° (analysis gives the compn. of a monoacylated deriv., $C_{13}H_{15}O_5N_3S$). $PhCH_2SO_2NHCH_2COCl$ in $PhNO_2$ (0.5 hr. at 130°) gave the *1,4-bis(N-benzylsulfonylglycyl)-2,5-diketopiperazine*, decomp. 236° (from $PhNO_2$). I shaken 1 week with 2 moles $EtO_2CCH_2NH_2$ in Et_2O, then treated with dry HCl after filtration, gave unreacted ester, while extn. of the original ppt. with EtOAc yielded II (R = $N[COCH_2N(CO)_2C_6H_4]CH_2CO_2Et$), m. 145°, giving *N-(N-phthaloylglycyl)glycine*, m. 229.5°, on enzymic cleavage or without the enzyme in the presence of 1% HCl; no diketopiperazine was formed.

$H_2C.NH.C(OH)R$

$R(HO)C.NH.CH_2$

(II)

G. M. Kosolapoff



Structure of the micromolecule of protein

The previous work

synthetic models of

zymes which attack the natural

derivs. show lability

peptide link

synthesis in the nature

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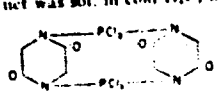
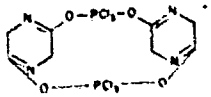
Structure of protein micromolecule V. Action of phosphorus pentachloride on diketopiperazine. N. I. Gavrilov, R. G. Petrova, and N. A. Poldubnaya (Moscow State Univ.) *Zhur. Obshchei Khim.* (J. Gen. Chem.) 21, 294-9(1951); cf. *C.A.* 43, 3709g.—2,5-Diketopiperazine (I) with PCl_5 gives capricious irreproducible results, which at times lead to the isolation of P-contg. products. The specific conditions assuring their formation have not been worked out. However, 0.5 g. powd. I and 0.4 g. PCl_5, carefully triturated together, heated rapidly in 40 ml. CCl_4 in the previously described app., refluxed 5 hrs., cooled without access of moisture, and filtered, gave yellowish crystals, $(C_4H_6O_2N_2Cl_2P)_n$ (II), decomp. 200°, giving the reactions of I and forming in air, a dipeptide which yields a characteristic Cu complex. The product was impure, as some I crystals could be seen under a microscope; the material could not be recrystd. nor could its mol. wt. be detd. because of its insoly. Similarly, 1 g. I and 8 g. PCl_5 in 40 ml. hot C_6H_6 gave much HCl; filtering the hot soln. after 20 min. without access to moisture and letting it stand 1 hr. gave 0.75 g. needles, decomp. 160-70° and analyzing as above; the microscopic appearance was very similar to 2,5-dichloro-3,6-dihydropyrazine (III); the product was sol. in cold H_2O, had no amino N, and treatment



(IIIA)



(IIIB)

with MeOH precooled with Dry Ice and letting warm up to 10-15° gave I, indicating the ease of hydrolysis of the P link and thus showing the product was not IIIA, but probably an ester of the acid with an enol form of I (IIIB). Treatment with $(COCl)_2$ failed to yield III and PCl_5, expected for the amide formulation, and no reaction took place even in 6 hrs. Treatment of the product in cold Et_2O with $H_2NCH_2CO_2Et$ and extn. with Et_2O gave a little I, $H_2NCH_2CO_2Et.HCl$, and H_4N_2. Thus, P is not joined to the N of I, nor is it an ester of the enol, since neither Et glycinamidine nor *N*-phosphorylated glycine Et ester were isolated. The structure of the product remains unknown. Unsuccessful attempts were made to establish the best conditions for the prepn. of III by the above reaction. In C_6H_6 the reaction occasionally succeeds but the yields are lower than in CCl_4. In MeOH both II and III form. II predominating. In pentane or cyclohexane the reaction does not go, while in isooctane a poorly stable product is formed, contg. 44% Cl, indicating some III. No reaction occurs in petr. ether, b. 50-70°, while in hexane is formed a chlorinated product, m. 120-2°, which decomp. in air and gives a biuret reaction. In AcCl II formed exclusively. Addn. of quinoline did not facilitate the reaction. I was prepd. by diverse methods in a high degree of purity and was tried in the PCl_5 reaction with the following results: the product, purified by crystn. from $PhNH_2$, m. 274°, does not react with $KMnO_4$, with PCl_5 gives both II and III, and with PCl_5 does not react at all, indicating a completely keto form. I, from the di-1,4-Ac deriv. and $H_2NCH_2CO_2Na$ in H_2O, m. 319°, gave with PCl_5 only II; irradiation with ultraviolet light failed to alter the result. I crystd. from EtOH and dried at 110° also gave only II. After 4 hrs. PCl_5 with the di-Ac deriv., in CCl_4 gave only impure unreacted material, but in 24 hrs.

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trace of III, m. 70° and free of I, was obtained. III is best prepd. in CCl_4 from fresh or thoroughly dried (150°) I, although even then II may form occasionally. **VI. Preparation of some amidines of the dihydropyrazine series and their acylation.** N. I. Gavrilov and L. N. Akimova. *Ibid.* 289-94.—Addn. of 27.8 ml. 25% NH_4OH in 45 min. to 50 g. $MeO_2CCH_2NH_2.HCl$ in 10 ml. H_2O at −10° gave, after 48 hrs., 60% *2,5-diketopiperazine* (I). I (1 g.) and 8 g. PCl_5 treated with 70 ml. dry CCl_4 (for app., see *C.A.* 43, 3790a), rapidly heated, boiled 1.5 hrs., cooled, filtered without access of moisture, and washed with CCl_4, gave 93.7% *2,5-dichloro-3,6-dihydropyrazine* (II), m. 83°, and free of P. II (1.5 g.) gradually added to 4.6 g. tyrosine Me ester HCl salt in 25 ml. dry MeOH with ice cooling gave the poorly sol. *2,5-dityrosyl-3,6-dihydropyrazine di-Me ester-2HCl*, m. 132° (from $CHCl_3$); when $CHCl_3$ is used as solvent, the reaction does not take place, and some glycine dipeptide may be isolated. Treatment with $PhCH_2O_2CCl$ yields the *N,N'-bis(carbobenzyloxy) deriv.*, m. 122° (from C_6H_6). Similarly, $H_2NCH_2CONHCH_2CO_2Et.HCl$ gave *3,5-bis(N-glycylglycyl)-3,6-dihydropyrazine di-Et ester-2HCl salt*, m. 156° (from MeOH-Et_2O); attempts to form the *carbobenzyloxy deriv.* under various conditions gave only the corresponding deriv. of *glycine*, m. 119°; I formed in a reaction run in aq. NaOH. Apparently the acylated amidine loses ROH and the glycyl residue is acylated in a reaction of the exo-type. **VII. Some transformations of acylated 2,5-diketopiperazines in their reaction with amino acids and amines.** L. N. Akimova and N. I. Gavrilov. *Ibid.* 294-311.—1,4-Diacylated diketopiperazines react with amino acids and some primary amines in such a way that the NH_2 group adds to the CO group of the diketopiperazine, forming a hydrate of the corresponding amidine, which undergoes the exo-rearrangement of its acyl group; the product may either lose the acylated amine with formation of the diketopiperazine, or it may lose ROH and form bis-exo-aminoacyl-2,5-dihydropyrazineamidines. The exo-acylated amidines form Cu complexes of the tripeptide type with a 1:1 ratio of Cu to the amidine; on treatment with alkali the amidines form Cu salts of the acetyldipeptide type. Refluxing 1,4-diacetyldiketopiperazine with excess abs. EtOH until soln. occurs and chilling rapidly, followed by addn. of $H_2NCH_2CO_2Et$ (2.1 g./2 g. piperazine) gave in 2 hrs. a ppt. of diketopiperazine (I), and a *solid*, $C_{16}H_{28}N_4O_6$ (II) (extd. with EtOH from the crude ppt.), that gives the anhydride and the biuret reactions of dipeptide type, and m. 133.5-5.0° (from EtOH-Et_2O), apparently *bis(exo-N-acetyl)-2,5-(N-glycine Et ester)-2,5-dihydroxyldihydropyrazine*, $RC(OH):CH_2.NH.C(OH)R.CH_2.NH$ (R = EtO_2CCH_2Na) while the mother liquor yielded *AcNHCH$_2$CO$_2$Et*, m. 48°, and $H_2NCH_2CO_2Et.HCl$, m. 145°. With abs.

