No. 44 1974

BULLETIN

OF THE INTERNATIONAL SOCIETY
OF SOIL SCIENCE

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BULLETIN

DE L'ASSOCIATION INTERNATIONALE
DE LA SCIENCE DU SOL

•

MITTEILUNGEN

DER INTERNATIONALEN BODENKUNDLICHEN
GESELLSCHAFT

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DRUKKERIJ SYSTEMA B.V. — AMSTERDAM (HOLLAND)

INTERNATIONAL SOCIETY OF SOIL SCIENCE

ASSOCIATION INTERNATIONALE DE LA SCIENCE DU SOL

INTERNATIONALE BODENKUNDLICHE GESELLSCHAFT

Office/Bureau: c/o Royal Tropical Institute, 63 Mauritskade, Amsterdam, Netherlands

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No. 44 **1974**

NEWS OF THE SOCIETY

Xth International Congress of Soil Science
Moscow, 12-20 August, 1974
Fifth circular

I. **Programme of the Congress**

August 9-11	9.00-22.00	Registration of arriving participants.
	9.00-18.00	Scientific excursions and sightseeing tours of Moscow.
August 11	*16.00-18.00*	*I.S.S.S. Council Meeting.*
August 12		Congress Opening Ceremony.
	10.00-13.00	Plenary Meeting.
	16.00-18.30	Commissions Meetings.
August 13-16	10.00-14.00 16.00-18.30	Commissions Meetings.
August 17	10.00-14.00	I.S.S.S. Council Meeting.
	10.00-14.00	Commissions Meeting.
	16.00-18.30	I.S.S.S.Jubilee Meeting for all members.
	19.00	Concert.
August 18		Free.
	10.00-18.00	Sightseeing tours of Moscow.
August 19	10.00-14.00 16.00-18.30	Symposia Meetings.
August 20	10.00-14.00	I.S.S.S. Council Meeting.
	10.00-14.00	Symposia Meetings.
	16.00-18.30	Congress Closing Ceremony.
	19.30	A farewell party for participations and accompanying persons.
August 12-20	9.00-21.00	Scientific excursions and sightseeing tours of Moscow.
August 21	Departure of post-Congress tours.	

August 21-
September 3 Termination of the Tours viz.:

Tour 1 - August 31
Tour 2 - August 25
Tour 3 - August 31
Tour 4 - September 2
Tour 4a - September 3
Tour 5 - August 30
Tour 6 - August 31
Tour 7 - August 31
Tour 8 - September 2

II. Scientific excursions in Moscow

Visits to the following scientific institutions are planned for Congress participants:

— The Museum of Earth Sciences of Moscow State University.
— Wilyams Soil-Agronomic Museum of Moscow Agricultural Academy.
— Dokuchaev Soil Institute and other institutions.

III Sightseeing tours of Moscow

The following tours will be offered to Congress participants:

— Bus excursions round Moscow.
— Visits to the Moscow Kremlin, Exhibition of Economic Achievements of the USSR, State Tretyakov Art Gallery.
— Cutter trip on Moskwa river.

At an additional fano Intourist also offers visits to ancient Russian towns of Vladimir and Suzdal, to Zagorsk, Arkhangelskoye, Kuskovo, Lev Tolstoy museum in Yasnaya Polyana, Chaikovsky's house in Klin.

IV. Exhibitions

Three scientific exhibitions will be open in Moscow from 8-20 August, 1974:

— "Pochvovedenie (Soil Science) - 74" — the international exhibition of equipment and devices used in soil science, agrochemistry and agriculture (at the territory of the Exibition of Economic Achievements of the USSR - VDNKh).
— "Soil-fertilizer-yield" exhibition demonstrating achievements in the field of chemicalization in agriculture, erosion control and plant protection in the USSR (at the territory of VDNKh).
— Exhibition of soil maps and literature on soil science (in Moscow State University).

V. Post-Congress tours: additional information

These are the official names of the tours offered:

Tour 1 - "The East European plain. Forest-steppe and steppe zones".
Tour 2 - "Forest zone. Central Russia".
Tour 3 - "Forest zone. Karelia and Komi Autonomous Republic".
Tour 4 - "Transcaucasus. Georgia and Azerbaijan".
Tour 4a - "Transcaucasus. Georgia and Armenia".
Tour 5 - "North Kazakhstan".
Tour 6 - "Western Siberia".
Tour 7 - "Central Asia".
Tour 8 - "The Povolj'e.

Participants of all the tours will enjoy the Intourist services according to the first class category except tour 6 which provides the tourist class category in all points (but Novosibirsk), overnight stays in tents are possible.

Special attention to tour 8

For the first time in the practice of International Congresses held in the USSR participants can join the Volga river cruise on board a modern comfortable motor

ship "N. A. Nekrasov". They will study a number of soil profiles and visit points of scientific and touristic interest at each of the ship's stays.

The cost of the first class category is 280 roubles, of the second class category 250 roubles.

The tour starts in Kazan and is terminated in Rostov-on-Don.

The costs of flights from Moscow to Kazan and from Rostov-on-Don back to Moscow are included in the tour fare.

VI. **Communications**

Ten minutes are given to present a paper, five minutes for discussion.

As the authors will not be able to present the whole of their papers during the ten minutes given, they are kindly requested to hand short texts and summaries of their communication to the scientific secretaries of corresponding commissions before the Congress.

VII. **The Transactions**

The Transactions of the 10th International Congress of Soil Science are being prepared for publication and will appear before the Congress starts.

They are arranged into 11 volumes in which the papers are grouped according to the topics announced in the Programme of the Congress.

Each volume contains a list of contents in Russian, English, French and German, as well as an index of authors.

VIII. **Registration: preliminary results**

Up till now more than 700 soil scientists from 48 countries have announced their participation by having sent their completed registration forms and remitted registration fees.

The deadline for receipt of registration forms is the 1st of May, 1974.

THE ORGANIZING COMMITTEE

Xe CONGRES INTERNATIONAL DE LA SCIENCE DU SOL

Moscou. 12 - 20 août 1974

5ième circulaire

I. *Programme du Congrès*

9-11 août	9.00—22.00	Enregistrement de l'arrivée des participants
	9.00—18.00	Excursions scientifiques et visites touristiques de Moscou
11 août	10.00—14.00	Réunion du Conseil de l'A.I.S.S.
12 août		Cérémonie d'ouverture du Congrès
	10.00—13.00	Réunion plénière
	16.00—18.30	Réunions de Commissions
13-16 août	10.00—14.00 16.00—18.30	Réunions de Commissions
17 août	10.00—14.00	Réunion du Conseil de l'A.I.S.S.
	10.00—14.00	Réunion des Commissions
	16.00—18.30	Réunion jubilaire de l'A.I.S.S. pour tous les membres
	19.00	Concert
18 août		Temps libre
	10.00—18.00	Visites touristiques de Moscou
19 août	10.00—14.00 16.00—18.30	Réunions des symposiums
20 août	10.00—14.00	Réunion du Conseil de l'A.I.S.S.
	10.00—14.00	Réunions de symposiums
	16.00—18.30	Cérémonie de clotûre du Congrès
	19.30	Séance d'adieu pour les participants et ceux qui les accompagnent
12-20 août	9.00—21.00	Excursions scientifiques et visites touristiques de Moscou
21 août	Départ des excursions post-Congrès	
21 août 3 setembre	Fin des excursions, à savoir:	
	Excursion 1 : 31 août	
	Excursion 2 : 25 août	
	Excursion 3 : 31 août	
	Excursion 4 : 2 septembre	
	Excursion 4a: 3 septembre	
	Excursion 5 : 30 août	
	Excursion 6 : 31 août	
	Excursion 7 : 31 août	
	Excursion 8 : 2 septembre	

II. *Excursions scientifiques dans Moscou*

La visite des unstitutions scientifiques suivantes a été organisée pour les participants au Congrès:

— Le Musée des Sciences de la Terre de l'Université d'Etat de Moscou.
— Le Musée Pédo-agronomique Wilyams de l'Académie d'Agriculture de Moscou.
— L'Institut de Pédologie Dokuchaev et d'autres Institutions.

III. *Visites touristiques de Moscou*

Les excursions suivantes seront proposées aux participants au Congrès:

— Excursion en car à travers Moscou.

— Visite du Kremlin, de l'Exposition des Travaux Economiques de l'URSS, de la Galerie d'Art de l'Etat Tretyakov.

— Excursion en bateau sur la Moskva.

Comme voyage complémentaire Intourist propose également la visite d'anciennes villes russes comme Vladimir et Suzdal, les visites de Zagorsk, Arkhangelskoye, Kuskovo, le musée Lev Tolstoy à Yasnaya Polyana, la maison de Chaikovsky à Klin.

IV. *Expositions*

Trois expositions scientifiques seront ouvertes à Moscou du 8 au 20 août 1974:

— "Pochvovedenie (Science du Sol) — 74" — Exposition internationale d'équipements et d'appareillages utilisés en science du sol, en agrochimie et en agriculture (territoire de l'exposition des travaux économiques de l'URSS - VDNKh).

— Exposition "Sol-engrais-rendement" avec démonstration de travaux sur le terrain d'utilisation de la chimie en agriculture, de la lutte contre l'érosion et de la protection des plantes en URSS (territoire de VDNKh).

— Exposition de cartes de sols et d'ouvrages traitant de la science du sol (à l'Université d'Etat de Moscou).

