

5. Aerolite from Estacado, Crosby County, Texas.

6. Aerolite from Allagan, Allagan County, Michigan. (Fell July 10, 1899.)

The two siderites, of which the writers possessed a comparatively large quantity, were subjected to chemical treatment for the purpose of extracting germanium from them. The procedure was as follows.

Twenty-six grams of the Toluca siderite and sixteen grams of the Welland siderite were introduced into separate Pyrex distilling flasks connected to water-cooled condensers and provided with glass receivers cooled with ice. An excess of hydrochloric acid was added to the meteorites through dropping funnels. The reaction, which was violent, was allowed to proceed to completion. The solutions in the flasks were kept boiling till each was reduced to about one half of its initial volume. In this manner the germanium in the soluble portion was afforded an opportunity to form the tetrachloride, which is a fuming liquid boiling at 86° C., and as such to condense in the cooled receiver together with a preponderating amount of hydrochloric acid. The distillates were next saturated with hydrogen sulphide and allowed to stand several days. The precipitated sulphides were collected on small filter papers; the papers and contents were placed in porcelain crucibles and treated with nitric acid. The excess of acid was driven off with the aid of heat, and the viscous residues were examined spectrographically for the presence of germanium. The results were gratifying. The residue obtained from the Toluca meteorite yielded a spectrum which contained the following germanium lines: $\lambda\lambda$ 3039.1, 2754.6, 2709.6, 2691.3, 2651.6, 2651.1, 2644.2, 2592.5 and 2533. The more persistent of these lines, namely, $\lambda\lambda$ 3039.1, 2651.6 and 2651.1, were also visible in the spectrum of the Welland meteorite, though their intensity was much lower. This decrease in number and intensity of the spectral lines is to be ascribed to the fact that the quantity of germanium extracted from the Welland meteorite was smaller than that extracted from the Toluca meteorite.

The controversial views expressed by Merrill⁵ regarding the presence of arsenic in meteorites made it desirable to look for this element in the two siderites. When the siderites were dissolved in hydrochloric acid and the solutions distilled for the extraction of germanium, it was anticipated that arsenic, if present, would also distil over, as the trichloride. Accordingly, when the distillates were saturated with hydrogen sulphide and the resulting precipitates oxidized with nitric acid, the excess of acid, as already

stated, was driven off till *viscous* residues were obtained. It was feared that if the residues were taken down to dryness, or ignited, the arsenic, if present, would be expelled. The spectrograms of these residues contained the arsenic line λ 2780.2. An additional spectrographic examination in the more refrangible range revealed the presence of the following lines also due to arsenic: $\lambda\lambda$ 2349.8 and 2288.1.

To obviate errors that might result from use of reagents and apparatus, "blank" tests were made as follows. A volume of hydrochloric acid equal to that used in connection with the siderites but somewhat more dilute was distilled in a manner similar to that already described. As a matter of fact, in one case the apparatus employed for this purpose was the same that was used in the work on the Toluca siderite. The distillate was saturated with hydrogen sulphide. As usual a slight opalescence, undoubtedly due to precipitated sulphur, made its appearance. Since there was not enough of this precipitate to be retained by a filter paper, a few milligrams of copper sulphate dissolved in a minute quantity of water were added. The copper sulphate was found on previous examinations to be free from germanium and arsenic, at least in quantities detectable spectroscopically. The precipitated copper sulphide is an ideal adsorbent for traces of other sulphides. The solid material thus obtained was removed by filtration, oxidized with nitric acid as before and examined spectrographically. No lines of germanium or arsenic were observed.

SUMMARY

1. Spectroscopic evidence has been obtained of the occurrence of germanium in certain siderites, siderolites and aerolites.
2. Judging from the number and intensity of spectral lines the germanium in these meteorites is present in traces.
3. Germanium has been extracted from Toluca and Welland siderites.
4. Arsenic has been extracted from Toluca and Welland siderites.

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BOOKS RECEIVED

- GRAHAM, MICHAEL. *The Victoria Nyanza and its Fisheries*. 64 illustrations. 55 tables. