

Proceedings of the Iowa Academy of Science

Volume 1 | Part 1, 1887-1889; (1887) -

Article 36

1889

The Crystalline Rocks of Missouri

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Recommended Citation

Haworth, Erasmus (1889) "The Crystalline Rocks of Missouri," *Proceedings of the Iowa Academy of Science*, 1(Pt. 1), 66-68.

Available at: <https://scholarworks.uni.edu/pias/vol1/iss1/36>

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pale brown head, while the latter have one black spot back of each eye and one on the vertex. *M. ignota* is probably single brooded, as none of the larvæ which entered the earth June 1st have pupated, but up to date, September 2d., have only contracted to one-half the length.

Monostegia ignota appears and again disappears about a month earlier than the old pest *H. maculatus* (Nor.). The young larvæ, therefore, are plenty before the strawberry plants begin blooming and hence can be easily exterminated by the application of any of the arsenical poisons without the danger of poisoning the berries. These poisons can be effectively applied about the latter part of April or first of May.

THE CRYSTALLINE ROCKS OF MISSOURI.¹

BY PROF. ERASMUS HAWORTH, PH. D.

(Abstract.)

In the May and June numbers *American Geologist* the writer published a preliminary description and classification of the crystalline rocks of Missouri. Since that time considerable more field work has been done, and much new material gathered which is now being examined in the laboratory. Thus far nothing has been discovered which would originate any new ideas regarding the geology or petrography of the district under discussion, but a great deal of evidence has been obtained confirming views advanced in the publication above mentioned.

The relative ages of the crystalline and sedimentary rocks may now be considered established. The sedimentary rocks are younger than the underlying granites and porphyries. This has been stated by every geologist who has written on the subject, but the evidence, so far as made known, was simply that of super-position. This evidently is not conclusive;

1. Read by consent of the Director of the U. S. Geological Survey.

For if the granites and porphyries are eruptives they might be beneath the sedimentary rocks in many places and still be the younger.

The writer observed, in many localities, limestones and sandstones, and conglomerates which had fragments of the crystalline rocks imbedded in them, varying in size from very small to more than two feet in diameter. It is the rule rather than the exception that these fragments are present. There can therefore be no doubt whatever but that the sedimentary rocks are younger than the underlying granites and porphyries. This is all the more interesting on account of the conclusion reached by the Director of the Arkansas State Geological Survey, which had heretofore been counted archæan.²

The porphyries and probably the granites of Missouri are unquestionably of eruptive origin. Both the field and petrographical evidence in support of this proposition has been greatly increased since June, 1888.

The interesting relations between the porphyries and granites have been studied in detail in several localities. At present positive statements cannot be made, but it seems probable that the granites and porphyries belong to one and the same eruptive mass. The granite areas are quite small, some of them measuring only a fraction of a mile in diameter while others are three or four miles. The boundaries between the two rocks were traced in different places, and hand specimens carefully taken for petrographic study. All the evidence gathered favors the view advanced above.

In the *American Geologist*, Vol. I, p. 290-291, the writer has figured certain enlargements of feldspar crystals in the granite, and explained this secondary growth by supposing that the enlargement took place prior to the final consolidation of the magma. Prof. J. W. Judd has done me the

2. *Am. J. Science*; (3). 33. 50, July, 1889.

honor to reproduce these drawings in the Quarterly Journal of the Geological Society for May, 1889, p. 183, in an article: "On the Growth of Crystals in Igneous Rocks after Consolidation." In this interesting paper Prof. Judd concludes that the crystal enlargements from Missouri belong to the same general class observed in fragmental rocks by different workers, especially by Irving and Van Hise.³

It seems to the writer that the examples produced by Prof. Judd from Mull, in the Western Isles of Scotland, are so dissimilar to the Missouri specimens that it is unsafe to class them together. His is a *Labradorite-andesite* with large porphyritic crystals of labradorite, and a glassy base. The Missouri specimens are from a fairly well crystallized granite; one having idiomorphic crystals, it is true, but which is very far removed from a rock with a glassy base. Judd's idea is that "the growth of crystals of felspar and quartz goes on, at the expense of a more or less vitreous matrix, long after the solidification of the rock," etc.

Neither the field work nor the laboratory work on the Missouri crystalline rocks is completed. The writer will hold himself ready to alter his views on any of the subjects, or to entirely abandon them, should subsequent evidence demand it.

THE NATIVE FOOD FISHES OF IOWA.

BY PROF. SETH E. MEEK, M. S.

(Abstract.)

In the waters of Iowa, including the Mississippi River along her eastern border, are found about one hundred species of fishes, of these about thirty-six are usually found in our markets, and are regarded as food fishes of more or less value. About eight of the remaining species are large enough for food, but for various and just reasons, have no market

3. See Bull. 8, U. S. G. S. and Am. J. Science, (3), 30. 233, 35.