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# BULLETIN OF THE GEOLOGICAL SOCIETY OF CHINA

## EDITORIAL

### THE GEOLOGICAL SOCIETY OF CHINA HISTORY OF ORGANIZATION

The Geological Society of China was organized in Peking on Jan. 27, 1922, with twenty-six charter members. The need for such a society has been felt for some time by the workers in geological science in China who realized that in the interchange of ideas and in the criticism of each others work lay a source of hitherto unavailabla mutual benefit. The idea of such an organization lay dormant, however, until Dr. H. T. Chang, chief of the division of geology of the Geological Survey undertook to call together the geologists of the National Survey, the teachers of geology in the various institutions of higher learning in Peking and others temporarily engaged in research in Peking to discuss definitely the plans for such an organization. The response was very satisfactory, and on Jan. 27, 1922, twenty six persons gathered in the lecture room of the new Library building of the Geological Survey in Peking, and then are there discussed the articles of a constitution for this society which had been previously prepared by a voluntary committee. The chairman of the meeting, Dr. V. K. Ting, Director of the Geological Survey, on motion carried, appointed a committee of the following five persons to nominate candidates for officers of the society.

Chairman H. T. Chang, chief of division of geology of the Survey.

W. H. Wong, associate director of the Survey.

L. Wang, Professor of Geology, National University of Peking.

J. S. Lee, Deputy Professor of Geology, National University of Peking.

A. W. Grabau, Professor of Palaeontology, National University of Peking, and Palaeonologist to the Survey.

At the adjourned meeting on Feb. 3, 1922, this committee reported its candidates and the officers listed on cover were elected. The constitution was adopted in the form given below and the Geological Society of China had completed its organization.

This bulletin is the official organ of the Society, and in it will appear the proceedings of the meetings and the papers in full or in abstract, presented before it by its members. Though the youngest in the fraternity of scientific societies, the Geological Society of China comes to its fellow societies with the confidence born of high aims, and the desire to be judged solely on the basis of its performance, with full conviction that its older brethren will give it its proper place in the ranks of those who battle for the advancement of human knowledge.

V.K. TING

#### CONSTITUTION OF THE GEOLOGICAL SOCIETY OF CHINA

Article I. This society shall be known as The Geological Society of China.

Article II. The object of this society shall be the advancement of geology and its allied sciences.

Article III. The membership of the society shall consist of fellows and associates.

The following persons shall be eligible for membership in the society:

A. as fellows, geologists and other scientists interested in geology.

B. as associates, college students of good standing in the studies of geology and its allied sciences.

Article IV. Any candidate desiring to be admitted as a fellow or as an associate must be nominated by two fellows and elected by the vote of the council.

Article V. The officers of the society shall consist of one president, two vice-presidents, one secretary and one treasurer. The president and the vice-presidents are at the same time councilors ex-officio. Each officer shall be elected by the general meeting from the three candidates proposed by the passing council.

Article VI. The elected council of the society shall consist of seven to eleven councilors, the exact number to be elected by the general meeting shall be determined by the passing council.

Article VII. Officers shall be elected for one year and shall not be eligible for re-election for more than three successive terms. Elected Councilors shall hold office for three years; one-third of their number is to be elected each year.

Article VIII. Both fellows and associates shall be entitled to vote; only fellows are entitled to hold office.

Article IX. The election shall be conducted by two ballots one for the officers and one for the councilors.

Article X. Any important business of the society must receive the approval of the council on the proposition of the president or vice-president before it can be transacted.

The meeting of the council shall be presided over by the president or one of the vice-presidents.

Propositions presented through the president to the council for its approval must be signed by at least ten fellows.

Article XI. The society shall hold one general meeting each year which shall be for elections of officers and councilors, the presentation of annual reports, the transaction of business, and the reading and discussion of scientific papers.

Article XII. Special meetings and excursions may be held with the approval of the council.

Article XIII. A Publication shall be issued under the name, Bulletin of the Geological Society of China.

Article XIV. Membership dues for fellows shall be five dollars (silver) and for associates two dollars.

Membership dues of fifty dollars paid up at one time shall entitle a fellow to life-membership.

Article XV. Financial support in addition to membership fees may be obtained from special contributions.

