

## 'Sigmund the Scholar, My Mentor

J. DI GLÉRIA

*Research Institute for Soil Science and Agricultural  
Chemistry of the Hungarian Academy of Sciences,  
Budapest (Hungary)*

A. A. J. DE 'SIGMOND, Professor of the Technical University of Budapest for over 30 years, was my teacher in soil science and later I had the privilege of being one of his co-workers.

Although he carried on valuable activity in agrotechnics and food chemistry as well, his favourite subject was pedology. His achievements in this field made him one of the great personalities of soil science, and were — and still are — recognized with appreciation not only by Hungarian but also by foreign scientists.

To relate — or even only to outline — the whole scope of the activities of this tireless, dedicated man would be simply impossible within a short paper like this. Therefore I have to restrict my thoughts to only a few aspects of his complex scientific achievements.

At the very beginning of this century he started research work in the Agricultural Research Institute in Magyaróvár. His first task was to study the amelioration of alkali soils, in particular to test gypsum as an amendment. In the course of the experiments he realized the necessity of carrying out soil analyses before starting actual amelioration. His views were influenced by the results of HISSINK's investigations.

'SIGMOND soon recognized the differences in the chemical compositions of the various kinds of salt affected soils. He summarized his findings in his book "Hungarian Alkali Soils and Methods of Their Reclamation" as follows:

"According to my own experiences we might divide the alkali soils of the Hungarian Plain into two characteristic groups, based on their occurrence as well as their mechanical and chemical composition. This classification I do not consider as a final or settled question because it is concerned strictly with those alkali lands which I have studied myself. . . . Formerly those soils which were supposed to be unproductive because of their content of sodium carbonate were called 'szik' soils. Based on my own experiments I can declare that this theory is not quite adequate. There are indeed soils in which the content of sodium carbonate is responsible for the unproductivity, but there are very extensive unproductive alkali lands in which I could not find any trace of carbonate of soda. There are also alkali soils containing so small a quantity of any water soluble salts that we can not ascribe their unproductivity to these salts."

'SIGMOND elaborated several schemes and theories concerning the formation of salt affected soils. In his opinion the hydrological and climatic con-

ditions were of particular importance in the formation of these unproductive soils.

The results of his investigations directed 'SIGMOND's attention to the absorbing complex of the soil and to the exchange processes taking place in it. He prepared artificial zeoliths to study these processes, as well as the mineral composition of soil colloids in detail.

Within the scope of 'SIGMOND's many-sided activities the improvement of soil analytical methods and the development of new ones (i.e. hydrochloric acid extract, determination of exchangeable cations, saturation and acidity relations in soils, etc.) constituted a very important part. He also laid emphasis on the proper evaluation of analytical data.

Naturally all these studies contributed considerably to the elaboration of 'SIGMOND's soil classification system, which was published in 1932.

'SIGMOND was familiar with the work carried out in this field by the Russian, American and German soil scientists and highly appreciated their achievements, nevertheless he also realized the weaknesses of those systems. He writes in "The Principles of Soil Science": "Not having found among the systems of soil classification so far known any which, while sufficiently comprehensive and based upon the characteristics of the soil, is nevertheless genetic and dynamic in character, I have established a new system." 'SIGMOND incorporated in his system several of the principles of other classifications, and used all data he considered as up-to-date, but in spite of this his work was entirely original.

In the introduction of his general soil system he stated: "This system is based on soil characteristics which fairly reflect the present state not only of soil conditions, but also of the dynamic forces acting in the soil. . . . For that reason this general soil system, though genetic in some respects, may also be called a dynamic soil system. . . . This system deals not with zonal or regional soils, but with main groups, sub-groups, soil orders, main types, sub-types, local varieties, physical and physiologic classes. These eight categories form the eight stages of the whole system, not excluding, however, the further development of the system for purposes of more specific differentiation. The first stage of the system is the most general and the eighth the most special of the categories. . . . The characterization of the units of each soil category is done in all cases by real and accessible soil characteristics and not by external factors such as climate, natural vegetation or topography. Though the deficiency of our present knowledge does not allow us to build up all branches of the different stages of the system, the frame of the system is large enough to embrace almost all future branches which may be discovered and worked out later on."

'SIGMOND maintained that all soils on the earth's surface can be classified in three *main groups* (first category) according to the origin of their parent material:

1. Organic soils.
2. Organic and mineral soils.
3. Purely mineral soils.

The *sub-groups* (second category) are based on the various dynamic conditions of the original soil forming materials.

In the case of *soil orders* (third category) classification is based upon the various specific features of the soil dynamics. The dynamic character of the

soil may be defined by those physical, chemical and biological changes which have had, and still have, a decisive influence on the formation of the soil profile.

The first three categories of 'SIGMOND's general soil system are presented in Table 1.

*Table 1*  
**The first three categories of 'Sigmond's general soil system**

Category I Main groups	Category II Sub-groups	Category III Soil orders
I. Organic soils	1. Raw organic soils i.e. turfy soils	Turfs, poor in bases Turfs, rich in bases but not salty Salty turfs
	2. Humified organic soils i.e. peat soils	Acid peat soils Neutral peat soils Salty peat soils
II. Organic mineral soils	3. Raw organic mineral soils	Endodynamic soils Ectodynamic soils Pseudodynamic soils
	4. Humic siallites	Hydrogen soils Calcium soils Sodium soils
	5. Ferric siallites	Brown earth Red earth Yellow earth
	6. Allites	Pure allites Siallitic allites Bauxitic allites
III. Purely mineral soils	7. Raw mineral soils	Soils of mixed rock débris Soils of mineral grits Soils of fine mineral dust
	8. Mineral soils with some decomposition	The calcium of the mineral matter partly mobilised The silica of the mineral matter partly mobilised
	9. Mineral soils with the end- products of decompo- sition	Soils with easily soluble salt crust Soils with slowly soluble salt crust

Soil microbiology also aroused 'SIGMOND's interest. He recognized how important is the role that microorganisms play in the development of soils, in humus formation and in the nutrient supply of plants.

In his department at the University experiments were conducted to study the decay of organic matters in soils under both aerob and anaerob conditions.

It would be wrong to think that 'SIGMOND was interested only in theoretical and methodological questions. He studied extensively the problems of the

application and utilization of organic and inorganic fertilizers and quite a few of his publications dealt with nutrient uptake processes.

'SIGMOND carried on valuable activity in many other fields as well. It was only just that numerous distinctions were granted him during his life-time. When he died in 1939 S. A. WAKSMAN voiced the general opinion saying that international soil science suffered a great loss.

Numerous Hungarian soil scientists, agrochemists, food-chemists studied and worked under the supervision and guidance of this exceptional man. All of us who had this privilege have been accompanied and guided by his principles and instructions throughout our life.