

DISCUSSION OF A PAPER HEADED "GENETIC  
CLASSIFICATION OF UNDERGROUND  
VOLATILE AGENTS."

Sir: In a paper in ECONOMIC GEOLOGY, Prof. R. A. Daly<sup>1</sup> says that I have erroneously stated that Posepny includes in the vadose circulation, water below the permanent water level. Professor Daly evidently had in mind Posepny's definition<sup>2</sup> rather than his usage of the term. The conception of the water level is a very helpful one if sufficient emphasis is given to its real character. It is not permanent, it is not a level; indeed it is a shifting, oscillating, undulating surface. It rises with the wet season and falls with the dry season, so that there is a zone, probably of considerable thickness in some places, which is below the water level in wet seasons and above the water level in dry seasons. This zone should be duly recognized in any treatment of underground waters, especially in the treatment of concentration of sulphide ores by underground waters. The oscillations of this zone, although "vadose," have deep-seated results. This may be illustrated in the diagram herewith (Fig. 27). After a dry season the water level will of course be low and the water near the water level will

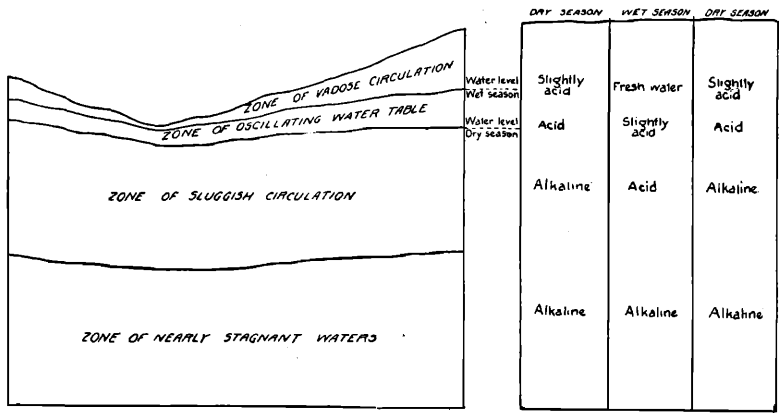


FIG. 27. Diagram showing chemical changes in the water of the zone of oscillating water table, and in the zone of sluggish circulation below it.

<sup>1</sup> Daly, R. A., "Genetic Classification of Underground Volatile Agents," ECON. GEOLOGY, Vol. 12, 1917.

<sup>2</sup> Posepny, F., "Genesis of Ore Deposits," p. 19.

be acid. At greater depth it will be alkaline. During the next wet season fresh water will raise the level of the water table, the resulting solutions will descend and a zone which has previously been alkaline will become acid by reason of the encroachment of the overlying acid waters. After longer contact with ores and rocks, however, the water again will become alkaline. It is in this zone of alternating alkaline and acid conditions where many of the changes take place in the enrichment of copper and silver ores. It is practically impossible to make synthetically under natural conditions the compounds of the silver-antimony-arsenic sulphides without recognition of these changes. By varying acidity and alkalinity it is easy, however, to form such compounds even in cold solutions in short periods. It seems to me that the oscillations of the water table have not yet been given the attention they deserve in classifications which have been proposed for underground waters.

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### *THE GEOLOGIST IN WAR TIME—GEOLOGY ON THE WESTERN FRONT.*

*Sir:* The practical applications of the general principles of geology in the Great War have been described by Professor J. S. Ames, of Johns Hopkins University, who was sent abroad last spring by the National Research Council as chairman of a committee of six to investigate the application of science to war, as illustrated on the western front. Three paragraphs from his article "Science at the Front," *Atlantic Monthly*, January, 1918, will be of interest to geologists.

Take geology. I had heard that geologists were attached to the Staff; but I had pictured them as mining engineers rather than as professors of the pure science. Imagine, then, my surprise when I found in one of the rooms at headquarters a world-famous geologist studying and marking areas on a geological map of Flanders. All this country through which the battle-line passes has been studied with care by geologists for many decades, and Belgium and France have both published sets of maps showing all the geological details. On the professor's table was a map of the district directly east of Ypres; he was coloring certain areas red and others various shades of blue. He was also marking certain points and drawing a few straight lines.