Article XVI. There shall be by-laws for the matters not included

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Article XVII. This constitution may be amended by two-third vote at the annual meeting, after the amendment is submitted by more than five members

Proceedings of the First General Meeting

BY THE SECRETARY

The first general meeting of the Geological Society of China was held on the evening of March 2, 1922 in the lecture hall of the Library Building of the Geological Survey in Peking in the presence of distinguished foreign and native men of science and an appreciative audience.

The event was a memorable one for it marked not only the opening of a new era in the intellectual and especially the scientific life of the Chinese nation, but has become a distinct mile-stone in the history of science itself. It has been remarked by those whose privilege it was to be present and assist in the celebration of the event that theirs was a unique experience, and one to which they always might look back, as a significant moment in their intellectual life.

The meeting was opened by the address of President H. T. Chang, which was followed by the addresses of others.

On the History of the Geological Science in China

H. T. CHANG

Ladies and Gentlemen, I take the occasion of the first meeting of the Geological Society of China to give a brief outline of the growth of geological knowledge in our history as well as a review of its development in the more recent years; for it seems to me not only proper but also useful to have a clear view of the manner in which things have been done in the past, in order that we may see more clearly our proper course in the future.

China is, comparatively speaking, an old country. Consequently, all branches of learning had a very early origin. In this respect Geology is no exception. From the earliest times, useful minerals and soils attracted the attention of our ancestors. The knowledge of metallurgy dates back to the prehistoric period. In the book of Yu, one of the earliest works on geography, the nature and color of the soil of every province was carefully described. It seems in fact that the administrative units were based on the differences of the

soil. Again in addition to the metals of gold, silver, copper, iron and lead, there was a metal called Lei 鐵 which seems to be a kind of steel. Many different kinds of rock were also mentioned, and it thus appears that our ancestors did not confine their attention to the metals. The book known as Shan Hai King or "Book of Mountains and Seas" is really a primitive treatise on natural history. These books dealt with only the useful rocks and minerals, but the geological processes did not escape notice. For example in the Book of Poetry it is said, "high banks become valleys and deep valleys become mountains". The well-known literary phrase "the immense ocean becomes fields of mulberry" is a distinct embryo of the modern idea of the cycle of erosion. In the works of Chuangtzu 莊子, it is said that, "When the wind passes the rivers, it takes away something, so does also the sun". Here we have apparently the proper understanding of evaporation and erosion. Thus the early Chinese not only observed the geological phenomena, but also tried to understand them.

Even palaeontology had its pioneers. An author of the Tang dynasty, Yen Cheng-ching 顏真卿, in his description of the temple of Maku at Fuchou, spoke of the secular changes of the sea and the land, because he correctly recognised the brachiopod fossils that occur nearby, as marine animal remains. The famous scholar Chu Hsi 朱熹 of the Sung dynasty says, "bivalves are often found on high mountains sometimes occurring in solid rock. This rock must have been the soil of ancient days and these bivalves must have lived in water. Thus low ground becomes high and soft earth becomes hard rock". Chu Hsi therefore had even correctly interpreted the origin of the sedimentary rocks! It is to be noted that both these authors are famous for their moral rectitude which is perhaps the common characteristic of the modern palaeontologists.

These strains of thought were doubtlessly unorganised and fragmentary and lack the sureness and consistency of modern scientific knowledge. Nevertheless we cannot help thinking that they were true germs of the science of geology. If we now graft onto this ancient stock the beautiful flowers from foreign countries they will doubtless bear good fruit.



True scientific geology, however, began only with the Republic. They were born indeed in the same year, although the embryo was already conceived in the last years of the Manchu dynasty, for the National University had already a geological department and my friend Mr. Wang Li who is present here tonight was in that class. Both Mr. Ting and myself returned to China in the first year of the Republic.

In 1912 when the provisional government of Nanking was organized there was for the first time a department of geology in the Ministry of Commerce. When at that time I was put in charge of the department, I at once proposed the organization of a school of geology for the training of students. Before my proposal was adopted the provisional government moved to Peking, and I left the department to go to the Ministry of Agriculture which was then distinct from that of Commerce, and the realization of my project was left to Mr. Ting. When he went to Yunnan in 1913 I was appointed Director of the newly organized school, and Dr. Wong soon joined me. It was largely due to his efficient teaching that we were able to produce more than twenty graduates in 1916. These formed the nucleus of the present staff of the Geological Survey.