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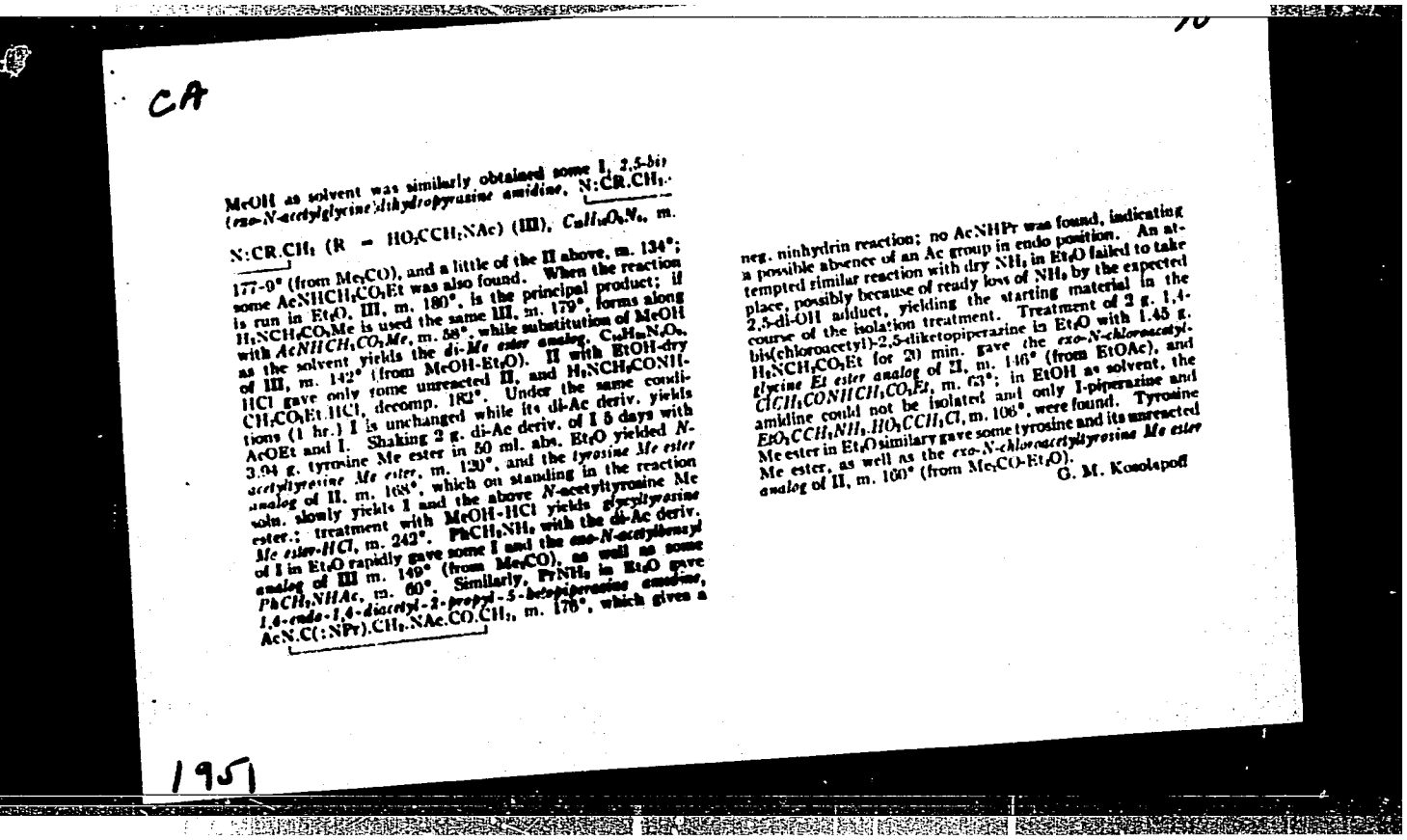

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MeOH as solvent was similarly obtained some 1, 2,5-bis(*exo-N-acetylglycine*)*dihydropyrazine amidine*, N:CR.CH$_2$·N:CR.CH$_2$ (R = HO$_2$CCH$_2$NAc) (III), $C_{14}H_{20}O_6N_6$, m. 177-9° (from Me$_2$CO), and a little of the II above, m. 134°; some AcNHCH$_2$CO$_2$Et was also found. When the reaction is run in Et$_2$O, III, m. 180°, is the principal product; if H$_2$NCH$_2$CO$_2$Me is used the same III, m. 179°, forms along with *AcNHCH$_2$CO$_2$Me*, m. 58°, while substitution of MeOH as the solvent yields the *di-Me ester analog*, $C_{16}H_{24}N_6O_6$, of III, m. 142° (from MeOH-Et$_2$O). II with EtOH-dry HCl gave only some unreacted II, and H$_2$NCH$_2$CONHCH$_2$CO$_2$Et.HCl, decomp. 182°. Under the same conditions (1 hr.) I is unchanged while its di-Ac deriv. yields AcOEt and I. Shaking 2 g. di-Ac deriv. of I 5 days with 3.94 g. tyrosine Me ester in 50 ml. abs. Et$_2$O yielded *N-acetyltyrosine Me ester*, m. 120°, and the *tyrosine Me ester analog* of II, m. 168°, which on standing in the reaction soln. slowly yields I and the above *N*-acetyltyrosine Me ester.; treatment with MeOH-HCl yields *glycyltyrosine Me ester-HCl*, m. 242°. PhCH$_2$NH$_2$ with the di-Ac deriv. of I in Et$_2$O rapidly gave some I and the *exo-N-acetylbenzyl analog* of III m. 149° (from Me$_2$CO), as well as some *PhCH$_2$NHAc*, m. 60°. Similarly, PrNH$_2$ in Et$_2$O gave *1,4-endo-1,4-diacetyl-2-propyl-5-ketopiperazine amidine*, AcN.C(:NPr).CH$_2$.NAc.CO.CH$_2$, m. 176°, which gives a neg. ninhydrin reaction; no AcNHPr was found, indicating a possible absence of an Ac group in endo position. An attempted similar reaction with dry NH$_3$ in Et$_2$O failed to take place, possibly because of ready loss of NH$_3$ by the expected 2,5-di-OH adduct, yielding the starting material in the course of the isolation treatment. Treatment of 2 g. 1,4-bis(chloroacetyl)-2,5-diketopiperazine in Et$_2$O with 1.45 g. H$_2$NCH$_2$CO$_2$Et for 20 min. gave the *exo-N-chloroacetylglycine Et ester analog* of II, m. 146° (from EtOAc), and *ClCH$_2$CONHCH$_2$CO$_2$Et*, m. 63°; in EtOH as solvent, the amidine could not be isolated and only 1-piperazine and *EtO$_2$CCH$_2$NH$_2$.HO$_2$CCH$_2$Cl*, m. 108°, were found. Tyrosine Me ester in Et$_2$O similary gave some tyrosine and its unreacted Me ester, as well as the *exo-N-chloroacetyltyrosine Me ester analog* of II, m. 160° (from Me$_2$CO-Et$_2$O).