V. *Excursions post-Congrès: information complémentaire*

Voici les dénominations officielles des excursions proposées:

Excursion 1 : "Plaine européenne orientale. Zones des forêts-steppes et des steppes".

Excursion 2 : "Zone des forêts. Russie centrale".

Excursion 3 : "Zone des forêts. Carélie et République autonome de Komi".

Excursion 4 : "Transcaucasie. Géorgie et Azerbaijan".

Excursion 4a: "Transcaucasie. Géorgie et Arménie".

Excursion 5 : "Kazakhstan septentrional".

Excursion 6 : "Sibérie occidentale".

Excursion 7 : "Asie centrale".

Excursion 8 : "Povolj'e".

Les participants à toutes ces excursions contacteront les services d'Intourist qui prévoit la 1ère classe sauf pour l'excursion 6 qui se fera en classe touriste, le logement sous tente est possible.

Remarque spéciale pour l'excursion 8

Pour la première fois dans les Congrès internationaux qui se tiennent en URSS, les participants pourront rejoindre la Volga sur un bateau moderne et confortable le "N.A. Nekrasov". Ils pourront étudier plusiers profils de sols et visiter des lieux scientifiques et touristiques à chaque escale du bateau.

Le prix est de 280 roubles en 1ère classe et de 250 roubles en 2ème classe.

L'excursion part de Kasan et se termine à Rostov-sur-le-Don. Le retour à *Moscou est prévu dans les frais.*

VI. *Communications*

10 minutes sont accordées pour présenter une communication et 5 minutes pour la discussion.

Les auteurs qui ne sont pas en mesure de présenter toute leur communication sur les 10 minutes accordées, sont priés, de bien vouloir remettre un texte concis et un résumé de leur communication aux sécrétariats scientifiques des commissions *correspondantes avant le congrès.*

VII. *Comptes-rendus*

Les comptes-rendus du Xe Congrès International de la Science du Sol sont en voie de préparation pour publication et seront disponibles avant que ne commence le Congrès.

Ils sont rassemblés en 11 volumes dans lesquels les communications sont groupées en fonction des sujets annoncés dans le programme du Congrès.

Chaque volume comporte la liste des communications en russe, en anglais, en français et en allemand de même qu'un index des auteurs.

VIII. *Inscriptions: premiers résultats*

Jusqu' à présent plus de 700 pédologues appartenant à 48 pays ont annoncé leur participation, ont envoyé les formulaires et ont payé leur inscription.

La dernière limite pour l'envoi des formulaires d'inscription est fixée au 1er mai 1974.

Le Comité d'Organisation

NEUES AUS DER GESELLSCHAFT

10. INTERNATIONALER BODENKUNDLICHER KONGREß IN MOSKAU VOM 12.-20. AUGUST 1974
FÜNFTES RUNDSCHREIBEN

I. Programm des Kongresses

9.-11. August	9.00-22.00	Anmeldung der ankommenden Teilnehmer.
	9.00-18.00	Wissenschaftliche Exkursionen und Stadtbesichtigungen in Moskau.
11. August	16.00-18.00	IBG-Präsidiumssitzung.
12. August		Eröffnungsfeier des Kongresses.
	10.00-13.00	Plenarsitzung.
	16.00-18.30	Kommissionssitzungen.
13.-16. August	10.00-14.00 16.00-18.30	Kommissionssitzungen.
17. August	10.00-14.00	IBG-Präsidiumssitzung.
	10.00-14.00	Kommissionssitzungen.
	16.00-18.30	Jubiläumssitzung für alle Mitglieder.
	19.00	Konzert.
18. August		Frei.
	10.00-18.00	Stadtbesichtigungen in Moskau.
19. August	10.00-14.00 16.00-18.30	Symposiensitzungen.
20. August	10.00-14.00	IBG-Präsidiumssitzung.
	10.00-14.00	Symposiensitzungen.
	16.00-18.30	Abschlußfeier des Kongresses.
	19.30	Abschieds-Party für die Teilnehmer und ihre Begleitpersonen.
12.-20. August	9.00-21.00	Wissenschaftliche Exkursionen und Stadtbesichtigungen in Moskau.
21. August		*Beginn der Exkursionen nach dem Kongreß.*
21. August 3. September		Ende der jeweiligen Exkursionen:

Exkursion 1 : 31. August
Exkursion 2 : 25. August
Exkursion 3 : 31. August
Exkursion 4 : 2. September
Exkursion 4a: 3. September
Exkursion 5 : 30. August
Exkursion 6 : 31. August
Exkursion 7 : 31. August
Exkursion 8 : 2. September

II. Wissenschaftliche Exkursionen in Moskau

Für Kongreßteilnehmer sind Besuche der folgenden wissenschaftlichen Institutionen geplant:

— Museum für Erdwissenschaften der Staatsuniversität Moskau.
— Bodenkundlich-Landwirtschaftliches Museum "Wiljams" der Landwirtschaftlichen Akademie Moskau.
— Bodenkundliches Institut "Dokutschajew" und andere Institutionen.

III. **Stadtbesichtigungen in Moskau**

Den Kongreßteilnehmern sollen folgende Besichtigungsfahrten angeboten werden:

— Busfahrt rund um Moskau.

— Besuche im Moskauer Kreml, Ausstellung wirtschaftlicher Errungenschaften der UdSSR, Staatliche Kunstgalerie Tretjakow.

— Kutter-Ausflug auf dem Moskau-Fluß.

Zu einem besonderen Preis bietet Intourist außerdem an:

Besuche in den alten russischen Städten Wladimir und Susdal, nach Sagorsk, Archangelsk, Kursk, dem Leo-Tolstoi-Museum in Jasnaja Poljana und Tschaikowskis Haus in Klin.

IV. **Ausstellungen**

Drei wissenschaftliche Ausstellungen werden in Moskau vom 8.-20. August 1974 geöffnet sein:

— "Potschowedenje (Bodenkunde) - 74" — die internationale Ausstellung von Geräten und Apparaten für Bodenkunde, Agrikulturchemie und Landwirtschaft (auf dem Gelände der Ausstellung der wirtschaftlichen Errungenschaften der UdSSR - VDNKh).

— "Boden-Düngung-Ertrag", Ausstellung zur Demonstration von Leistungen auf dem Gebiet der Chemikalisierung der Landwirtschaft, des Erosionsschutzes und des Pflanzenschutzes in der UdSSR (auf dem Gelände der VDNKh).

— Ausstellung von Bodenkarten und bodenkundlicher Literatur (in de Staatsuniversität Moskau).

V. **Exkursionen nach dem Kongreß: zusätzliche Information**

Nachstehend die Bezeichnung der vorgesehenen Exkursionen:

Exkursion 1 : "Die osteuropäische Ebene. Waldsteppe und Steppengürtel".
Exkursion 2 : "Waldgürtel. Zentralrußland".
Exkursion 3 : "Waldgürtel. Karelien und Autonome Republik Komi".
Exkursion 4 : "Transkaukasien. Georgien und Aserbaidschan".
Exkursion 4a: "Transkaukasien. Georgien und Armenien".
Exkursion 5 : "Nord-Kasachstan".
Exkursion 6 : "West-Sibirien".
Exkursion 7 : "Zentralasien".
Exkursion 8 : "Gebiet der unteren Wolga".

Die Teilnehmer aller Exkursionen werden den Intourist-Servic der 1. Klasse genießen, außer Exkursion 6, für die in allen Punkten (außer Nowosibirsk) Touristen-Klasse vorgesehen ist, möglicherweise mit Übernachtung in Zelten.

Besonderer Hinweis für Exkursion 8

Erstmals in der Praxis der Internationalen Kongresse, die in der UdSSR stattfinden, können sich Teilnehmer zu einer Kreuzfahrt auf der Wolga zusammenfinden. Hierfür steht das moderne, komfortable Motorschiff "N. A. Nekrasow" zur Verfügung. Sie werden eine Anzahl von Bodenprofilen studieren und bei jedem Aufenthalt Punkte von wissenschaftlichem und touristischem Interesse besuchen.

Die Kosten der 1. Klasse betragen 280 Rubel, die der 2. Klasse 250 Rubel.

Die Exkursion beginnt in Kasan und endet in Rostow am Don. Der Exkursionspreis enthält die Flugkosten von Moskau nach Kasan und von Rostow am Don zurück nach Moskau.

V. **Vorträge**

Für jeden Vortrag stehen zehn Minuten Redezeit und fünf Minuten für die Diskussion zur Verfügung. Wenn die Autoren nicht ihre gesamte Arbeit in den Zehn gegebenen Minuten vortragen können, werden sie höflich gebeten, kurze Texte und Zusammenfassungen ihrer Mitteilung schon vor dem Kongreß bei den wissenschaftlichen Sekretären der betreffenden Kommissionen abzugeben.

VII. **Die Berichte**

Die Berichte des 10. Internationalen Bodenkundlichen Kongresses sind für die Veröffentlichung vorbereitet und werden erscheinen, bevor der Kongreß beginnt.

Sie umfassen 11 Bände, in denen die Vorträge nach den im Programm des Kongresses angekündigten Themen angeordnet sind.

Jeder Band enthält ein Inhaltsverzeichnis in Russisch, Englisch, Französisch und Deutsch sowie ein Verzeichnis der Autoren.

VIII. **Anmeldungen: vorläufige Zahlen**

Bis jetzt haben über 700 Bodenkundler aus 48 Ländern ihre vollständigen Anmeldeformulare eingereicht und die Anmeldegebühren überwiesen.

Der letzte Termin für die Annahme von Anmeldeformularen ist der 1. Mai 1974.