The Geological Survey was organized in the spring of 1916 and Mr. Ting has been responsible for its direction ever since. Whilst no one is more conscious of the imperfection of our results, we can say that we have spared no effort to make the institution a living organization. The obstacles in our way have been many and serious, and progress has only been made by constant effort and sacrifice.

Although the Geological School organized in 1913 was discontinued in 1916, the Department of Geology was revived in 1918 at Mr. Ting's suggestion. Now they have the Professors, Wang Lieh, Li Ssu-kuang and Grabau. I have no doubt that they will furnish us with the necessary young recruits from generation to generation.

Now we have, in addition to the Geological Survey and the University, this Society the formation of which is the natural step in evolution. Let us hope that by the constant interchange of ideas and by frank and friendly discussion the society will supplement the work of the Survey and the

University, and become an institution worthy to be ranked with the similar organizations existing in all civilized countries. For from my personal experience I can say without fear of contradiction that the results so far achieved have always been the fruit of loyal cooperation. Personally I owe to my colleagues a heavy debt. My friendship with Mr. Ting is now of ten years standing. What I conceived in theory he has carried out in practice. That is why we all feel that we cannot do without him. Nor can I imagine how things could have come to pass without loyal and unselfish help of Dr. Wong and Mr. Wang.

Looking back at the history of the development of knowledge we cannot but be struck by the absolute necessity of intercourse. The wonderful achievement in the field of speculative philosophy in days of the feudal period was largely due to the constant interchange of ideas. The importation of Buddhism from India revolutionized our philosophy. The coming of the Jesuit fathers, Riggi and Verbist marked the beginning of a new system of mathematics and astronomy. I would not be speaking the truth if I did not mention the debt we all owe to our foreign colleagues. The first professor of geology was a German, Dr. Friedrich Solger. The seven years that Dr. Andersson has been associated with us are full of important discoveries and research. The coming of Dr. Grabau has made us independent of palaeontologists of foreign countries. I have already shown that our ancient palaeontologists were all moralists. Who can tell the influence of Dr. Grabau's infectious enthusiasm and unlimited capacity for work!

Let us hope that the younger members of the society will take the lesson to heart. We are all students of nature. We are friends and teachers of one another. So long as we are willing to learn and are united in our efforts neither the lack of money nor that of political peace will hinder us from our progress. The presence of so many distinguished guests here tonight shows that our efforts have not been unappreciated. Let us prove to them that their confidence and appreciation are not misplaced. It is our duty to show our sister institutions abroad that the Geological Society of China is not an organization on paper but a living organism that is constantly growing and developing.

Address delivered in Chinese and repeated in English by P.L. Yuan.

**The Aims of the Geological Society of China.**

V. K. TING

(abstract)

This Society affords an opportunity, for full and free discussion of the principles and problems of our science, such as is not possible in our official organization where of necessity attention must largely be centred on detail. It also gives opportunity for intercourse with the scientific men in all parts of this country by bringing them together at intervals in our large meetings; such intercourse and exchange of ideas is bound to be of benefit to all participants and to become a factor in the advancement of the scientific life of this nation.

Address delivered in English.

**China as a Field for Scientific Research**

ROY C. ANDREWS\*

I am particularly pleased to be able to bring the greetings of the Third Asiatic Expedition of the American Museum of Natural History to this new society.

I feel that it is a momentous occasion, for it marks a new era in the scientific life of China.

The intercourse with each other of men of science can not but assist and stimulates research and have far reaching results.

I believe that here in China you have two great assets, which few other countries of the world enjoy in a like degree. One is a field for investigation which is unrivalled in importance and interest. The other is, that you have scientific men who are eminently qualified to study and interpret that field for the benefit of mankind.

That other countries of the world look to Asia, and particularly China, as the place where some of the important problems of the present day will have their solution, is demonstrated by the fact that more and larger expeditions are being sent to this country from foreign lands every year. Such expeditions require great effort and heavy expense, but they are considered to be essential if we are to understand adequately the world in which we live. In China you are at the very door of the field instead of being thousands of miles away from it as are those of us who live in America or Europe, and your opportunities are correspondingly greater.

That you are taking advantage of those opportunities in a splendid way is shown by your Geological Survey. In the thorough manner in which its work has been projected and is being executed, the Survey would be a credit to any country of the world. Moreover its officials are actuated by the finest type of scientific spirit—that of cooperation—as I personally have had ample opportunity to learn.

I wish again to express on behalf of the Third Asiatic Expedition congratulations and best wishes for the success of the Geological Society of China.