G. M. Kosolapoff

1951

GARILOV, N. I.

"Structure of macromolecular units of proteins. VI. Preparation of some amides of the dihydropyrazine series and their acylation." by N. I. Garilov, and L. N. Aldinova. (p.289)

SO: Journal of General Chemistry (Zhurnal Obshchoi Khimii) 1951, Volume 21, No. 2

GAVRILOV, N. I.

"Structure of submolecular units of proteins. VII. Some transformations of acylated 2, 5-diketo-piperazines during reaction with aminoacids and amines." by L. N. Akimova and N. I. Gavrilov. (p.294)

SO: Journal of General Chemistry (Zhurnal Obshchei Khimii) 1951, Volume 21, No. 2

GAVRILOV, N.I., professor, redaktor.

[Protein chemistry; collection of articles. Volume 2.] Khimiia belka; sbornik statei. Perevod s angliiskogo. Moskva, Izd-vo inostrannoi lit-ry, 1952-

(MLRA 6:5)
(Proteins)

N. I. GAVRILOV

USSR/Chemistry - Proteins Jul/Aug 52

"Types of Bonding in Proteins and Methods of Synthesizing Models of Protein Microstructures," N.I. Gavrilov, L.N. Akimova, Moscow

"Uspekhi Khim" Vol XXI, No 4, pp 483-495

Review subject from the viewpoint of work done by themselves and other USSR investigators. List 33 references, of which 20 are Russian.

216T26

GAVRILOV N. I.

238T35

USSR/Chemistry - Amino Acids Nov 52

"Imidines of Amino Acids: I. Synthesis of Imino Ethers of Amino Acids," A. N. Bekhteyev (dec) and N. I. Gavrilov, Chair of Org Chem, Moscow State U

"Zhur Obshch Khim" Vol 22, No 11, pp 2021-2029

A method of synthesizing imino ethers of α-amino acids was developed, and its applicability for synthesizing imino ethers of the aromatic and β-series was demonstrated. The imino ethers so formed were comparatively stable in a surplus of alc satd with hydrogen chloride. This permitted

238T35

the products of the reaction to be sepd out in sufficiently pure state. The effect of the position of the amino group on the rate at which imino ethers of α- and β-amino acids were formed was recorded. A series of new imino ethers of α-amino acids was prepared. Representatives of the aromatic and β-series were similarly prepd.

238T35

USSR/Chemistry - Amino Acids Nov 52

"Amidines of Amino Acids, II," A. N. Baksheyev(dec), and N. I. Gavrilov, Moscow State U, Chair of Org Chem

"Zhur Obshch Khim" Vol 22, No 11, pp 2030-2035

A series of N-substituted amidines of amino acids was synthesized. Certain dipicrates were sepd out. In most cases, these picrates were easily and directly obtained by the combination of the salt of dimethylaminoacetiminomethyl ether with the picrate of the corresponding amine in an alc soln. The

238T36

tendency of the imino ethers of α-amino acids to form only monosubstituted amidines was noted, whereas β-dimethylaminopropyliminomethyl ether, when reacting with aniline under analogous conditions (depending on the reagent ratio) readily provides both mono- and disubstituted amidines. The treatment of the dihydrochloride of aminoisobutyriminomethyl ester with pyridine led to the hydrochloride of aminoisobutyramide.

238T36

GAVRILOV N. I.

GAVRILOV, N. I.

(12) Chem

Amidines of amino acids. I. Synthesis of imido ethers of amino acids. II. A. N. Rekshcev and N. I. Gavrilov. *J. Gen. Chem. U.S.S.R.* 22, 2077-84, 2085-9(1952)(Engl. translation).—See *C.A.* 47, 8641e. H. L. H.

GAVRILOV, N. I.

Chemical Abst.
Vol. 48 No. 9
May 10, 1954
Organic Chemistry

Microstructure of protein. X. Substituted N-aminoacyl derivatives of dioxopiperazines. L. N. Akimova and N. I. Gavrilov. *J. Gen. Chem. U.S.S.R.* 22, 2207–17 (1952)(Engl. translation).—See *C.A.* 48, 12699*d*. XI. Some reactions of diacyldioxopiperazines. *Ibid.* 2219–27.—See *C.A.* 48, 1270*i*. H. L. H.

1. AKIMOVA, L. N., GAVRILOV, N. I.

2. USSR (600)

4. Piperazine

7. Microstructure of protein. Part 11. Some reactions of diacyldiketopiperazines. Zhur. ob. khim. 22 No. 12, 1952.

9. Monthly List of Russian Accessions, Library of Congress, May 1953. Unclassified.

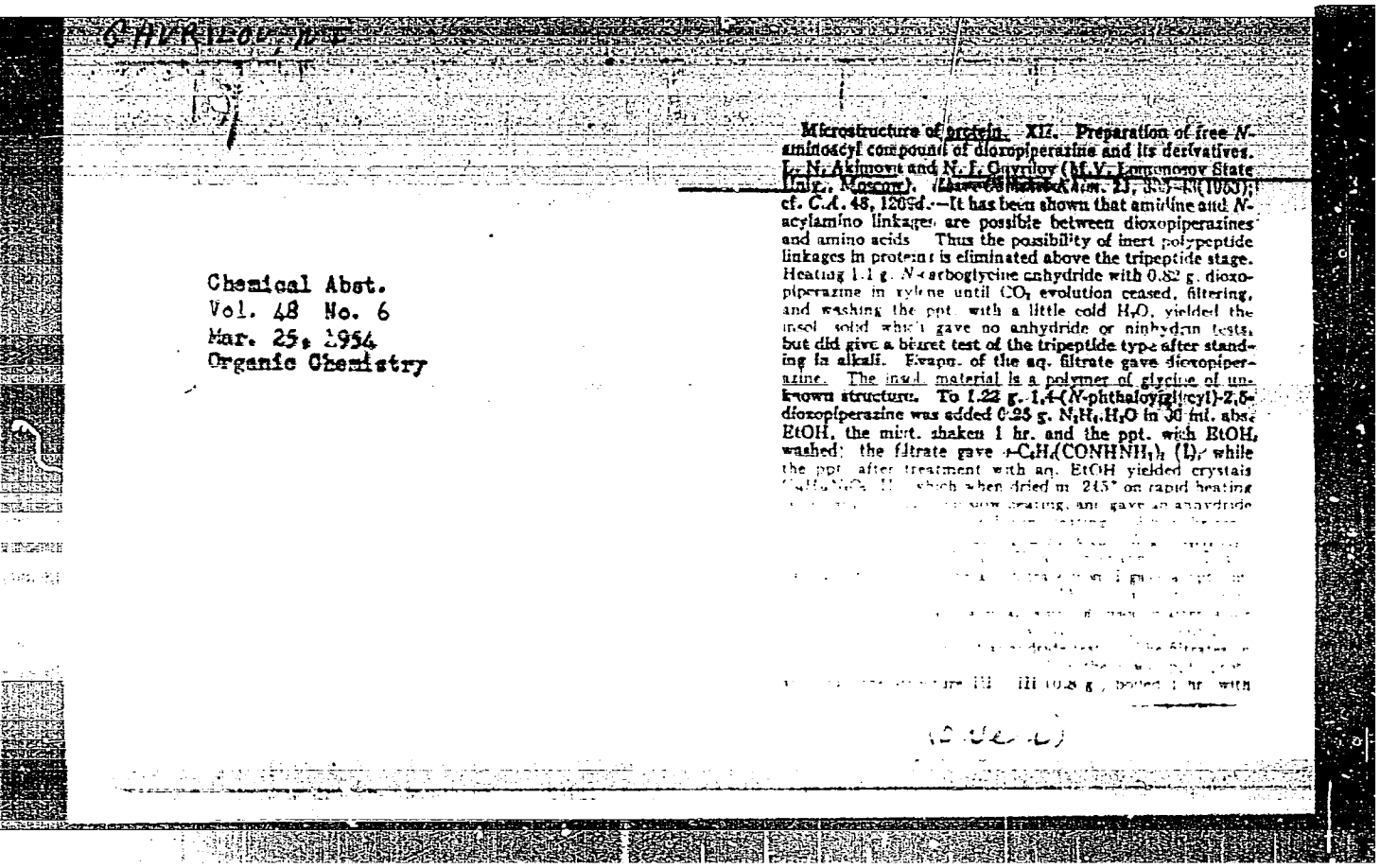
GAVRILOV, N. (,

Gavrilov, N. Akhinova, L.
"Systems of association and ways of synthetizing models of protein microstructures. Tr. from the Russian" p. 70.
(Analele Romano-Sovietice, Seria Chimie, Series a III-a, v. 5, no. 1, 1953, Bucuresti)

SO: Monthly List of East European Accessions, Vol. 2, No. 9, Library of Congress, September 1953, Uncl.

GAVRILOV, N.I. (Moscow)

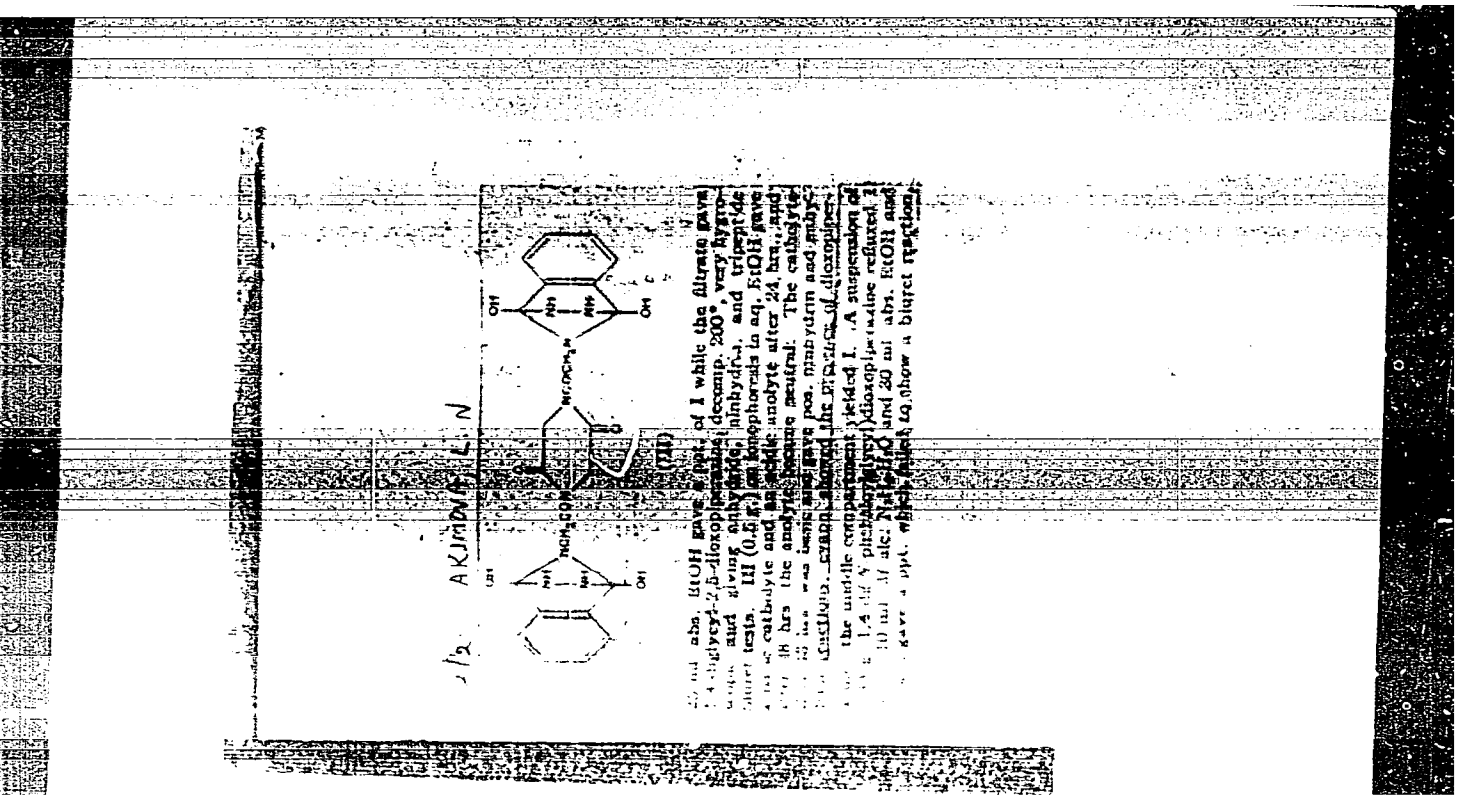
Chemical nature of proteins. Biokhimiia 18 no.3:376-384 My-Je '53.
(MLRA 6:7)
(Proteins)