Das Organisations-Komitee

JUBILEE BOOK

50th Anniversary of the Society

It has been announced in Bulletin 41 that a JUBILEE BOOK would be published by the Society on the occasion of the 50th anniversary of the ISSS. However, the members who have expressed their interest to purchase a copy by returning the card enclosed with the Bulletin were too few for publishing it for an exceptable price.

It has now been agreed that Elsevier Publishing Company will bring out a Special Issue of the journal Geoderma. It will contain, as planned, the papers on the achievements and developments of soil science in the last 50 years, as dealt with by the seven Commissions. It is foreseen that reprints of the Special Issue will be made available to members of the Society at an estimated price of $ 8.—. Detailed information will appear in the next number of the Bulletin.

NEWS OF THE COMMISSIONS, NOUVELLES DES COMMISSIONS, NEUES DER KOMMISSIONEN

COMMISSION I (SOIL PHYSICS)

SOIL PHYSICS TERMINOLOGY

The second Terminology Committee of Commission I of the International Society of Soil Science was appointed in January of 1973 by W.R. Gardner, the President of the Commission. The Committee was asked to update the terminology report published in 1963 in Volume 22 of the Bulletin of the International Society of Soil Science. Following is the preliminary report that will be discussed at the 1974 ISSS Meeting at Moscow. Readers are invited to submit comments to the chairman and any of the members of the Committee.

Preamble

The following proposal concerning definitions and terms in soil physics is far from complete. It appears almost certain that complete satisfaction for all conditions and all users cannot be reached. The potential use of such definitions could range from applied soil physics to advanced theoretical considerations, while the backgrounds of the potential users might include biology, chemistry, physics, hydrology, and perhaps geology. In view of the above, only a limited selection has been made, concentrating on terms with supposedly wide usage. Moreover, an accent has been placed on a wording that would appear to be comprehensible also to the non-specialist. If this would result in some dissatisfaction of the specialist, this was preferred above the situation where the non-specialist would be left in uncertainty. After all, the specialist should be able to take care of himself regardless of the particular wording chosen, while the applied scientist would hardly be served by a wording that goes beyond his background knowledge.

With due reference to the global acceptance of SI units, these have been, or are assumed to be, used throughout, with the single exception of the unit of pressure, which plays a key role in many of the definitions. Admitting that the soil physics world is still very much geared toward the use of the mbar, while on the other side the Pascal is often hardly known, the mbar has still been accepted as a unit, leaving it to the user to avoid errors due to mixing of units. As a reminder, it is pointed out that 1 Pascal (= 1 N/m^2) = 0.01 mbar.

As regards symbols representing the terms defined, the Committee views it as a sheer impossible task to suggest a set of symbols which on the one hand corresponds with common usage and, on the other hand, is completely consistent. The symbols used in the present text are thus meant to be exemplary at best.

As to terminology, in contrast to the position taken in the 1963 report, the name "water" is here limited to the chemical constituent H_2O, whereas "liquid phase" is used to indicate the aqueous solution residing in soil in situ. In the particular situation where this solution is considered separate from the soil it is termed "soil solution".

I. *Terms relating to the composition of the soil*

Recognizing the presence of three phases in soil, viz. the solid phase (index s), the liquid phase (index l) and the gas phase (index a), the composition of a soil can be fully described in terms of appropriate densities of all chemical constituents in all phases.

These densities, ρ, specify the mass of a component present in a unit volume of either

the appropriate phase or of the bulk soil, or in certain cases in a unit volume of the component itself. Unambiguous labeling of the density would thus require triple indexing, e.g. a superscript indicating the unit volume considered and two subscripts indicating the component and the phase in which it resides. To simplify the notation for the present purpose the following rule has been adapted. If the density of a constituent present in a phase is given with respect to a unit volume of its own phase, the superscript is omitted, while its density in the bulk soil is labeled with a superscript b; densities of pure components in pure phases will be labeled with a superscript o. Furthermore the double subscript will be used only if the presence of the constituent in more than one phase is to be considered explicitly.

DEF. 1: The phase density of a chemical constituent i (present in a phase α), ρ_i or $\rho_{i(\alpha)}$, is the mass of constituent i in a unit volume of phase α expressed in kg per m^3 of phase α.

Summing up the phase densities of all constituents of a phase gives the phase density, $\rho_\alpha = \Sigma_i \rho_{i(\alpha)}$.

DEF. 2: The bulk density of a constituent i (present in a phase α, ${}^b\rho_i$ or ${}^b\rho_{i(\alpha)}$, is the mass of constituent i (present in phase α) per unit bulk volume of soil, expressed in kg per m^3 of bulk volume.

The phase density and bulk density of a constituent i present in phase α are related via the volume fraction of the phase,
$\phi_\alpha = {}^b\rho_{i(\alpha)} / \rho_{i(\alpha)}$.
Summing up the bulk densities of all constituents in all phases gives the bulk density of the soil,
${}^b\rho = \Sigma_\alpha \Sigma_i {}^b\rho_{i(\alpha)} = \Sigma_\alpha \phi_\alpha \rho_\alpha$.
As generally the density of the gas phase is negligible, one finds that for a dry soil its bulk density equals the bulk density of the solid phase, ${}^b\rho = {}^b\rho_s$.

In soils the liquid phase (or soil solution) and its major constituent water are often of particular interest. There are several ways to express the water or liquid content of the soil, each having advantages under certain conditions. The basis of most experimental data is the water content on mass basis relative to the total solid content on mass basis.

DEF. 3: The water content or wetness, w, is the amount of water lost from the soil upon drying at 105°C, expressed in kg water per kg of solid phase after drying.

Disregarding the water present in the vapor phase $w = {}^b\rho_w / {}^b\rho_s$.

In flow problems one is primarily interested in the liquid content of the soil on a volume basis. The liquid volume associated with one kg of solid phase is then found as w/ρ_w; for lack of information as to the density of water in the liquid phase of the soil one is often satisfied to use the density of pure water, ${}^o\rho_w$, for this purpose. The above liquid volume is usually expressed per unit bulk volume of the soil (in case of a rigid matrix) or per unit volume of the solid phase (in case of a non-rigid matrix).

DEF. 4: The volume fraction of liquid, θ, is the volume of the liquid phase per unit bulk volume of soil, expressed in m^3 liquid per m^3 bulk volume.

Accordingly $\theta = w\ ({}^b\rho_s / \rho_w)$

DEF. 5: The liquid ratio, ϑ, is the volume of the liquid phase per unit volume of the solid phase, expressed in m^3 liquid phase per m^3 of solid phase.

Accordingly $\vartheta = w\ (\rho_s / \rho_w) = \theta/\phi_s$

In conjunction with the liquid ratio one often employs the void ratio in soils with non-rigid matrix.

DEF. 6: The void ratio, e, is the volume of the pores per unit volume of the solid phase, expressed in m^3 of voids per m^3 of solid phase.

Accordingly $e = (\phi_a + \phi_l)/\phi_s = (1 - \phi_s)/\phi_s$

II. *Terms relating to the state of water in soils*

A. The total potential and its components

At equilibrium, the constituent water of the liquid phase is subject to the action of the gravitational field, the influence of dissolved salts and of the solid phase (including adsorbed ions) in its given geometry of packing, and to the action of the local pressure in the soil gas phase. Together these factors determine the value of the total potential, ψ_t, of the constituent water in soil relative to a chosen standard state. Selecting as standard a system, S_o, comprising a pool of pure (i.e., water not influenced by dissolved salts, or, in other words, water whose osmotic pressure, π, is zero), free (i.e., water not influenced by the solid phase) water at temperature T_o, height h_o and atmospheric pressure P_o, one defines:

DEF. 7: The total potential, ψ_t, of the constituent water in soil at temperature T_o, is the amount of useful work per unit mass of pure water, in J/kg, that must be done by means of externally applied forces to transfer reversibly and isothermally an infinitesimal amount of water from the standard state S_o to the soil liquid phase at the point under consideration.

It is convenient to divide the transfer process referred to above into several steps, by introducing substandards according to:

S_1: a pool of pure, free water as in S_o, but situated at the same height as the soil liquid phase under consideration, h_x, i.e., S_1 is at T_o, h_x, P_o.

S_2: a pool of free soil solution (identical in composition with the soil liquid phase at the point under consideration), thus having an osmotic pressure, π, but otherwise identical with S_1, i.e., S_2 is at T_o, h_x, P_o.

Considering the transfer of water from the standard state S_o, via the substandards S_1 and S_2, to the soil liquid phase leads to the definitions of the component potentials of the constituent water, according to:

DEF. 8: The gravitational potential, ψ_g, of the constituent water in soil at temperature T_o, is the amount of useful work per unit mass of pure water, in J/kg, that must be done to transfer reversibly and isothermally an infinitesimal quantity of water from the standard S_o to the substandard S_1, as defined above. This potential may be expressed in terms of the difference in height between S_o and S_1, $\Delta H = h_x - h_o$, according to $\psi_g = g\Delta h$, in which g is the magnitude of the gravitational force per unit mass.

DEF. 9: The osmotic potential, ψ_o, of the constituent water in soil at temperature T_o, is the amount of useful work per unit mass of pure water, in J/kg, that must be done to transfer

reversibly and isothermally an infinitesimal quantity of water from the substandard S_1 to the substandard S_2, as defined above. This potential may be expressed in terms of the experimentally accessible osmotic pressure of the solution, π, according to

$$\psi_o = -\int_o^{\pi} \overline{V}_w \, dP,$$

in which $\overline{V}_w$ is the partial specific volume of the constituent water in the soil solution.