**The wider Significance of Palaeontological Research in China**

WALTER GRANGER\*\*

I feel much honored at being invited to attend and take part in the first meeting of the Society; and I extend to you my heartiest greetings. Geology and its sister science, Palaeontology, have just begun to make great strides in this, the country of the oldest civilisation. The organisation of such a Society at this time is an important step in the development of these sciences in China.

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\*Leader of the Third Asiatic Expedition of the American Museum of natural History, New York.

\*\*Palaeontologist to the Third Asiatic Expedition.

China and the border-lands to the north and west—the old Chinese Empire—has within its boundaries great possibilities for work in vertebrate Palaeontology. It is almost the last of the great regions of the earth to be explored for fossils and it promises to prove one of the most important. The researches of Schlosser gave the first intimation of the richness of China as a fossil field and more recently the extended, and splendidly conducted explorations of Dr. J. G. Andersson have shown that the field of northern China is one of the most prolific of its sort in the world. Not only has Dr. Andersson's work brought to light a great wealth of late Tertiary material, but he has determined, very recently, that mammal-bearing strata of Miocene age occur in north China—a most important discovery. Much of the country is still unexplored, and the great plateau regions of Mongolia and Tibet are practically untouched, and there is great promise for the future.

The American vertebrate Palaeontologist views the fossil faunas of Eastern and Central Asia from two angles of interest: first, there are those forms which throughout their line of descent have remained purely Asiatic; second, there is an even greater interest in tracing out the relationship between such groups of animals as are common to both Asia and the Americas.

We are accustomed in America to look to Asia as the place of origin of many of our forms, both fossil and recent. We are curious to know, for instance, whence came our Ungulates, Primates and Rodents which appear suddenly and in abundance in our Lower Eocene. Beds of earlier age, although highly fossiliferous, contain no trace of these three orders, and we must look to this continent for their ancestors. Former land connections between Asia and North America existed without question, and over this bridge undoubtedly came the ancestors of some of our American phyla. It can hardly be assumed that such a land bridge was strictly a one-way passage, and it is probable that from time to time America has contributed to Asia from the richness of its own fauna. We may even suppose, that groups of animals originating in Asia, migrated to America and later returned to the mother continent in a much modified form. The time and extent of former land connections between the two great land masses, the various migrations across this connection, the parallel development of similar phyla on the continents, and the relationship between the faunas of Asia and those of Europe are all matters of extreme interest and of fundamental importance and the continuance of the thorough and systematic collecting already begun in this most promising region is bound to throw a flood of light on these subjects. We have an excellent knowledge of the various vertebrate faunas of America; it is now necessary to learn more of those on this side of the Pacific.

Finally, there is that most interesting of all Palaeontological problems—the origin of the human race. It is pretty generally accepted, for reasons which it is not necessary to enumerate, that Asia is the place of man's origin and the center of his dispersal, and it is quite within the bounds of possibility that China holds somewhere within the limits of its vast area, the evidence which will some day elevate certain theories to the position of established facts.

That the Geological Society of China will take a keen and helpful interest in the future Palaeontological work in this region is, I venture to say, assured. The Society has my best wishes for a long and useful existence.

### The Geological Society and Science in China.

DAVIDSON BLACK\*

It is both a privilege and a pleasure to be present at the first meeting of the Geological Society of China and to bring to the Society the warmest congratulations and good wishes from its sister organization, the Anatomical and Anthropological Association of China.

When on February 26th, 1920 the Anatomical and Anthropological Association came into existence, it did so it is true as the result of combined Chinese and foreign effort, but its inception was largely due to foreign initiative.

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\*Dr. Davidson Black, First President of the Anthropological Society of China and Director of the Anatomical Department of Peking Union Medical College.

In the organization of the Geological Society of China such has not been the case. The meeting this evening is thus of special and peculiar interest in that it witnesses the inauguration of the first non-medical scientific association initiated and organized wholly by Chinese investigators for the study and advancement of one of the pure sciences.

One of the most necessary preliminary steps in any scientific investigation is the acquisition of a first class working library. The collection of books and journals for such a library is in itself a long and tedious task and it is a great satisfaction to know, that already in Peking there is in the Geological Survey, in the Peking Union Medical College and in private collections much of the material necessary for a library such as we need. It would, however, be of great assistance to all scientific workers if a Joint Catalogue of all our Peking libraries could be prepared, and in this work the cooperation of all scientific associations must be enlisted.