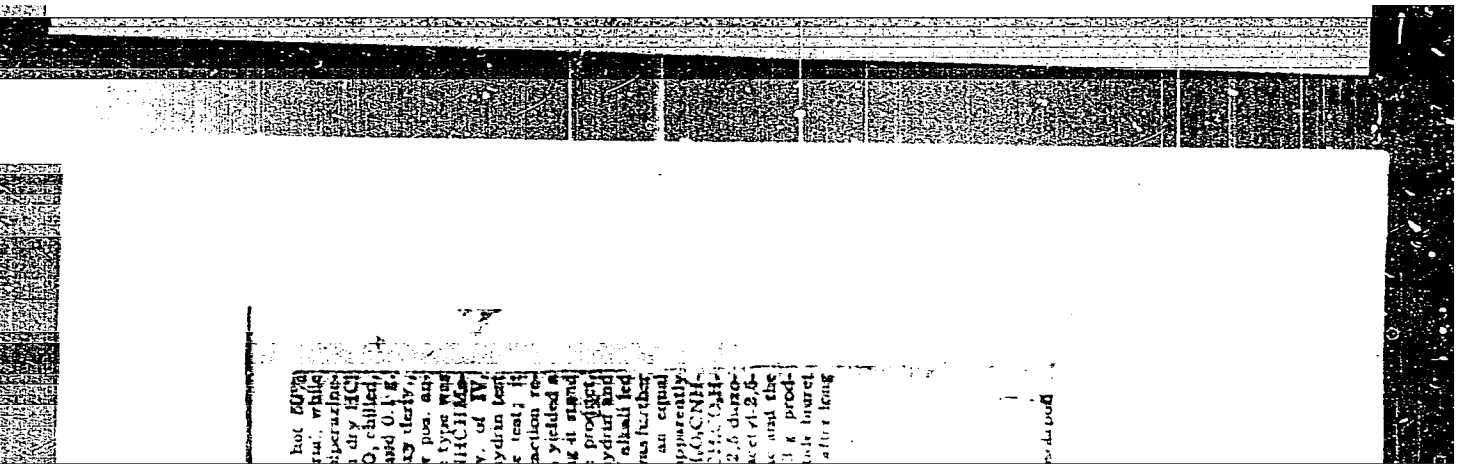


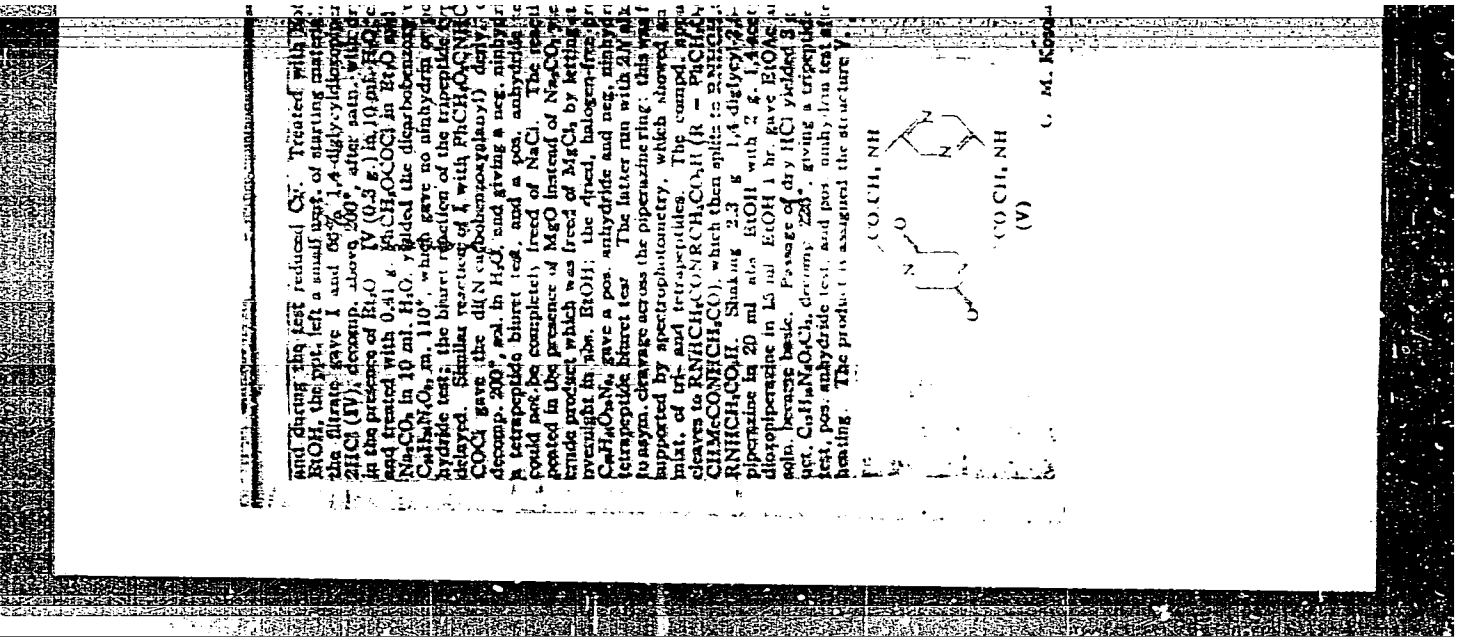
Chemical Abst.
Vol. 48 No. 6
Mar. 25, 1954
Organic Chemistry

Microstructure of protein. XII. Preparation of free *N*-aminoacyl compounds of dioxopiperazine and its derivatives. L. N. Akimova and N. I. Chyrylov (M. V. Lomonosov State Univ., Moscow). [illegible] cf. *C.A.* 48, 1205d.—It has been shown that amidine and *N*-acylamino linkages are possible between dioxopiperazines and amino acids. Thus the possibility of inert polypeptide linkages in proteins is eliminated above the tripeptide stage. Heating 1.1 g. *N*-carboglycine anhydride with 0.82 g. dioxopiperazine in xylene until CO_2 evolution ceased, filtering, and washing the ppt. with a little cold H_2O, yielded the insol. solid which gave no anhydride or ninhydrin tests, but did give a biuret test of the tripeptide type after standing in alkali. Evapn. of the aq. filtrate gave dioxopiperazine. The insol. material is a polymer of glycine of unknown structure. To 1.22 g. 1,4-(*N*-phthaloylglycyl)-2,5-dioxopiperazine was added 0.25 g. $N_2H_4.H_2O$ in 30 ml. abs. EtOH, the mixt. shaken 1 hr. and the ppt. with EtOH, washed; the filtrate gave o-$C_6H_4(CONHNH_2)_2$ (I), while the ppt. after treatment with aq. EtOH yielded crystals [illegible] which when dried at 245° on rapid heating [illegible] gave an anhydride [illegible] III 10.8 g., boiled 1 hr. with

(I)







GAVRILOV, N. I.

Chemical Abst.
Vol. 48
Apr. 10, 1954
Organic Chemistry

6

(3)

Carboanhydrides of amino acids as a structural fragment in protein molecule. L. N. Akimova and N. I. Gavrilov (M. V. Lomonosov State Univ., Moscow). *Zhur. Obshchei Khim.* 23, 417-28(1953).—In further attempts to establish the nature of the links of proteins to replace the unlikely simple peptide linkage (cf. *C.A.* 47, 2001*h*) the carboanhydride link was examd. Such links can exist in the form of ring-closing units (true anhydrides) in diacylated piperazinedione structures, or in the form of simple linear anhydrides. Several simple anhydrides were prepd. and the formation of acylated 2,5-piperazinediones from them was established. Heating 2 g. *N*-phthaloylglycine (I) with 2.5 g. $(COCl)_2$ 48 hrs. in C_6H_6 gave 99% *N-phthaloylglycine anhydride* (II) $[o\text{-}C_6H_4(CO)_2NCH_2CO]_2O$, m. 215° (from $PhNO_2$). This (3.9 g.) heated with 1.1 g. 2,5-piperazinedione in $PhNO_2$ 0.75 hr. at 140° gave a ppt. of *1,4-bis(N-phthaloylglycyl)-2,5-piperazinedione*, m. 385° (cf. *C.A.* 45: 10219*b*) and I. Heating 1.3 g. phthaloylglycylglycine with 1.3 g. $(COCl)_2$ in C_6H_6 6 hrs., extn. of the ppt. with Me_2CO, and heating the insol. portion with xylene gave the mixed anhydride $o\text{-}C_6H_4(CO)_2NCH_2CONHCH_2CO_2C(O)OCCl$, decomp. 220° (from $PhNO_2$). I (0.84 g.) in 10 ml. dioxane treated with 0.4 ml. Et_3N, then at 10° with 0.4 ml. EtO_2CCl, and after 10 min. with 0.84 g. I in dioxane, gave 93% ppt. identified as II, m. 215°. Treatment of 0.94 g. $MeCH(NHCO_2CH_2Ph)CO_2H$ (III) in dioxane with 0.45 ml. Et_3N, then with 0.4 ml. EtO_2CCl, and 0.94 g. III in dioxane, gave after 1 hr. (CO_2 evolution) *N-(benzyloxycarbonyl)alanine anhydride*, $C_{22}H_{22}O_7N_2$, square plates, m. 143° (from $PhNO_2$). Similarly, $PhCH_2OCNHCH_2CO_2H$ (IV) treated with $ClCO_2Et$ in the presence of Et_3N in dioxane, then with III, gave 50% $(PhCH_2O_2CNHCH_2CO)_2O$ (V), m. 114° (from $PhNO_2$). A more satisfactory procedure, developed later, for prepn. of the anhydrides is illustrated below: 4.18 g. IV in 20 ml. dioxane was treated with 2.4 ml. $Me_2NCH_2CHMe_2$, then at 10° with 1.9 ml. EtO_2CCl, and after 10 min. with 4.18 g. IV in 20 ml. *N* NaOH, and the ppt. filtered after 5 min., yielding 81% V, m. 110°; after