DEF. 10: The tensiometer-pressure potential, ψ_p, briefly referred to as pressure potential of the constituent water (in situ), is the amount of useful work per unit mass of pure water, in J/kg, that must be done to transfer reversibly and isothermally an infinitesimal quantity of water from the substandard S_2 to the soil liquid phase at the point under consideration. This potential may be expressed in terms of the experimentally accessible tensiometer pressure of the soil liquid phase in situ, p, according to:

$$\psi_p = \int_o^{p} \overline{V}_w \, dP.$$

Accordingly, the total potential may be found from the relation

$$\psi_t \equiv \psi_g + \psi_o + \psi_p = g\Delta h - \int_o^{\pi} \overline{V}_w \, dP + \int_o^{p} \overline{V}_w \, dP.$$

Referring to the set of definitions in the 1963 ISSS Report, the following differences are noted:

1. Aside from a "theoretical" definition in terms of the expenditure of useful work during reversible transport, a definition in terms of three experimentally accessible parameters, namely, Δh, π, and p, has been added.
2. As will be elaborated upon below, the viewpoint is taken that the pressure reading of a tensiometer installed in situ should be seen as one of the three parameters characterizing fully the state of water in soil under the conditions prevailing, including the effect of the presence of an external gas pressure different from atmospheric and/or the presence of a mechanical envelope pressure (e.g. overburden pressure). While admitting that in the specific case of a soil sample in a pressure membrane apparatus the external gas pressure is known, in the field this is often not the case. Nevertheless the determination of the three parameters Δh, π, and p (π in practice being calculated from the measured electrical conductivity of the soil solution) suffices for characterizing the state of water in soil; their gradients are the basis for transport theory.
3. The name associated with the potential derived from a tensiometer-pressure reading could be the pressure potential, as indeed it represents the equivalent pressure in the soil liquid phase in situ. It ranges from negative to positive values and in the latter case is often based on the pressure as calculated from piezometer readings. Obviously it foregoes a reference to its cause, but as this is the combined influence of gas pressure, matrix configuration, and water content and configuration, this seems unavoidable.

B. The subcomponents of the pressure potential

Any complete analysis of equilibrium or flow problems requires relating the water

potential to the water (or liquid) content of the soil. The components ψ_g and ψ_o being determined by height and osmotic pressure in the soil solution, the water content will influence only ψ_p. It must be realized that it is particularly the geometry of the liquid phase that determines the pressure increment from the gas phase to the liquid phase. The geometry of the liquid phase depends on the water content (for a given solute concentration in the liquid phase) and on the matrix geometry, the latter in turn being influenced by the mechanical envelope pressure. Thus in addition to the water content, at least two other independent variables, viz. the pressure in the gas phase, P_a, and the envelope pressure, P_e, will together determine ψ_p. Using again the tensiometer reading as the experimentally accessible parameter, one may introduce subcomponents of the pressure potential, according to $\psi_p = \psi_p^{\,w} + \psi_p^{\,e} + \psi_p^{\,a}$. Selecting the following order:

a) soil sample with wetness w, with $P_e = 0$ and $(P_a - P_o) \equiv \Delta P_a = 0$;

b) soil sample with wetness w, under envelope pressure P_e with $\Delta P_a = 0$;

c) soil sample in situ, at w, P_e and ΔP_a;

one may define:

DEF. 11: The wetness potential, $\psi_p^{\,w}$, is the value of ψ_p at wetness w, with $P_e = \Delta P_a = 0$.

DEF. 12: The "envelope-pressure potential" (overburden potential), $\psi_p^{\,e}$, is the increment of ψ_p upon the introduction of an envelope pressure P_e on the sample at water content w and at $\Delta P_e = 0$. This potential may be calculated according to:

$$\psi_p^{\,e} = \int_o^{P_e} \frac{\partial \psi_p}{\partial P_e}\Big|_{\Delta P_a = 0,\ w} dP$$

DEF. 13: The pneumatic potential, $\psi_p^{\,a}$, is the increment of ψ_p upon the introduction of an excess gas pressure ΔP_a on the sample at water content w and subject to an envelope pressure P_e. Inasfar as the application of ΔP_a does not influence the geometry of the liquid phase, this potential may be calculated according to:

$$\psi_p^{\,a} = \int_o^{\Delta P_a} \bar{V}_w' \, dP,$$

in which $\bar{V}_w'$ is the partial specific volume of water in the soil liquid phase in situ. In practice it is assumed to be equal to $\bar{V}_w$.

The above definitions, though involving a somewhat circular reasoning, were preferred above further extensions of the set under A, stressing the fact that ψ_t is fully determined by ψ_g, ψ_o, and ψ_p under all circumstances.

The choice of the name "wetness potential" for ψ_p at zero P_e and ΔP_a may seem a questionable introduction of a new name, but it is at least indicating directly its relation with the water content. It may be noted that if the matrix is rigid, $\psi_p^{\,e}$ vanishes, and that then $\psi_p^{\,w}$ equals the matric or capillary potential as defined in the report of 1963 (in which the effect of the envelope pressure was not taken into account). In swelling soils, however, the names matric and capillary potential should refer to the sum of $\psi_p^{\,w}$ and $\psi_p^{\,e}$, as the "matric effect" on the soil water in situ, as also the "capillary retention" due to curved interfaces, depend on the matrix geometry as it results from the packing of the grains under the local envelope pressure.

C. The pressure equivalents of soil water potentials

As all components and subcomponents of the total potential (except for the gravity potential) were expressed in terms of measurable pressures of the tensiometer (piezometer) and the osmometer, pressure equivalents of the components and subcomponents have, in effect, already been introduced. For completeness, we give the following explicit definitions.

DEF. 14: The negative osmotic pressure, $-\pi$, is the negative of the gaunge pressure, in Pascal or mbar, relative to atmospheric pressure, to which a sample of the soil solution at P_o and T_o must be subjected in order to be in equilibrium via a membrane impermeable to the solutes with pure water at P_o and T_o.

DEF. 15: The tensiometer pressure, p, is the gauge pressure, in Pascal or mbar, relative to atmospheric pressure, to which a sample of the soil solution at P_o and T_o must be subjected in order to be in equilibrium via a membrane impermeable to the soil matrix with the soil water at the point under consideration.

According to the procedure outlined in DEF. 11, 12, and 13, p may be subdivided according to $p = p^w + p^e + p^a$. It is noted that for all practical purposes $p^a = \Delta P_a$, the external gas pressure relative to atmospheric pressure. On the other hand, generally $p^e \neq P_e$.

D. The head equivalents of soil water potentials

As the soil water potentials defined above refer to the state of the constituent water in the liquid phase, while in practice head readings are obtained from the (hydraulic) equilibrium position of the soil solution in a piezometer pipe (if necessary in the open leg of a tensiometer equipped with a "solution manometer"), it should be stressed that in general the head refers to a potential of the liquid phase and has no unique relation with the water potentials above.

It is noted that in principle hydraulic equilibrium between two identical solutions positioned at different height precludes the existence of equilibrium of the component water. At least if the specific volume of water and solute are unequal, full equilibrium implies that concentration gradients arise in the gravitational field. Because of its usefulness in describing the flow of the liquid phase through soil, the head is defined here directly as:

DEF. 16: The hydraulic head, H, of the liquid phase is the height, relative to the standard height, at which the level of the soil solution stands in a piezometer tube (or "open" tensiometer), connected to the point under consideration in the soil, to be specified in meter.

If the liquid phase density, ρ_l, is constant and known, the hydraulic head may be related to the height and the pressure equivalent of ψ_p, according to:

$H = \Delta h + p/\rho_l g$,

in which case $p/\rho_l g$ is sometimes referred to as "pressure head". Conversely, a pressure equivalent of H may (under the stipulated condition of constant ρ_l) be defined as:

$p^* = p + \rho_l g \Delta h$.

As will be elaborated on in part III, in the above case $-\nabla p^*$ constitutes the driving force on the soil solution, in N/m^3, while $-\nabla H$ is the same in dimensionless units of N per kg of the liquid phase relative to the gravitational force on a kg liquid.

E. The water (or liquid) retentivity curve and the differential water (or liquid) capacity

In dealing with flow problems there is often a need for introducing a relationship between the water (or liquid) content of a soil and its wetness potential. Admitting that, due to hysteresis in the filling and emptying of the pores, such relationships are not unique, in practice one is generally satisfied to use such relationships as they are obtained experimentally by measuring water (or liquid) contents in a representative sample of the soil studied, at $P_e = \Delta P_a = 0$, as a function of the tensiometer pressure. Because of the application of the obtained relationship to flow problems it appears preferable to define it in terms of p^w and w (or θ).

DEF. 17: The water (or liquid) retentivity curve of a soil is the curve relating the tensiometer pressure under conditions of zero envelope and atmospheric external gas pressure of the soil, p^w, to the wetness w or volume fraction θ of the soil liquid phase. Because of hysteresis phenomena one may distinguish between wetting and drying (boundary)ccurves, if necessary supplemented by wetting and drying scanning curves corresponding to partial wetting and drying cycles.