China, from the standpoint of a worker in the natural science, offers a field of the richest promise to investigations. When it is considered how profoundly our conception of Tertiary mammalian succession has been altered during the past fifty years by systematic palaeontological research in America and Europe, one may expect as great or even more revolutionizing results to be forthcoming as the outcome of similar investigations in this vast country, so closely associated as it is with the probable centre of mammalian radiation.

I can assure the Geological Society that it may count on the heartiest support and cooperation, whenever possible, among the members of its sister organization in whose name I again tender you our warmest congratulations and good wishes.

## The Geological Society and Science in Asia

E. E. AHNERT\*

I feel it to be a great honor to be present here tonight and to take part in the exercises of the inaugural meeting of the Geological Society of China, a society organized and officered by Chinese Geologists. For me as for so many Russian geologists, this is an occasion for recitation; we are gratified to know that there exists under this sun, a land whose people, while conserving through centuries its ancient culture, in spite of the cataclysms of history—have also provided room and shelter for the seed of western science and have nourished it to vigorous life. Already our science has struck its roots deep into the congenial soil of this land, and has sent up a flourishing growth. With the careful tending it has received it has begun to put forth blossoms which give promise of a glorious fruition.

In the study of countries bordering their own native land, Russian naturalists have, like all true scholars, freed themselves from the bias of political separatism, and in the same spirit they have always accorded the freest facilities to the scholars of other lands who desired to make a study of the vast territory of Russia. For to the true man of science the earth is a unit, and cooperation is a sacred duty.

In the past not a few Russian geologists have consecrated the best years of their lives to the study of those regions, which from their nature and geological history form a natural if not a political entity with the territory of China. These studies have extended from the Pacific Ocean to far away Afghanistan. Others, through long years, have studied in the territory of China itself, and still others have devoted years of study to the fossils found in Chinese rocks. These men, one and all, have sincerely at heart the success of geological study in China, by all who are qualified to undertake it.

Because of their studies in the neighboring territories of Turkestan, Sungaria, Mongolia and Manchuria as well as in China proper. Russian geologists take a deeper interest in geological work in China than most others, and they gain deep satisfaction from the amplification and extension of their work which is now carried on by native Chinese geologists.

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\*Director of the Geological Committee of the Russian Far East—Vladivostok.

There stands within the city of our present meeting, a noble structure consecrated to the pure spirit of the universe. Your Altar of Heaven is a symbol of the aspiration towards truth which burns in the hearts of your people. And to me it is a promise, and a proof, that occidental learning will find in China, high priests of science, free from chauvinism, and consecrated to the search for truth—and to the keeping alive of its pure white flame, which consumes the dross of daily life, and points unwaveringly to the heaven of truth.

It is with these convictions that I present to you, gentlemen, the felicitations and heartiest good wishes of the Geological Committee of the Far East, of the members of the ancient Comité Geologique Russe, and of the geographers and naturalists of Russia, and in general of all men of science at work in the orient. And above all, I tender you my own good wishes, as those of one who has always ardently desired that the explorers and naturalists should form one united family, linked together by the love of science and of mutual interests for the great work that is entrusted to them.

Address delivered in French and translated by A.W.Grabau.

The last speaker was Prof.C.P.Berkey who after an introductory speech presented his scientific paper, "The New Petrology", before the meeting, which is printed in full in the following. It was discussed by Dr.V.K. Ting, Dr.W.H.Wong, Dr.Grabau, Mr.Yuan and Prof.Morris and the author. Then the evening was closed with a social hour.

## THE NEW PETROLOGY

BY CHARLES P. BERKEY\*

I suppose that one is not far wrong in saying that Petrology is the science of rocks. But we have not made ourselves very clear by saying it. To the average student of the subject, who must judge from what he is taught, and from what he can find in texts, petrology looks like a very complicated lot of methods of discrimination, coupled with still more complicated schemes of classification, by means of which one sometimes succeeds in finding a sufficiently mystifying name for a very innocent looking fragment of rock, to satisfy a perfectly natural craving for worthwhileness.

But this is not petrology—the real petrology that ought to be—no matter how elaborate it is, or however minutely every little detail may be described. It is one kind of rock study,—one form of petrology. The description of rocks is a form that no doubt has served a very good purpose in collecting and recording and classifying data; but there are other things, to be done.

