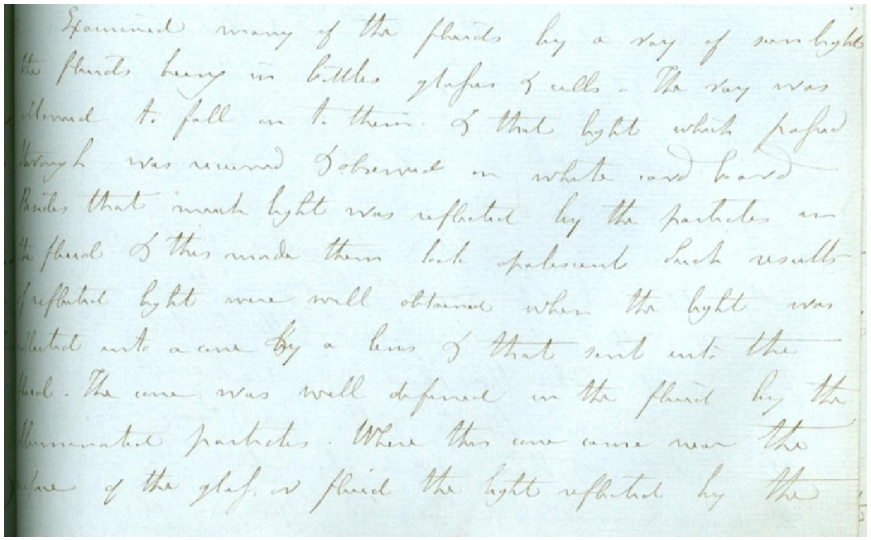
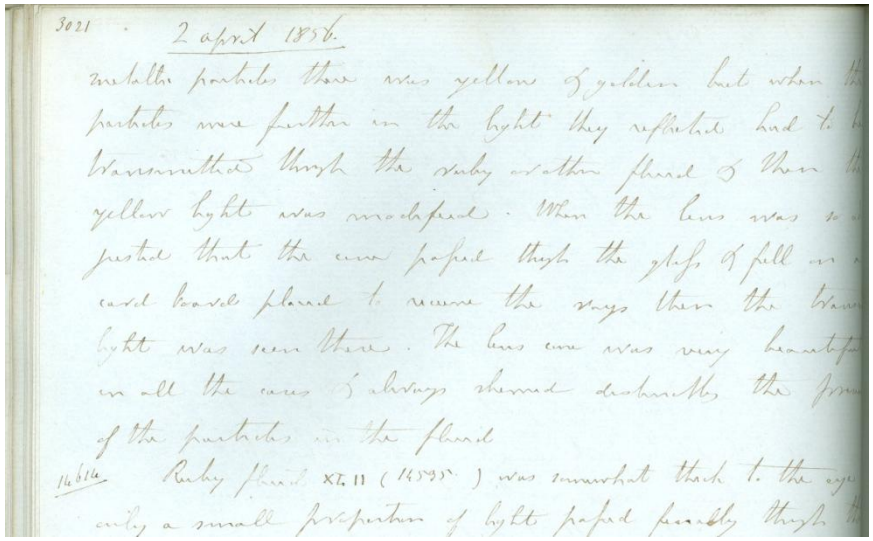
Faraday's notebooks: Gold colloids

The Royal Institution of Great Britain



Examined many of the fluids by a ray of sunlight the fluids being in bottles glasses & cells. The ray was allowed to fall on them & that light which passed through was received & observed on white card board. Besides that much light was reflected by the particles in the fluid & this made them look opalescent. Such results of reflected light were well obtained when the light was collected into a cone by a lens & that sent into the fluid. The cone was well defined in the fluid by the illuminated particles. Where this cone came near the surface of the glass or fluid the light reflected by the



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metallic particles there was yellow & golden but when the particles were further in the light they reflected had to be transmitted through the ruby or other fluid & then the yellow light was modified. When the lens was so adjusted that the cone passed thrgh. the glass & fell on a card board placed to receive the rays, then the transmitted light was seen there. The lens cone was very beautiful in all the cases & always shewed distinctly the presence of the particles in the fluid.

14614 Ruby fluid XT. 11 (14955) was somewhat thick & the eye only a small proportion of light passed freely thrgh.

Transcription

14613. Examined many of the fluids by a ray of sunlight, the fluids being in bottles, glasses and cells. The ray was allowed to fall onto them, and that light which passed through was received and observed on the white card board. Besides that, much light was reflected by the particles in the fluid and this made them look opalescent. Such results of reflected light were well obtained when the light was collected into a cone by a lens and that sent into the fluid. The cone was well defined in the fluid by the illuminated particles. Where this cone came near the surface of the glass or fluid, the light reflected by the

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metallic particles there was yellow and golden, but when the particles were further in, the light they reflected had to be transmitted through the ruby or other fluid and then the yellow light was modified. When the lens was so adjusted that the cone passed thrgh. the glass and fell on a card board placed to receive the rays, then the transmitted light was seen there. The lens cone was very beautiful in all the cases and always shewed distinctly the presence of the particles in the fluid.

Faraday kept meticulous notes throughout his scientific career; from 1832 he began numbering each paragraph for reference, eventually finishing about 30 years and 16041 paragraphs later. This is a good example of how he used the numbers as references in his work.

This paragraph from notebook RI MS F_2_I refers to Faraday's later work on gold colloids. This project grew out of his investigations into gold film which he prepared on glass slides to look at under a microscope. These gold colloids, which you can see on the bench in front of you, are the first metallic colloids to be created. A colloid is '*a homogeneous non-crystalline substance consisting of .... ultramicroscopic particles of one substance dispersed through a second substance.*' Every day examples of colloids include milk and mayonnaise.

Colloids are important because they give a handle on the relationship of light to very small particles of matter. On this page Faraday noted experiments with a cone of light made using a lens shone through the colloid. A similar effect is achieved with a modern laser pointer as seen above.