For presumably rigid soils, the habitual choice is to plot p^w against θ. As, however, such a liquid retentivity curve of a local soil may differ from that of the sample used for its determination, its critical dependence upon the packing of the sample must be fully realized. As furthermore the value of θ used in plotting the curve is in practice often obtained from the measurement of changes in w/ρ_w, it would merit attention to label the liquid content axis as $w\ {}^b\rho_s(i)/\rho_w$, indicating that the curve refers to a sample of the particular soil type with an initial solid phase bulk density ${}^b\rho_s(i)$. This would also cover any error due to a slight change of ${}^b\rho_s$ upon absorption of the water in not quite rigid soils.
Again in flow theory not only the liquid retentivity curve, but specifically its slope as a function of p^w and θ is of importance. This leads to the definition of a capacity according to:

DEF. 18: The differential water (or liquid) capacity of a soil, C_w or C_θ, is the rate of change of w (or θ) with p^w, to be specified in $Pascal^{-1}$ or $mbar^{-1}$.

III. *Terms relating to the movement of the liquid phase*

A complete treatment of the movement of water in a soil would require an analysis of the forces acting upon the constituent water in each phase. However, for the purpose of this report only the movement of the liquid phase will be considered and the presence of dissolved substances will, in effect, be ignored. In other words, the definitions of various quantities will be based upon the forces acting on the liquid phase as a whole. The primary forces are the gravitational force, the force associated with gradients of the tensiometer pressure, p, and the drag forces exerted upon the liquid phase by the solid and gas phases. The gradient

of p can, in general, be decomposed into gradients of p^w, p^e, and p^a. The drags exerted by the solid and gas phases, are, for simplicity, lumped into one force.

DEF. 19: The velocity of the liquid phase relative to the solid phase, $\mathbf{V}$, is the time rate of change of position of an element of the liquid phase relative to an element of the solid phase in m/sec.

DEF. 20: The flux of the liquid phase relative to the solid phase, $\mathbf{q}$, is the product of the volume fraction θ and the velocity $\mathbf{V}$ in m/sec.

DEF. 21: The hydraulic conductivity, K, in m^2 per Pascal per sec or m^2 per mbar per sec is the constant of proportionality between the flux $\mathbf{q}$ and the total driving force $(-\nabla p - \rho_l g \nabla h)$ in Darcy's law:

$$\mathbf{q} = -K(\nabla p + \rho_l g \nabla h).$$

The flux $\mathbf{q}$ divided by the hydraulic conductivity K represents the drag force. The hydraulic conductivity K may also be defined as the flux caused by a unit driving force. If the soil is rigid and the pressure P_a of the gas phase is uniform, then the pressure p in Darcy's law can be replaced by the pressure p^w. If, moreover, the pressure p^w is a unique function of the volume fraction θ (no hysteresis!), then Darcy's law can be written as:

$$\mathbf{q} = -K\left(\frac{dp^w}{d\theta}\nabla\theta + \rho_l g \nabla h\right).$$

DEF. 22: The liquid diffusivity, D, in cm^2/sec is the quotient of the hydraulic conductivity K and the differential liquid capacity, C_θ.

Introducing D in Darcy's law gives:

$$\mathbf{q} = -D\nabla\theta - K\rho_l g \nabla h.$$

The diffusivity D may also be defined as the flux caused by a unit gradient of the volume fraction θ.

Slightly different definitions of water capacity and hydraulic conductivity result if the pressure p^w is replaced by the pressure head $p^w/\rho_l g$.

NEWS OF THE NATIONAL SOCIETIES — NOUVELLES DES ASSOCIATIONS NATIONALES — NEUES DER GESELLSCHAFTEN IN EINZELNEN LÄNDERN

Danish Society of Soil Science

At the Annual Meeting on February 26th, 1974 the following board was elected:

President: S. Storgaard Jørgensen, Royal Veterinary and Agricultural University, Department of Soils and Agricultural Chemistry, 40, Thorvaldsensvej, DK-1871 Copenhagen V.

Secretary and treasurer: Aage Henriksen, State Laboratory for Soil and Crop Research, 24, Lottenborgvej, DK-2800 Lyngby.

H. Sørensen, A.E.C. Research Establishment, Agricultural Department, Risø, DK-4000 Roskilde.

On the Council of ISSS the Danish Society will be represented by Prof. Dr. Kj. Rasmussen, Royal Veterinary and Agricultural University, Department of Soils and Agricultural Chemistry, 40 Thorvaldsensvej DK.1871, Copenhagen V.

Israel Soil Science Society

The following new members of the council have been elected:

Chairman: Prof. U. Kafkafi
Secretary: Dr. A. Hadas
Treasurer: Mr. D. Rosenberg
Member: Dr. Y. Noy
Member: Dr. Israela Ravina

Soil Science Society of America

Over 3000 participants attended the annual meeting of SSSA held in Las Vegas, Nevada from November 11-16,1973 in conjunction with the American Society of Agronomy and the Crop Science Society of America. 985 papers written by 1720 authors were presented. A number of symposia were held. More typical in the field of soil science were: "Solute movement in soils" and "Laboratory characterization for Soil Classification and interpretation". The next joint meeting will be in Chicago, November 10-15,1974.

Soil Science Society of Ghana

At the 8th Annual Meeting of the Society held at Kwadaso-Kumasi from the 28th to the 30th of November 1973 the following were elected officers of the Society for the period 1973—1975:

Vice-President: Dr. H. B. Obeng, Director, Soil Research Institute, C.S.I.R., Kwadaso-Kumasi.

President: Dr. Yaw Ahenkora, Senior Research Officer Cocoa Research Institute, C.S.I.R., Tafo.

Secretary: Dr. P. K. Kwakye, Research Officer, Soil Research Institute, C.S.I.R., Kwadaso-Kumasi.

Treasurer: Mr. D. O. Tenadu, Snr. Tech. Officer, Soil Research Institute, C.S.I.R., Kwadaso-Kumasi.

Publicity Sercretary: Mr. E. Bruce- Okine, Research Officer, Soil Research Institute, C.S.I.R., Kwadaso-Kumasi.

Ordinary Members: Dr. D. K. Acquaye, Dean, Faculty of Agriculture, University of Ghana, Legon, Accra.

Dr. G. T. Agyepong, Lecturer, Dept. of Geography, University of Ghana, Legon, Accra.

Dr. L. R. Roberts, Adum Clinic, Kumasi.

Mr. E. J. A. Khan, University of Ghana, Agric. Irrigation Research Station, P.O. Box 9, Kpong.

A main topic was the concern expressed with regard to soil conservation and erosion in Ghana. A recommendation was sent to the Government drawing attention to the seriousness of the problem and requesting to consider the setting up of a Soil Conservation and Erosion Control Authority preferably including Water Resources Control.

Soil Science Society of Hungary

The Soil Science Society of Hungary held its Meeting on the 29th November 1973 and the following members were elected to serve on the General Committee for a period of four years:

President	:	*Prof. Dr. I.Szabolcs*
Vice-President	:	Prof. Dr. I. Láng Prof. Dr. P. Stefanovits Dr. L. Gerei
Secretary	:	Mr. F. Jassó

Commissions:

Soil Physics	President	:	Dr. G. Várallyay
	Secretary	:	Dr. I. Dezsó
Soil Chemistry	President	:	Dr. L. Hargitai
	Secretary	:	Dr. K. Darab
Soil Fertility	President	:	Dr. J. Pecznik
	Secretary	:	Dr. I. Latkovics
Soil Microbiology	President	:	Dr. J. Szegi
	Secretary	:	Dr. É Zámory
Soil Genesis, Classification and Cartography	President	:	Mr. G. Földváry
	Secretary	:	Mr. J. Mélyvölgyi
Soil Technology	President	:	Dr. L. Ábrahám
	Secretary	:	Dr. J. Bocskai

Soil Science Society of Rumania

The 8th National Conference was held at Satu Mare on September 2nd, 1973. The central subject was "Better knowledge and valorization of the natural resources in the North-Western part of Rumania".

At this occasion a new Management Committee composed of 21 members was elected.

The Executive Board includes:

Chairman	:	*Prof Dr. Gr. Obrejanu — Academician*
Vice-president	:	Prof. C. Chirita
	:	Prof. D. Davidescu
	:	Dr. A. Canarache
Secretary General	:	Dr. D. Teaci
Members	:	Ing. Rauta Cornel
	:	Prof. I. Maxim

Soil Science Society of Southern Africa

The next Congress of this Society will be held in July 1975 in the Eastern Transvaal Lowveld. The Fertilizer Society together with Dr J. von M. Harmse of the Potchefstroom University are the local organizers.

Malaysian Society of Soil Science

The new management committee of the M.S.S.S. for the session 1974/1975 is:

President	:	Mr. E. Pushparajah
Vice-President	:	Mr. Chew Poh Soon (Pen. Malaysia) Mr. Sim Eng Shiong (Sarawak) Dr. Shao Yen Tze (Sabah)

Hon. Secretary	:	Mr. Chan Heun Yin c/o Rubber Research Institute of Malaysia, P.O. Box 150, Kuala Lumpur, Malaysia.
Hon. Treasurer	:	Dr. Tan Keat Leong
Immediate Past President	:	Mr. Law Wei Min
Committee Members	:	Mr. Khoo Khee Ming Mr. Teoh Cheng Hai Mr. Zulkifli b. Hj. Shamsuddin Mr. B. Gopinathan Mr. S. Paramananthan Mr. Tan Meng Hui

The Proceedings of the Conference on the Fertility and Chemistry of Tropical Soils held at Kuala Lumpur from 5-10 November 1973, will be published shortly. Please contact the Hon. Secretary or Mr. Tan Meng Hui, Cawangan Soils, Jabatan Pertanian, Jalan Swettenham, Kuala Lumpur, Malaysia.