After the first steps in a new scientific field are taken, it is not sufficient to present simply long lists of names and descriptions and descriptive terms and tabulations of facts and classification schemes. Such data alone do not satisfy the legitimate demands for an explanation of some kind. Such natural grouping of rocks as has been attempted, is a first step toward meeting this demand, but it has not gone far enough in petrology.

## THE FIELD

It is easy to assume or to adopt too simple a conception of the term, *rock*. It is clearly in the interest of beginners for them to think of a rock as a mineral aggregate, representative of a structural unit of considerable magnitude, and as a very definite and constant and reliable thing. But this is no great advantage to the investigator; and to insist on its magnitude and constancy may be very misleading indeed.

Petrology by rights includes the whole range of natural products of definite mineral make-up, all kinds of mineral aggregates, all kinds of origin, and all sorts of conditions.

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\*Geologist of the Third Asiatic Expedition of the Am. Museum of Nat. Hist., N. Y. and Prof. of Petrology and structural Geology, Columbia Univ., N. Y.

In actual investigation, it is a mistake to be content with the types of material representing only the more apparent large physical units. Some insignificant-looking portion, usually too unimportant-looking to be regarded as a rock-type at all, may carry more readable meaning than all the rest of the surrounding material. An ore, or a vein-matter, or a contact product, are as suitable material for the petrographer as are the igneous rocks or the sediments.

For this kind of petrology the term rock requires a revised definition.

A rock is a natural mineral aggregate of sufficiently definite composition and character to be representative of some structural unit, or of some process or condition, to justify separate consideration in arriving at a working understanding of the life-history and meaning of the physical unit to which it belongs.

How large these units may be, or how small, depends on the detail of the study, and the significance of the material in contributing to the solution of the problem involved.

Any petrographer, who has tried to make practical use of his petrology and of his own skill in any more systematic or connected way than that of simply naming or classifying separate fragments of rock, knows that it is very easy indeed to over-state the requirements of constancy of mineral makeup. Two pieces taken from the same physical unit in close proximity, often vary enough to require classification as quite different rocks. In many comparatively simple igneous bodies, this variation is in many cases still greater, and a whole series of different types could be recorded. If one is content with classification—such classification as we now have—such conditions may easily lead to confusion. There is no indication, in the terms usually used, of the fact that these varieties are all one geological unit of a very simple history and meaning. Emphasis on these classification-differences, therefore, may be very misleading. Many difficulties have arisen where the geologist or the engineer tried to find in the field as many structural units, as the petrographer, who described the rocks, called for.

The fault has been, in the past at least, that the petrographer dealt largely with mechanical distinctions, whereas the field man had to deal with



genetic relations. The time has come now, surely, when a real petrographer must also be a field geologist, or he must at least appreciate the point of view of a field investigator.

#### THE OBJECT.

In the past our best petrographers have lent the weight of their influence and the fruits of their labors to the field of tabulated detail, and to niceties of discrimination, and to schemes of classification, as if the chief aim were to divide and subdivide, and to discover still more intricate or arbitrary bases of further subdivision. Description has been recognized as a more or less necessary accompaniment, but this usually covered chiefly the features useful in the scheme of classification. Otherwise it became a more or less rambling account of every thing that could be seen.

Thus to be able to describe and classify rocks, marked one as an accomplished petrographer; and to have discovered a slightly different or new mineral proportion, or a slightly different chemical proportion from anything previously described, and to be thoughtful enough to give it a new name, marked one as an active contributor to the science.

In the effort to reach the last word in this direction of intimate discrimination, some of the foremost petrographers of our own day have gone so far as to wholly destroy the actual rock by a complete chemical analysis, before even beginning the task of classification. Sometimes, by this method, mineral constituents were listed in the recast of this analysis, and taken into serious account, that never occurred at all in the live rock itself, whereas the much more suggestive constituents and structures that it did have, were largely disregarded.

The most serious offender in this respect is the so-called quantitative system of rock classification, originated by four eminent American petrographers. In saying these things, there is no wish to be understood as attempting to belittle any of this pioneer work. Much of it, doubtless, had to be done, to lay the foundation of critical inspection, discrimination, and comparison. The quantitative principle was a good one to emphasize. The principle itself has come to stay; but a classification as mechanical as the quantitative system, can be at best only a side-issue in the real petrology that is already coming.