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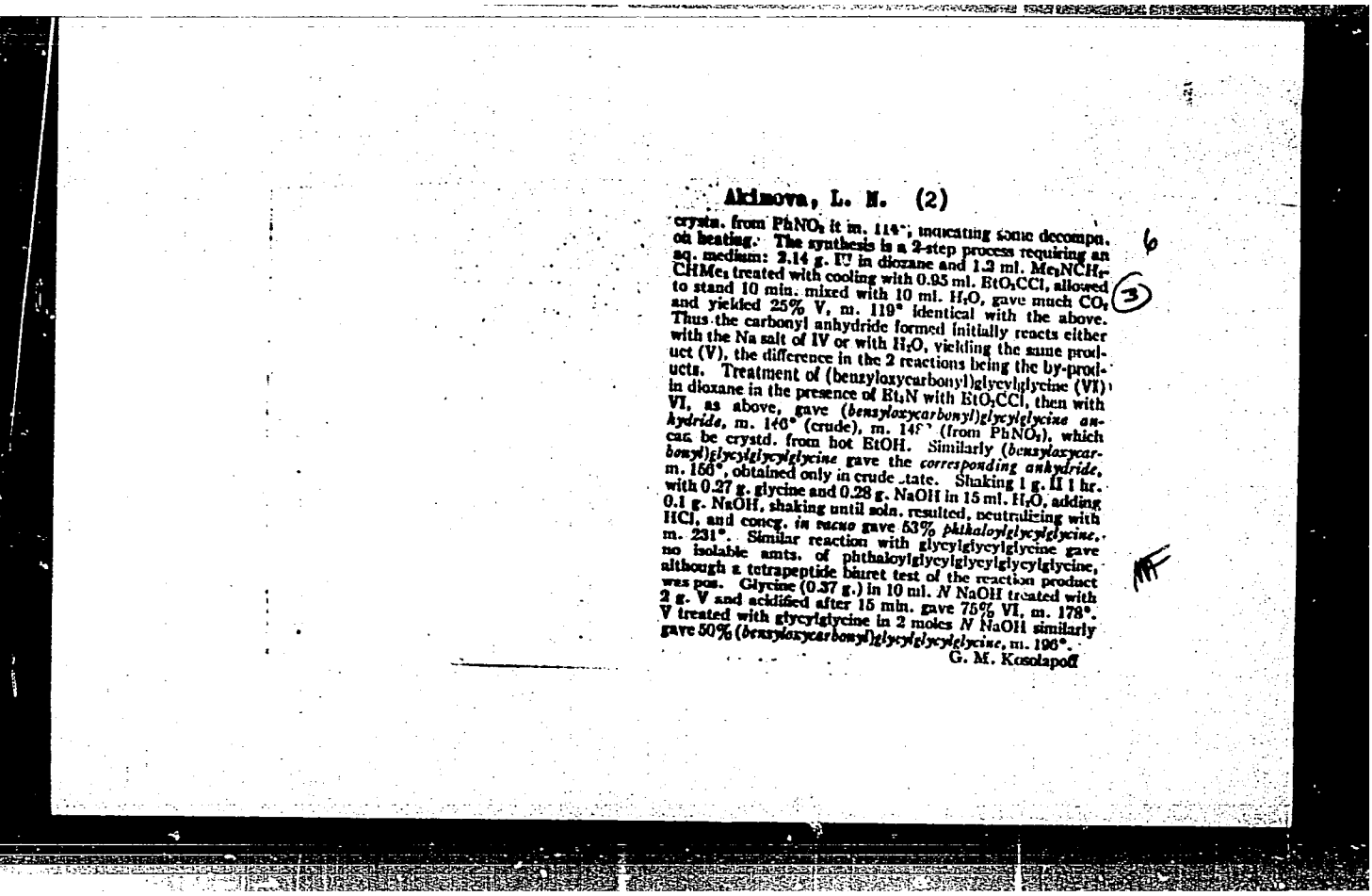


Akimova, L. N. (2)

crysts. from $PhNO_2$ it m. 114°; indicating some decompn. on heating. The synthesis is a 2-step process requiring an aq. medium: 2.14 g. IV in dioxane and 1.2 ml. $Me_2NCH_2CHMe_2$ treated with cooling with 0.95 ml. EtO_2CCl, allowed to stand 10 min. mixed with 10 ml. H_2O, gave much CO_2 and yielded 25% V, m. 119° identical with the above. Thus the carbonyl anhydride formed initially reacts either with the Na salt of IV or with H_2O, yielding the same product (V), the difference in the 2 reactions being the by-products. Treatment of (benzyloxycarbonyl)glycylglycine (VI) in dioxane in the presence of Et_3N with EtO_2CCl, then with VI, as above, gave *(benzyloxycarbonyl)glycylglycine anhydride*, m. 140° (crude), m. 148° (from $PhNO_2$), which can be crystd. from hot EtOH. Similarly *(benzyloxycarbonyl)glycylglycylglycine* gave the *corresponding anhydride*, m. 166°, obtained only in crude state. Shaking 1 g. II 1 hr. with 0.27 g. glycine and 0.28 g. NaOH in 15 ml. H_2O, adding 0.1 g. NaOH, shaking until soln. resulted, neutralizing with HCl, and concg. *in vacuo* gave 53% *phthaloylglycylglycine*, m. 231°. Similar reaction with glycylglycylglycine gave no isolable amts. of phthaloylglycylglycylglycylglycine, although a tetrapeptide biuret test of the reaction product was pos. Glycine (0.37 g.) in 10 ml. *N* NaOH treated with 2 g. V and acidified after 15 min. gave 75% VI, m. 178°. V treated with glycylglycine in 2 moles *N* NaOH similarly gave 50% *(benzyloxycarbonyl)glycylglycylglycine*, m. 196°.

G. M. Kosolapoff

IOANISIANI, P.G.; GAVRILOV, N.I.

Formol titration with application of a glass electrode. Biokhimiia 19 no.3:345-348 My-Je '54. (MLRA 7:8)

1. Kafedra organicheskoy khimii Moskovskogo gosudarstvennogo universiteta.

(FORMALDEHYDE,
titration of amino acids with glass electrode)
(AMINO ACIDS,
titration, formol technic with glass electrode)

GAVRILOV, N. I.

USSR/Chemistry - Albumina

Card 1/1 Pub. 151 - 32/38

Authors : Akimova, L. N., and Gavrilov, N. I.

Title : Carbonaceous amino acid anhydrides as a structural fragment in an albumina molecule. Part 2.-

Periodical : Zhur. ob. khim. 24/2, 361-364, Feb 1954

Abstract : The reaction process during the derivation of mixed anhydrides from carbobenzoxytyrosine and chlorocarbonic ester is described. Ferments which hydrolyze the carboanhydride bond were not discovered in trypsin and pepsin fermentation systems. It was found that the hydrolysis of a carbon glycol anhydride is very smooth in an alkaline medium but becomes retarded in the acid zone of the solution. The effect of hydrogen ion concentrations on the stability of such anhydrides is explained. Three references: 1-USSR and 2-German (1924-1953). Table.

Institution : State University, Moscow

Submitted : July 20, 1953

GAVRILOV, N. I.

USSR/Chemistry - Biochemistry

Card 1/1 Pub. 151 - 33/38

Authors : Ioanislani, P. G.; Gavrilov, N. I.; and Plekhan, M. I.