Soil Science Society of Egypt

The Board of the S.S.S.E. for 1974 is:

President	:	Prof. Dr. Hassan Hamdi 18, Road 5, Meadi - Cairo
Secretary	:	Prof. A. Fathy, University of Cairo
Treasurer	:	Dr. A. El Leboudi, University of Ain Shams
Members	:	Prof. A. El Damati, University of Ain Shams Dr. A. El Shabassi, Ministry of Agriculture Dr. A. Mitkies, Ministry of Agriculture Eng. A. Abou Hussein, Ministry of Agriculture Dr. S. A. Amer, University of Cairo Dr. F. Anter, National Research Centre Dr. N. El Mowelhi, Ministry of Agriculture.

The Society intends to held a number of seminars during 1974 on certain topics. It is also a pleasure to annouce that in March 1975 a general meeting will be held to celebrate the 25th anniversary of the Society of Egypt.

The theme of the meetings will be focused on soil reclamation and management. It is hoped that a number of soil scientists from abroad will join in the ceremony.

Venezuelan Soil Science Society

The new composition of the Venezuelan Soil Science Society for the period 1974—1975 is:

President	:	Julia G. de Brito
Vice-President	:	Juan B. Castillo
Secretary	:	Jerson Sucre
Treasurer	:	Jesús Pérez P.
Vocal	:	Pedro Brito
International Delegate	:	J. Comerma

Commissions:

Genesis and Classification	:	O. Luque
Fertility and Biology	:	P. Santiago
Chemistry and Mineralogy	:	A. Chirinos
Physics and Technology	:	A. Atencio
Teaching	:	L. Medina
Documentation	:	E. Hidalgo

MISCELLANEOUS NEWS — INFORMATIONS DIVERSES VERMISCHTE MITTEILUNGEN

Prof. Dr. Dr.h.c. F. Scheffer honored

In Anerkennung seiner wissenschaftlichen Leistungen auf den Gebieten der Agrikulturchemie und Bodenkunde und in Würdigung der internationalen Beziehungen ernannte die Ungarische Akademie der Wissenschaften in Budapest Herrn Prof. Dr. Dr.h.c. F. SCHEFFER, Göttingen, dem früheren Direktor der Göttinger Institute für Agrikulturchemie und Bodenkunde und dem langjährigen Präsident der Deutschen Bodenkundlichen Gesellschaft zu ihrem Ehrenmitglied.

In einer Institutsfeier im Göttinger Institut für Bodenkunde überreichte Generalbotschaftsrat Hamburger, Budapest, im Namen der Ungarischen Akademie kürzlich die Ehrenurkunde über diese seltene ehrenvolle Auszeichnung.

Prof. Dr. I. Szabolcs honored

The Hungarian Government awarded Prof. Dr. I. Szabolcs the Gold Medal *of Work in recognition of his outstanding scientific achievements.*

International Society for Horticultural Science

This Society distributed a letter to its members dated 16 January 1974. Reference is made to a meeting of soil scientists at Freising-Weihenstephan, Germany, in 1973, where a standardization of methods used in soil analysis was the main topic dicussed.

From the report of this meeting one may conclude that it appears at present unlikely that "standard" methods will be adopted widely or rapidly.

Colleagues interested in this subject should contact the Secretary of ISHS.

Ir. Y. van Koot
ISHC
Zuidweg 38
Naaldwijk, Netherlands.

International Symposium on Brackish Water as a Factor in Development Israel, January 1975

The Israel National Committee for the International Hydrological Decade is planning to organize the above mentioned symposium as a contribution to the International Hydrological Programme of Unesco.

For further information please apply to:

Dr. A. Issar
Geology Department
Ben Gurion University
Beer-Sheva, Israel.

Glacial Till: An Interdisciplinary Conference Ottawa, Canada, 17-18 February 1975

An Inter-disciplinary Conference on Glacial Till will be held in Ottawa, Canada, at the Auditorium of the National Library on 17 and 18 February 1975, under the sponsorship of the Royal Society of Canada and other Canadian organizations with active interest in till. Geological, geotechnical and pedological aspects will be discussed together with engineering uses and problems as well as the significance of till in modern prospecting.

Inquiries and offers of papers should be addressed to:

Mr. M. K. Ward
Executive Secretary
c/o National Research Council of Canada
Ottawa, Ont. K1A OR6
Canada.

International Course on Land Drainage
Wageningen, Netherlands, 19 August to 4 December 1975

The 14th International Course on Land Drainage, a post-graduate course conducted in the English language, is organized jointly by the International Institute for Land Reclamation and Improvement and the International Agricultural Centre.

The course in intended for those who are engaged in the field of land drainage in either humid or arid regions. Its object is to provide participants with a thorough knowledge of the underlying physical and agricultural principles, the surveying methods, and the principles of design and construction.

The programme comprises lectures, practical exercises, demonstrations, and field trips to projects in the Netherlands. Netherlands Government fellowships may be applied for.

For information on the course and application forms please contact

International Agricultural Centre
P.O. Box 88
Wageningen, Netherlands.

The closing date for applications is 1 April 1975.

10th International Symposium on Remote Sensing of Environment
6-10 October 1975

Information on this yearly event on remote sensing of the environment may be obtained from

The Center for Remote Sensing
Information and Analysis
Environmental Research Institute of Michigan
Ann Arbor, Michigan, USA

Symposium on Arid Land Irrigation in Developing Countries
Alexandria, Egypt, February 1976

The ICSU Scientific Committee on Water Research, COWAR, covened a meeting of the Steering Committee in Rome from 3-5 April 1974. The purpose of this meeting was to discuss in more detail the program of the Symposium which will survey world experience in research and its application in arid land irrigation, with emphasis on the inter-disciplinary study of water use and the environmental effects of irrigation. The soils are to be dealt with in session 3: Land Use, Soils and Waterquality. The Symposium will be held in Alexandria, Egypt in February 1976.

As far as soil science is concerned, COWAR aims at a close co-operation with the ISSS by its decision that an observer will be invited to attend all future sessions.

For Sale — Personal library Dr. J. Bonnet

Dr. Bonnet has asked the office of the Society to include the following notice in the Bulletin.

For Sale: My up-to-date personal library enriched with bound and unbound publications relative to my 35 years of experience with soils, especially tropical soils and crops, including those resulting from research projects under my supervision.

Please write for further details.

Dr. Juan A. Bonnet
1625 Santa Angela
Sagrada Corazón
Rio Piedras, Puerto Rico 00926.

International Association of Hydrological Sciences
International Survey of Unsaturated-Zone Studies

The International Association of Scientific Hydrology is sponsoring a survey of unsaturated-zone studies throughout the world. Under the leadership of the International Commission on Subsurface Water, the survey project will include a compilation of research, standardization of terminology, and classification and evaluation of methods and collected data. The project coordinator is Dr. G. Kovacs of the Hungarian Research Institute for Water Resources Development.

A circular has been prepared to summarize information collected from a preliminary questionnaire and from a detailed study of published literature. The present phase of the survey is designed to collect reactions to proposals contained in the circular for standard terminology for the unsaturated zone and for a classification system for lysimeters. The results received from the questionnaires will be used to revise the project circular prior to publication by the IAHS.

The questionnaire and circular has been distributed to many individuals and organizations working in the various fields of hydrology. Anyone who has not been contacted previously may request a questionnaire from the following adress:

Dr. G. Kovacs, Secretary General
International Association of Hydrological Sciences
Research Institute for Water Resources Development
1428 Budapest, VIII, Rakoczi ut 41
HUNGARY

KAWASE, K., YOKOYAMA, E. and MATSUI, M. Color Photographs of Paddy Soils. Kodanska Ltd., Tokyo. 1973. Pp. 122, with 64 colour photographs. Special price for ISSS members $ 15.00 (see advertisement).

This very interesting and well-printed book is the result of studies carried out since 1964 on the improvement of taking colour photographs of profiles from paddy soils during the growing season. The authors claim that the present publication is the first one ever made.

Everybody who has tried to make photographs under this condition will appreciate the great difficulties the authors have overcome. They will be pleasantly surprised with this set of colour photographs. The authors are to be congratulated with this fine work!

Added to the pictures are some properties of the horizons and chemical and physical data. The book contains also brief chapters on the Japanese classification, nomenclature and fertility survey of paddy soils, and some notes on the analytical methods.

It is regrettable that no attention has been given to the techniques used to obtain these good results. The publication would have been more useful for scientists outside Japan if the soils were also classified according to the USDA Soil Taxonomy.

The low price of $ 15.00 for ISSS members has been made possible by a grant from the Ministry of Education.

International Soil Museum
Utrecht, Netherlands.

ACID SULPHATE SOILS. Proceedings of the International Symposium, Wageningen, Netherlands. 13-20 August 1972 ILRI, Publication 18 vol. I (pp. 295) and II (pp. 406). Int. Inst. for Land Reclamation and Improvement, P.O. Box 45, Wageningen, Netherlands, 1973. Price Dfl. 30.—, incl. packing and postage.

Two volumes give a review of the introductory papers and bibliography and the research papers presented during the symposium. (see Bulletin 42, p 12) It is the first time that a rather complete insight is given in the distribution, properties, genesis, classification, agricultural signification, reclamation and improvement of the various kinds of acid suphate soils.

Scientists from many countries give a clear picture of the aspects mentioned above.

The proceeding will be a useful standard work for scientific workers and agronomists of marine soils.

