of the country. Human figures, horses, weapons, birds and symbols are the most common forms represented. In one place a man is seen leading seven ponies. Again the gigantic figure of a man about fifteen feet in length is reclining. Spears, shields, eagles, turtles, men on foot and horseback are scattered over the surface of the rocks in apparently endless confusion.

The soft sandstone is rapidly weathering away. In many places only mere outlines of the figures remain. Often the entire face of the cliff will fall off. It is but a question of a few years when the last trace of the figures will be gone. But more destructive than the ravages of time is the vandalism of man. It would seem that every white man who has visited these localities has felt it incumbent upon him to scratch his own name on the rock. This of itself might be considered only an exhibition of poor taste, were it not for the fact that he has almost invariably chosen to carve his own plebeian name over a pictograph. And with characteristic American thoroughness the scrawling letters are so broad and deep that the older figure is usually obliterated. Thus it is that many of the best examples of Indian picture writing have been and are being destroyed. Unfortunately there seems to be no way to prevent this vandalism. In a few years these records of a forgotten people shall have disappeared. CHARLES NEWTON GOULD.

UNIVERSITY OF NEBRASKA,
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SYSTEMATIC ARRANGEMENT OF ORE DEPOSITS ON A GEOLOGICAL BASIS.

THERE has been, of late years, a growing tendency to consider ore deposits from a geological standpoint. Heretofore it has been the general custom to almost ignore the physical character and structure of the rock formations with which given ore bodies are associated.

As some sort of comparison must be necessarily made between ore bodies as they are developed, their classification crude though it is, begins to take place early in their consideration. With the ordinary miner such a scheme is strictly empirical, according to some obvious features presented. From this to a scientific plan the step is a long one.

Why the classification of ore bodies has remained so long in an unsatisfactory state, and little or no real progress made, while other related branches of knowledge have advanced with gigantic strides, finds its chief explanation in the fact that our methods of investigating the phenomena connected with the alteration of rocks generally were inadequate. Until the beginning of the last quarter of our century these methods were advanced but little beyond what they were a hundred years before. The activity in natural science studies was in other directions.

With the application of the microscope to the rocks and the opening of a new world to the geologist as vast and as interesting as that which the same magnifying glass gave to the biologist, rock metamorphism assumed a new rôle. Ore formation is found to be merely a special phase of general rock alteration. It goes on under the same conditions and by the workings of the same geological processes.

The study of ore genesis and relationships of ore bodies has become a strictly geological proposition. The recent investigation of the ores from the standpoint of geology appears to be capable of producing good results. It is replete with suggestive inference. With modern geology as a foundation the near future cannot but open up to us unheard of and unthought of advantages in the practical development of the ores. We stand on the threshold of a new era.

On this topic we get a glimpse of the general trend of modern thought respecting the genesis of ore deposits by reference to the principles, formulated by Prof. C. R. Van Hise in his treatise on the general metamorphism of rocks (not yet published), as adapted recently to ore deposits. This summary is contained in his paper on 'Some Principles controlling the Deposition of Ores,' read at the Washington meeting of the American Institute of Mining Engineers.

So far as the classification of ore deposits is concerned we appear safe in concluding that:

(1) The chief feature wherein the classificatory scheme hereafter presented differs from others, is in the prominence given to geological occurrence and the direct operation of the geological processes as essential factors in the genesis of the ore bodies.

(2) The nearest possible approach to a purely genetic classification of ore deposits is believed to be found in their geological relationships, as determined by the great geological processes and not in their direct chemical formation, or physical shapes.

(3) The chemical reactions so widely used as criteria of ore classification are to be regarded as general agencies and therefore they are not available in the specific determinations of the various groups of ore bodies.

(4) In the discovery and exploitation of ores, structure is of first importance; not so much the structure of the individual ore body itself as the geological structure of the enclosing country rocks.

(5) The primary groupings of ore bodies appear to be best indicated when based upon their geological occurrence, as governed by the nature of geological processes operating.

(6) The secondary groupings appear to be best based upon the general form of the ore-bodies as geological formations produced by the grander categories of geological agencies.

(7) The ternary groupings are best based upon the specific phases of the geological processes involved in the formation of ores as ore bodies.

(8) The source of the ore materials is an unessential factor in their classification; the great practical question is, how are ores best exploited? In this connection it matters little what was the original condition of the ores. Nor have we to do very much with the detailed, complex, and usually theoretical reactions that are supposed to take place before the final stage of the ore, as we find it, is reached.

(9) Very similarly appearing ore-bodies may be formed by very different methods, a fact which, while apparent in all classifications, does not necessarily vitiate any.

(10) The present scheme is merely suggestive. It is the barest outline of what is believed to be capable of much further expansion and development into a comprehensive, rational and practical general plan.

CLASSIFICATION OF ORE DEPOSITS.

GROUPS.	CATEGORIES.	MINERS' TERMS.
I. HYPOTAXIC (Mainly Surface Deposits.)	Aqueous transportation. Residual cumulation. Precipitative action.	Placers, beds. Pockets (in part), some breccias. Bog bodies, bedded veins, layers.
II. EUTAXIC (Chiefly Stratified Deposits)	Emponded amassment. Selective dissemination. Fold filling. Crevice accretion. Concretionary accumulation. Metamorphic replacement.	Some masses, segregations (in part). Impregnations (in part). Saddle-reefs. Gash veins, some stock-works Nodules, some bands. Fahlbands (in part).
III. ATAXIC (Largely Unstratified Deposits.)	Magmatic secretion. Metamorphic segregation. Fumarole impregation. Preferential collection. Shearing satiation. Fault occupation.	Masses (in part), some lenses Stocks. Contact veins, some impregnations Chambers (in part), some pockets, linked veins. Attrition veins, some disseminations. True veins, some linked veins, lodes.

CHARLES R. KEYES.

NOTES ON INORGANIC CHEMISTRY.

THE work of H. Brereton Baker on extremely dry gases is continued by a paper on the vapor densities of dried mercurous chlorid and dried mercury, read before the Chemical Society (London). It is found that perfectly dry mercurous chlorid at 443° in an atmosphere of nitrogen shows a density of 217.4 which corresponds to the formula Hg_2Cl_2. The undried substance gives a deeper density of 118.4° showing that the dissociation of mercurous chlorid like that of ammonium chlorid is dependent on the presence of water vapor. The density of dry mercury on the other hand was found to be 108.1 at 448° showing that at this temperature the molecule of mercury is monatomic.