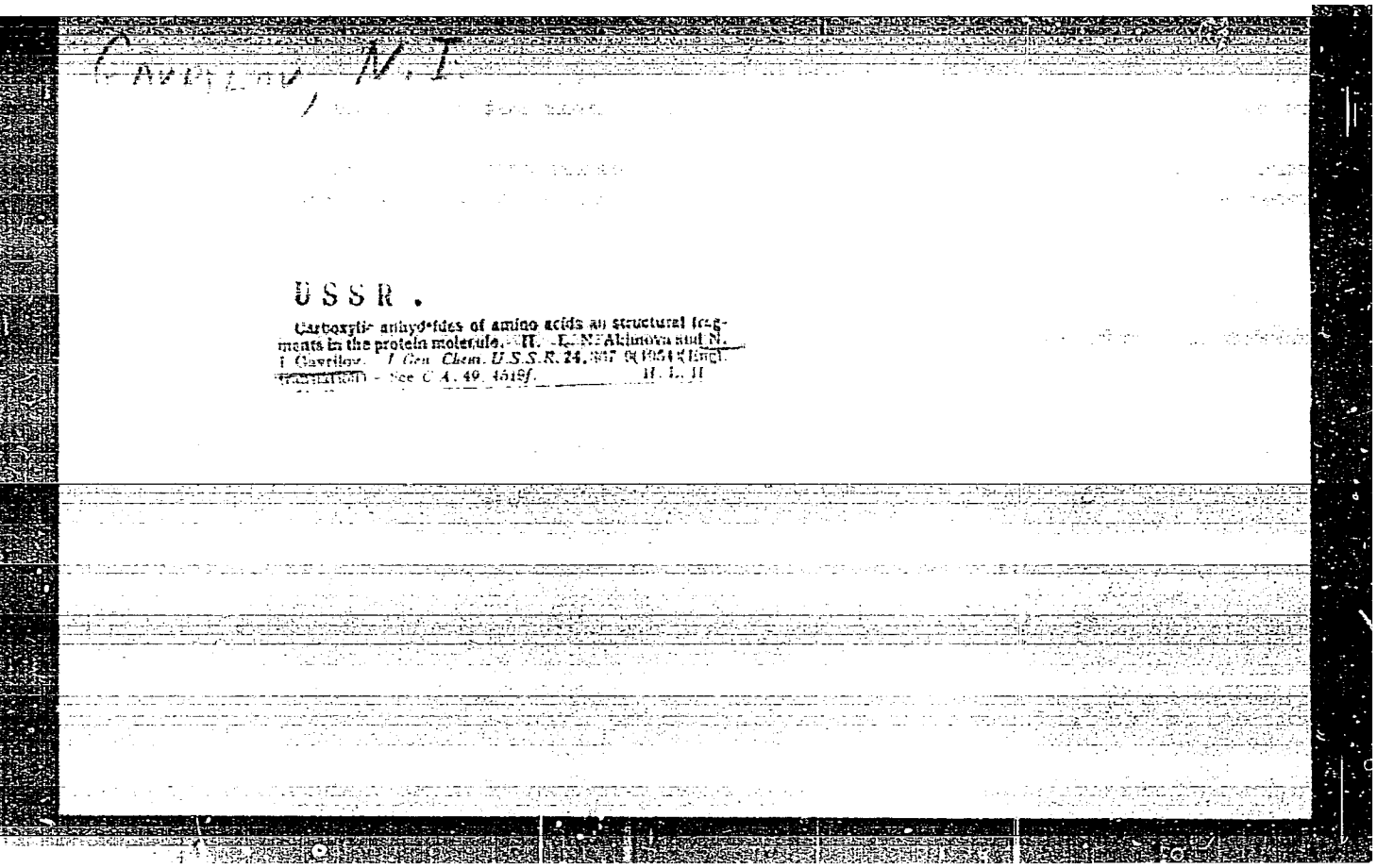
Title : The structure of gramicidin C. Part 1.- Reduction of gramicidin C.

Periodical : Zhur. ob. khim. 24/2, 364-369, Feb 1954

Abstract : The existence in gramicidine C of two diketopiperazine and tripeptide fragments, the first one of which contains proline, was established experimentally The peptides found in the products of incomplete gramicidin C hydrolysis are listed. The structural formula for the gramicidin C monomer is presented. Various characteristics of gramicidin C are described. Twelve references: 8-USSR; and 1-French; 3-USA (1939-1953). Tables.

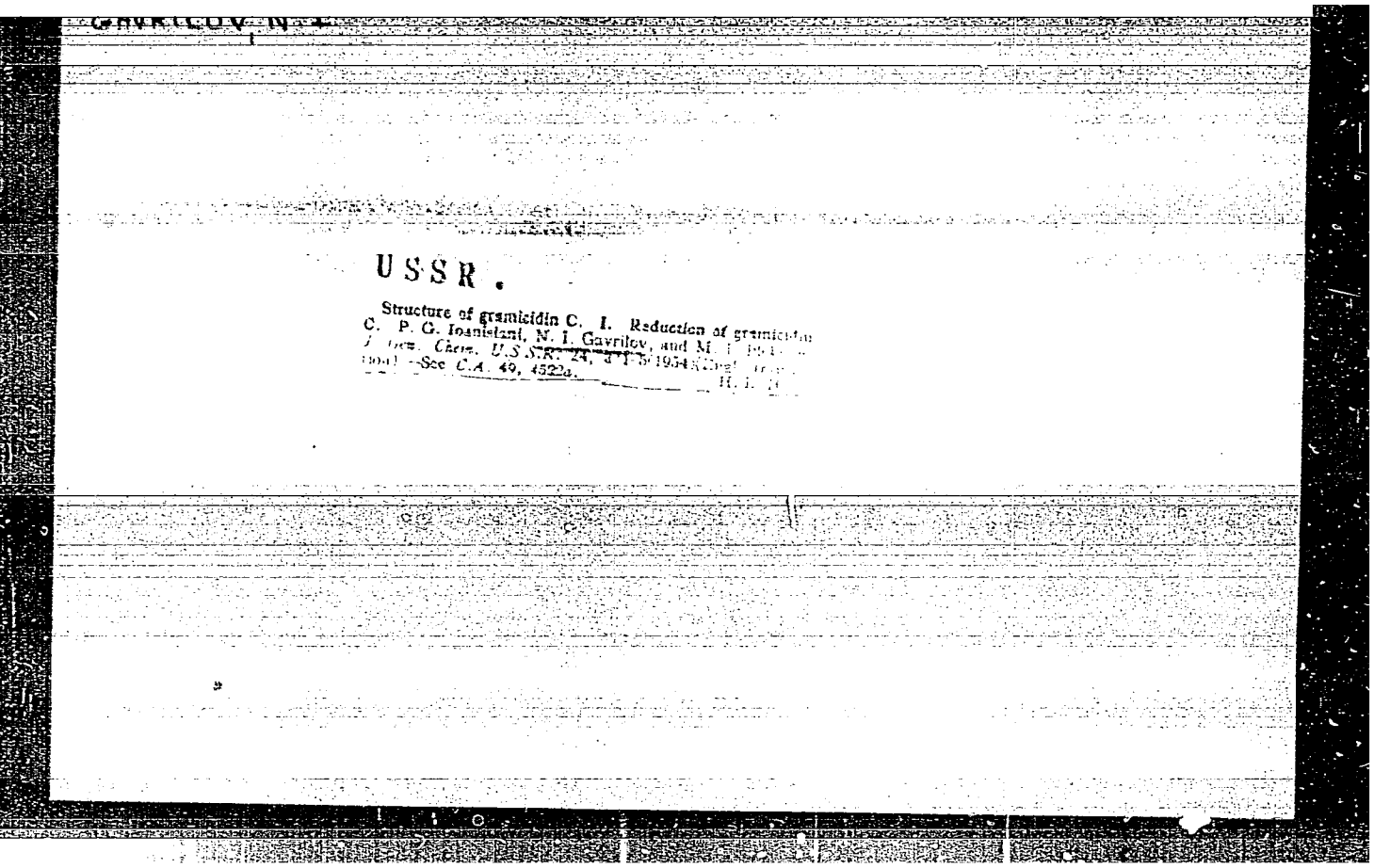
Institution : The M. V. Lomonosov State University, Moscow

Submitted : August 7, 1953



USSR .

Carboxylic anhydrides of amino acids as structural fragments in the protein molecule. II. L. N. Akimova and N. I. Gaverilov. *J. Gen. Chem. U.S.S.R.* 24, 987-9 (1954) (Engl. translation) - See *C. A.* 49, 4519f.