J. J. Reynders
Soils Institute
Utrecht, Netherlands.

MUCKENHAUSEN, E. Entstehung, Eigenschaften und Systematik der Böden der Bundesrepublik Deutschland. (In Japanese). 1973.

The well-known book on the soils of the Federal Republic of Germany by Prof. Mückenhausen, published in 1962 by DLG-Verlag in Frankfurt, has now been translated into Japanese. The 60 coloured soil profiles are also contained in the Japanese edition.

It may also be mentioned that Prof. Mückenhausen's book will be reprinted soon.

GOUDIE, A. Duricrusts in Tropical and Subtropical Landscapes. Oxford Research Studies in Geography. Clarendon Press, Oxford. 1973. Pp. 174 Price £ 4.25 in U.K., $ 13.75 in U.S.A.

This is the first volume in a new series of Oxford Research Studies in Geography, publishing the results of original and specialized research on a wide variety of geographical subjects.

After an examination of the nature of calcrete, ferricrete and silcrete, the author shows the importance of duricrusts in the landscape, their distribution and geographical relationships, and the genesis of duricrusts.

Calcrete in particular has been dealt with.

The reviewer regrets that the soils aspect has not been included. No mention was made of the USDA Soil Taxonomy, or of the FAO/Unesco Soil Map of the World.

Dr. Goudie has succeeded in bringing together a wealth of information, which was hitherto unobtainable under one cover.

A book of this size, which spans such a broad field can only serve as a general introduction. As such, it is of value to students in geography and soil science. It is especially useful to people in developing countries, where other more specialized books are usually not readily available.

International Soil Museum
Utrecht, Netherlands.

BAUMANN, H., SCHENDEL, U., and MANN, G. Wasserwirtschaft in Stichworten. Verlag F. Hirt, Kiel, 1974. Pp. 208. Price DM 24.80.

This book is the newest volume in a series of compendia on various aspects of earth science. Within the space of approximately 200 pages a number of subjects related to the management of surface and subsurface water is dealt with in a very concise but clear way.

The authors claim to have treated water management from the hydrological point of view. The introductory chapter is followed by a survey of the main aspects of the water balance. Further chapters deal with the behaviour of water in the soil and its significance for plant growth and crop production. Also contained in this instructive booklet are the principles and applications of irrigation, drainage and water purification.

The book is well provided with diagrams and tables; each chapter is concluded by a concise and up-to-date list of references. As a first introduction to water management this book will certainly serve its purpose.

International Soil Museum
Utrecht, Netherlands.

ISHIZUKA, Y. et al. Rice growing in a cool environment. ASPAC Food & Fertilizer Technology Center, Taipei, Taiwan. 1973 Pp. 98.

This book is based on research carried out in Hokkaido, the most northerly island of Japan. The island is situated between lat. 41.3 and 45.5°, and the mean summer temperatures range from 14° to 16°C. These temperatures are adequate for rice production, but in years when the summer temperature is low, rice yields are considerably reduced, regardless of the average mean temperature figures. With improvements of cultural technology, rice yields are increasing but, ironically, the more advanced rice growing technology is, the greater are the crop losses due to cold weather conditions. The book consists of 5 chapters, discussing the following subjects, respectively: (1) description of cold damage; (2) physiological effects of low temperatures on the rice plant; (3) rice breeding in Hokkaido; (4) control of soil fertility and fertilizer application; and (5) cultural techniques recommended for rice cultivation in a cool climate.

Royal Tropical Institute
Amsterdam, Netherlands.

PADDOCK, W. and E. We Don't Know How. Iowa State University Press, Ames, Iowa. 1973. Pp. 351. Price cloth $ 9.95, Paper $ 4.95.

In this audit of what the authors call "success in foreign assistance" only very incidentally mention is made of the soil as the decisive factor in agricultural production. However, it merits to be included in this section of the Bulletin, because an increasing number of soil scientists and agronomists are involved in the implementation of development programs. This very critical book of William and Elisabeth Paddock centers on the question whether, after 25 years, 150 billion dollars and the dedicated efforts of thousands of well-trained technicians, the United States has learned how to carry out an effective development project in an un(der)developed nation. The answer is NO.

The authors took Latin-America as an example. They give the names of one hundred and twelve agencies, co-operations, institutions of diverse nature, etc. working in the region.

After analysing many projects in Mexico and Central America the authors' conclusion is that practically not one of them had the success that was claimed by the promotors, be they private, governmental, international of national.

The authors, both with a wide experience in agricultural development and social work in the tropics do not present a guideline how misjudgements and mistakes made in the past can be prevented in future. They make clear that problems in countries with adverse infra-structural conditions cannot be solved by money and technical know-how alone.

The authors' advice is to use their own country, the U.S.A., as a laboratory to master the ways in which development programs should be carried out successfully.

They end their provoking review with an enumeration of some problems at home that await solution. Finding the right answer in these cases would make it perhaps possible to help more effectively the hundreds of millions of malnourished people in the hungry nations. Not a soil science book, but definitely worthwhile reading.

F. A. van Baren.

PEREIRA, H. C. Land Use and Water Resources. Cambridge University Press, Bentley House, 200 Euston Road, London NW1 2DB. 1973. Pp. 246. Price £ 1.95 in U.K., $5.95 in U.S.A. (paperback edition).

Dr. Pereira states that the objective of the book is to give "a summary in plain language of the information at present available to guide descisions on policy for land-use management in watersheds". Without doubt, the rational use and protection of water and land resources is of increasing concern throughout the world.

After chapters on the world's resources and the ever-growing demand for water, the development of a watershed discipline and methods for the collection of hydrological information, the author gives a very interesting account of the effects of forests on the watershed, in tropical as well as in temperate regions. Further chapters deal with the effects of grazing animals on the watershed and of croplands on water resources, the roles of irrigation and drainage in water resources and their effect on the hydrological conditions.

The book concludes with an extremely absorbing chapter on the problems facing mankind in the subjects dealt with. It is rightly stated that the problems are different in detail but equally acute and important for the most developed as well as for the developing countries.

Dr. Pereira's account is not only a good text for students in many disciplines, but is also suggested reading for development experts and planners of rural and urban areas throughout the world. The subject should be of international concern.

International Soil Museum
Utrecht, Netherlands.

ROSSWALL, T., Editor. Modern Methods in the Study of Microbial Ecology. Proceeding of a symposium held at Uppsala, Sweden 19-23 June 1972. Pp. 511.

This book comprises some 53 papers and 28 short communications, all dealing with various aspects of microbial ecology in general and with the ecology of microorganisms in the soil in particular. The following topics are discussed in detail: Techniques for the observation of microorganisms in soil and water; Isolation and characterization of microorganisms; Techniques for the determination of microbial activity in relation to ecological investigations; The estimation of microbial growth rates under natural conditions; Model systems; Mathematical models and systems analysis in microbial ecology; The traditional plate count technique among modern methods; Problems of assessing the effect of pollutants on microorganisms; Problems in extraterrestrial life detection. All papers are followed by extensive reference lists and many of them by discussions.

This book truely highlights the many new methods which have recently opened up the field of microbial ecology. Techniques as e.g. scanning electron microscopy, *fluorescent-antibody identification, microcalorimetry, radiorespirometry, and gas* chromatography mass spectrometry receive a great deal of attention. In addition, several methods to compare and quantify microbial ecosystems as e.g. mathematical modelling of microbial populations, vector analysis of biochemical reactions and clustering of biological results are covered in detail.

Notwithstanding the fact that a number of excellent handbooks of microbial ecology have been published in recent years, these proceedings bring together advanced information and methodology about microbial ecosystem research. Hence, these proceeding are strongly recommended to everyone interested in the microbial ecology of water and soil, and in particular to those dealing with research in this exciting and rapidly growing field.

Dr. Ir. W. Verstraete.

(by courtesy of Pédologie)

AGRO-ECOSYSTEMS — A New Journal

This new international journal, sponsored by the International Association for Ecology, will be published by Elsevier Scientific Publishing Company in quarterly issues, one volume per year. The Editor-in-Chief is J. L. Harper, U.K. and the Associate Editor P. Gruys, The Netherlands.

It will be concerned with ecological interactions within and between agricultural and managed forest systems. Such man-managed evironments — agro-ecosystems — pose ecological problems through interactions between crops and grazing animals, between cropping and cultivation systems and the soil, between natural wild life and the domesticated organisms; also in the impact of agricultural ecosystems on other parts of the environment (e.g. through leaching of nutrients into lakes and waterways), and in activities that impinge on the agricultural systems from outside (e.g. industrial pollution, outdoor recreation).

Papers concerned with ecological interactions affecting or affected by agriculture and forest practice will be encouraged but it is not intended that the journal will accept papers directly concerned with the specialist areas of soil, crop and livestock husbrandry.

The subscription price is Dfl. 80.00 (about $ 30.80) per volume, plus Dfl. 8.00 (about $ 3.10) for postage.

For more information:

Editorial Office
Agro-Ecosystems
P.O. Box 330
Amsterdam
The Netherlands

SIMONSON, R. W., Editor. Non-Agricultural Applications of Soil Surveys. Developments in Soil Science 4. Elsevier Scientific Publ. Comp. 1974. Pp. 178. Reprinted from Geoderma, volume 10, No. 1/2.

This volume with 15 articles from authors in Australia, Canada, Netherlands, New Zealand and the USA gives examples of non-agricutural use of soils information. In many instances of urban development soil maps have not been consulted. This leads to dramatic consequences, such as flooding of the area, pollution in several ways, or damage to constructions.

