

## SCIENTIFIC JOURNALS AND ARTICLES

THE contents of the *American Journal of Science* for May are as follows: "Contributions to the Geology of the Grand Canyon, Arizona.—The Geology of the Shinumo Area," by L. F. Noble (Part I.); "Additions to the Pleistocene Flora of Alabama," by E. W. Berry; "Application of Potassium Ferricyanide in Alkaline Solution to the Estimation of Arsenic, Antimony and Tin," by H. E. Palmer; "New Cystid from the Clinton Formation of Ontario—*Lepadocystis clintonensis*," by W. A. Parks; "New Petrographic Microscope," by F. E. Wright; "New Ocular for Use with the Petrographic Microscope," by F. E. Wright; "Behavior of Crystals in Light Parallel to an Optic Axis," by C. Travis; "Some Simple Improvements for a Petrographical Microscope," by A. Johannsen; "Natural Naphtha from the Province of Santa Clara, Cuba," by C. Richardson and K. G. Mackenzie; "Intrusive Granites and Associated Metamorphic Sediments in Southwestern Rhode Island," by G. F. Loughlin.

## SPECIAL ARTICLES

## THE CRITICAL SPARK LENGTH

REMOVING the condensers from the influence machine in order to avoid strong disruption discharge, the insulated metal sheet referred to in a former communication<sup>1</sup> placed between the terminals, separates the positive column from the Faraday dark space. In these two regions the mica wind-mill shows that the air-column is moving in opposite directions. In the dark space Franklin's fluid is carried by convection. The air molecules are overloaded. They flow from the cathode knob to the plate, to which they deliver their charge. On the positive side of the plate the air molecules have everywhere a less than normal charge. Franklin's fluid has been drained out of them and into the anode. The discharge here involves a transfer of Franklin's fluid (Thomson's corpuscles) from molecule to molecule. This operation is attended

by luminous effects. Here the convection air current and the electrical discharge are moving in opposite directions. If the metal plate be removed, the opposing air currents will mingle. The length of the Faraday space, where the discharge is mainly by convection will now in general have changed. It becomes less sharply defined.

If the anode knob is moved up to the Faraday dark space, we have the critical spark length when disruptive discharge is feeble on account of small capacity.

If the knobs are brought nearer together, the positive or luminous discharge surrounds the Faraday region where convection prevails. A further decrease in the distance between the knobs increases the cross section of the column where the non-luminous convection-transfer occurs. The luminous discharge is crowded out into longer arc-like paths. This luminous column is what is usually called the discharge. The air current here forms a return for the convection currents within the Faraday dark space. All of these phenomena have been studied in open air, and photographic evidence will be presented in a paper to be at once published by the Academy of Science of St. Louis. Canal-ray effects obtained when the metal plate is provided with an opening have also been photographed. The Hittorf tube referred to by Thomson<sup>2</sup> is a most striking illustration of phenomena which are above described. In the shorter branch the dark convection discharge involves a transfer of gas molecules which in this case forms, with the gas-flow in the longer branch, a continuous circulation around the circuit of the two branches.

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THE SAN LUIS VALLEY, COLORADO<sup>1</sup>

POPULARLY the San Luis Valley or park is supposed to be the southernmost one of a chain of four great parks, of which North, Middle and South parks are the others. In

<sup>2</sup> "Conduction of Electricity through Gases," 2d ed., p. 443.

<sup>1</sup> Published by permission of the director of the United States Geological Survey.

<sup>1</sup> April 22, p. 628.