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Structure of gramicidin C. I. Reduction of gramicidin C. P. G. Ioanidani, N. I. Gavrilov, and M. [illegible]. *J. Gen. Chem. U.S.S.R.* 24, 1 [illegible] (1954). See *C.A.* 49, 4522a.

GAVRILOV, N. I.

USSR/Chemistry - Biochemistry

Card 1/1 : Pub. 151 - 34/37

Authors : Gavrilov, N. I., and Akimova, L. N.

Title : Amount of chain and cyclic alpha-amino acid bonds in an albumin molecule

Periodical : Zhur. ob. khim. 24/3, 563-571, Mar 1954

Abstract : The quantitative participation of tripeptides and diketopiperazines in the formation of an albumin monomer was investigated. The difficulties involved because of the presence of large amounts of prosthetic groups of unknown structure in the albumina are explained. Numerous albumina were characterized by their copper number, by the cyclic form of the bond and absorption spectra of the Cu-complexes inherent in their structure. The determined copper numbers of the albumina offer a quantitative representation of the participation of chain and cyclic bonds in the formation of the albumen. Ten references: 5-USSR; 3-German and 2-USA (1908-1954). Tables; graph.

Institution : State University, Moscow

Submitted : July 20, 1953

GAVRILOV, N. I.

USSR/Chemistry - Antibiotics

Card : 1/1

Authors : Akinova, L. N., and Gavrilov, N. I.

Title : Structure of Gramicidin C. Part 2. - Study of the Formation of Cupric Gramicidin Complexes

Periodical : Zhur. Ob. Khim., 24, Ed. 6, 1064 - 1078, June 1954

Abstract : Experiments were conducted for the purpose of solving certain unexplained problems connected with the structure of gramicidin in the expectation that this would lead to the synthesis of this antibiotic. Incomplete data show that gramicidin C has a piperazine cycle, formed by phenylalanine and proline. Gramicidin is a dimer. The molecule of the original gramicidin has tripeptide which together with copper in an alkali medium gives a complex with a maximum absorption of 570 - 575 mμ. The displacement of the absorption maximum, toward the short wave band, was observed in the amide-tripeptide complex, containing asparagine. Five references. Tables, graphs.

Institution : State University, Moscow

Submitted : July 20, 1953

USSR/ Chemistry Polymers

Card : 1/1 Pub. 151 - 31/33

Authors : Akimova, L. N., and Gavrilov, N. I.

Title : About polymers of amino-acids

Periodical : Zhur. ob. khim. 24/8, 1457 - 1464, August 1954

Abstract : The principle difference in the behavior and characteristics of polymers and albumina, is explained. The most interesting of all polymer characteristics were found to be their copper biuret complexes. The cupric numbers of albumina clearly show the tripeptide nature of individual fragments, whereas the cupric complexes of polymers can most accurately be compared with tetrapeptides and peptides. Twelve references: 7 USA; 1 Japanese; 1 Swiss; 1 German and 2 USSR (1906 - 1954). Tables; graphs.

Institution : State University, Moscow

Submitted : March 15, 1954

Gavrilov, N.L.

Microstructure of proteins. XIII. Behavior of diacetyldioxopiperazine in its reaction with amines. R. G. Petrova, L. N. Akimova, and N. L. Gavrilov (Moscow State Univ.). *Zhur. Obshchei Khim.* 24, 2230–7(1954); cf. *C.A.* 49, 4007*e*.—Among the various reactions between *N,N'*-diacetyldioxopiperazine (I) with amines is that in which there is formed *N*-acetyldioxopiperazine (II). Shaking I with $H_2NCH_2CO_2Et$ several hrs. in Et_2O gave on extn. with $MeCO_2H$ an unstated yield of II, m. 180°, while the soln. yielded the aceturic ester, m. 43°; the Me ester reacts similarly; the result is similar in C_6H_6. Shaking I, mole I with 2 moles $PrNH_2$ in Et_2O with ice-cooling again gave II, and PrNHAc. Similarly, I and $PhNH_2$ (2 g. and 1.58 g., resp.) gave 1.5 g. II and AcNHPh in Et_2O solvent, while in C_6H_6 the yield of II was unstated. $PhCH_2NH_2$ gave 95–8% II. I and Bu_2NH in Et_2O gave 94% II and Bu_2NAc. I and dioxopiperazine (IIa) refluxed 3 hrs. in EtOH gave II. I and 2-$C_5H_7NH_2$ in Et_2O gave 17.4% II in 3 days; no reaction took place between I and $PhNH_2$ in EtOH. Heating II in dry alc. HCl gave IIa and *H-NCH₂CONHCH₂CO₂Et·HCl* (IV), m. 182°. Heating II with Ac_2O gave I. Hydrolysis of II with 0.1*N* HCl gave IIa and IV, if the reaction is run in dry EtOH; alc. NaOH and II gives III.

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NCH_2CO_2H at 125–30° 0.5 hr. gave IIa and aceturic acid, m. 206°. II stirred with alc. NaOH at room temp. gave III. Shaking II with $PhCH_2NH_2$ in abs. EtOH 1 hr. gave IIa and III; similar reaction with Bu_2NH in EtOH gave the same result; no reaction took place between I and $PhNH_2$ in EtOH. Heating II in dry alc. HCl gave IIa and *H-NCH₂CONHCH₂CO₂Et·HCl* (IV), m. 182°. Heating II with Ac_2O gave I. Hydrolysis of II with 0.1*N* HCl gave IIa and IV, if the reaction is run in dry EtOH; alc. NaOH and II gives III.

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FD-1685

USSR/Chemistry - Biochemistry

Card 1/1 : Pub. 129-10/25

Author : Makarov, K. S. and Gavrilov, N. I.

Title : Electrophoresis, electroreduction, and spectrophotometry of plasteins

Periodical : Vest. Mosk. un. Ser. fizikomat. i yest. nauk, Vol 10, 81-88, Feb 1955

Abstract : Showed by electrophoretic diagrams that plastein is not a fraction of casein. Conducted electrophoretic analysis of plastein obtained from human serum albumin hydrolyzate as prepared by enzyme hydrolysis. The plastein thus obtained differs from the plastein from casein in amino acid nitrogen content. Also prepared copper complexes of the plasteins and analysed them electrophoretically. Studied the electrophoresis of casein electroreduction. Tables, diagrams. Fourteen references (twelve USSR).

Institution : Chair of Organic Chemistry

Submitted : Jun 26, 1954

GAVRILOV, N.I.

USSR/Organic Chemistry - Naturally Occurring Substances and Their Synthetic Analogs, E-3

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61681

Author: Gavrilov, N. I., Ioanisiani, P. G.

Institution: None

Title: On the Amount of Cyclic α-[illegible]ine Bonds of Amino Acids in Some Proteins

Original P[illegible]dical: Zh. obshch. khimii, 1955, 25, No 9, 1802-1812

Abstract: On electric reduction (ER) of derivatives of diketopiperazines (DP) 2 reactions occur: in the case of aminoacyl-DP there are formed piperazines of peptides; in the case of amidine derivatives of DP ER is accompanied by formation of free piperazines and a splitting off of peptides [illegible] terminal amino group of which can be determined by the gasometric method. ER was carried out at a movable mercury electrode according to the method of Gavrilov and Koperina (Zh. obshch. khimii, 1947, 17, 955, 1651). Changes in procedure involve

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[illegible] (16.2), VI 13.9 (16.1). Respectively, N of DP in % of total N were found to be 27.6; 46.8; 31.03; 30.9; 23.1 and 40.0. Procedures used for the analysis of [illegible]ein hydrolysates before and after ER were checked with an artificial mixture of amino acids corresponding to the [illegible] formol titration with the use of

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