The need for multiple use of soil maps for the planning of expanding cities, highway and dike constructions is clearly demonstrated.

Attention is also given to the soil as land fill and as a container for municipal waste products. However, one should bear in mind that for rural and similar constructions and use of the soil not only the physical properties of the land should be considered, but the total of environmental conditions.

J. J. Reynders
Soils Institute
Utrecht, Netherlands.

New Zealand Journal of Zoology — A New Journal

The Department of Scientific and Industrial Research, Wellington, New Zealand, appreciating the considerable increase in the number of zoological papers in the country, felt the need to publish a separate journal for such papers. Some of these were formerly published in the New Zealand Journal of Science, also published by DSIR.

The Journal of Zoology publishes papers on original research in all branches of zoology, except some aspects of aquatic zoology, pertinent to New Zealand and associated territories.

The price of the journal is NZ $ 6 per volume of 4 quarterly issues, post free (surface mail). Cheques should be made payable to the Department of Scientific and Industrial Research and sent to

the Publication Officer
Information Service
DSIR
Private Bag
Wellington, New Zealand.

SIEFFERMANN, G. Les sols de quelques régions volcaniques du Caméroun. Mémoires ORSTOM No. 66. ORSTOM, Paris, 1973. Pp. 183. Price FFr. 90.

A large part of Cameroun is covered with pyroclastic rocks, slags, tuffs and ash of relatively equal composition, belonging to the basalt family, having ages extending from the Cretaceous to the Quaternary periods. These occur at present under various climates, ranging from very humid equatorial to the dry Sahelian climates. This enabled the author to study the soils at all stages of development in the various zones, especially the factors governing mineral neoformations.

The first part outlines the geographical setting and gives information on present and past climatic conditions. It ends with listing the analytical techniques used and the mineralogical composition of the soils.

The second and main part gives descriptions and complete analytical data of the andosols, brown eutrophic soils and ferralitic soils selected for the present study.

The interpretation of observations and data lead in the last chapter of this highly interesting study to the factors influencing the genesis of mineral products. Then follows the weathering sequences in relation to climates and time.

As is the case with most ORSTOM publications, no summaries are given in other languages. This is regrettable, because this study is certainly of interest to other areas of the world, especially Asia and South America.

International Soil Museum
Utrecht, Netherlands.

SCOTT, R. M. WEBSTER, R. and LAWRANCE, C. J. A. Land System Atlas of Western Kenya. Soil Science Laboratory, Dept. of Agriculture, University of Oxford, 1971. Pp. 363 in loose-leaf folder, with a 1:500,000 Land Systems map. Price £ 8.50, prepaid.

MURDOCH, G., WEBSTER, R. and LAWRANCE, C. J. Atlas of the Land Systems of Swaziland. Soil Science Laboratory, Dept. of Agriculture, University of Oxford, 1971. Pp. 49 in loose-leaf folder, with a 1:500,000 Land Systems map. Price £ 3.75, prepaid.

(Orders to: The Director, M.V.E.E., Barrack Road, Christchurch, Hants, BH23 2BB, England. Prices include packing and postage. Orders should be prepaid).

These reports are analogous to Terrain Classification and Data Storage- Land Systems of Uganda, by C. D. Ollier et.al. 1969, price £ 8.00, reviewed by J. A. K. Boerma in Bulletin 36, page 14.

The atlases in sturdy loose-leaf folders contain descriptions of the landscapes (Land Systems) in two other African countries, with land systems maps, as a basis for regional studies and land use planning. Each Land System has been subdivided into several Land Facets, providing a basis for local planning and for the collection and indexing of information on land resources. Each Land System is illustrated by a block diagram showing all the Land Facets and their relationship within the system, aerial photographs (stereo pairs) and a general description of the system as a whole, with data on climate, geology, morphology, soils, vegetation, land-use, relief and altitude.

The Land Facets, the basic units of the classification, are described in more detail, giving for each one the predominant landform, constituent soils, parent material, hydrological condition, vegetation and land-use. The reader will be able to identify these in the landscape or on aerial photographs.

Where the Land Facet is not sufficiently homogeneous to allow one method of management, it may be divided into Land Elements. This is the smallest unit of land likely to be of interest. Wherever possible these elements are indicated on the stereograms and on the block diagrams.

A consistent variation in one or two of the major attributes of a Land System gives rise to Variants of Land Systems. The reason for their establishment may be the presence or absence of an important Land Facet, or a consistent difference in climate, parent material, soil or vegetation that leaves other attributes apparently unaffected, or nearly so.

The reviewer regards the kind of data as well as their presentation as very useful basic information for sound regional and local planning. The atlases may also serve as a framework for the collection of a great variety of other relevant, also nonphysical, information.

Since the use of soil and other environmental information for improving efficiency of land-use needs to be increased, we are in full agreement with Boerma's statement in Bulletin 36 that this kind of reporting is "an excellent example of how to start a scientific (or commercial) project in the less known parts of the world". These high-quality reports merit a wide circulation, which is also made possible by their low price.

International Soil Museum
Utrecht, Netherlands.

HILLEL, DANIEL: Soil and Water, Physical Principles and Processes. Academic Press. Pp. 258.

In this book the author describes the basic principles and processes governing the cycle of water in the field.

The book is an outgrowth of lecture materials the author used in teaching soil physics and soil-water relationships edited by Dr. T. T. Kozlowski (University of Wisconsin, Madison, Wisconsin), in a series called Physiological Ecology.

The first half of the book has been used to discuss the basic physical properties of both water and soil, the interaction between the two, and the flow of water in saturated and unsaturated soil. In the second part the author describes separately the processes governing the cycle of water in the field as there are: Infiltration and redistribution of water in the soil, Evaporation of water from the soil surface, Uptake of soil water and transpiration by plants, Groundwater drainage.

The last chapter of this part is dealing with the water balance and the energy Agriculture is dealing with numerical solution of the flow equation.

One apendix, written by Dr. R. C. Amerman of the ARS, U.S. Department of Agriculture is dealing with numerical solution of the flow aquation.

A second one by Dr. E. E. Miller of the Department of Soil Science and Department of Physics, University of Wisconsin, describes the variables-separable (Boltzman) solution of the equation.

The presentation is oriented toward the applied aspects of soil physics, but the approach is more fundamental than directly utilitarian.

The book can be recommended not only to students and professional workers in soil physics but also to those of related disciplines, since little or no previous knowledge of the subject matter has been assumed. Only a basic knowledge of physics and mathematics will be necessary to read and digest the book.

P. Koorevaar
Agricultural University, Wageningen

OBITUARY — NECROLOGIE — NEKROLOG

Professor Joseph H. Ellis †

Suddenly on December 6, 1973 at the Victoria Hospital, Professor Joseph H. Ellis passed away.

Professor Ellis was born in Coventry, Warwickshire, England on February 11, 1890. He came to Canada as a young man and enrolled in the new Manitoba Agricultural College in Fort Garry in 1913 and graduated with his BSA in 1918. Professor Ellis commenced work with the department of Soil Science. His work with Soil Survey, Soil Fertility and Soil Management began during this period and had continued through the ensuing years. He was responsible for a soil survey of unused lands in Manibota in 1926 and this was the start of a continuing succession of soil surveys covering all agricultural portions of Manitoba. Throughout these years Dr. Ellis had been a dedicated teacher and a promotor of research in Soil Science. He also showed a dedication to soil conservation and proper land use. The hundreds of graduates who studied under him and those who worked with him have always held him in genuine respect, receiving inspiration and help, not only from his enthusiastic teaching of his subject, but from his boundless energy and positive philosophy of life.

Dr. Ellis received his BSA from the University of Manitoba, his M. Sc. from the University of Minnesota and was honoured by a Doctorate from Agriculture Institute of Canada and a Member of long standing in the International Society of Soil Science. Dr. Ellis had been a prolific writer and has many publications to his credit, culminating with the publication entitled "Evolution, Development and Activities of the Ministry of Agrculture in Manibota."

A. V. Rybalkina †

Soviet soil scientists have suffered a heavy loss. On 22 December 1973 Dr. A. V. Rybalkina, born in 1902, a well-known scientist in the field of soil microbiology, passed away.

A. V. Rybalkina devoted more than 40 years to her favourite science. She was one of the founders of the recent soil microbiology and belonged to that brilliant group of the Soviet soil microbiologists, which had been formed immediately under the influence of S. N. Vinogradsky's ideas.

For 26 years A. V. Rybalkina guided the microbiological investigations at the Dokuchaev Soil Institute, contributing greatly to the further development of soil microbiology. Under her guidance and direct participation fundamental investigations have been carried out in various soil zones of the USSR. She has found new lines to approach the study of soil microorganisms in their natural environment and suggested new investigation methods. A. V. Rybalkina was an excellent experimenter and a highly dedicated investigator. Her investigations made it possible to establish the relationships between the microorganisms in soil biogeocoenoses and to lay the foundation for a new concept of the active and potential soil microflora. It was of considerable importance for understanding of soil genesis and fertility.

A. V. Rybalkina's investigations have been generalized in numerous works. Particularly renowned are her monograph "Microflora in the soils of the European part of the USSR" as well as her fundamental paper "Microflora and nitrogen regime of some humus-peat soils".

A.V. Rybalkina's outstanding works received general recognition. She acquired great respect by her research work and personal qualities, high principles and remarkable tact. The bright image of A. V. Rybalkina as of talented investigator and responsive kind of person will remain for ever in memory of all, who worked with and knew her.

All-Union Society of Soil Scientists.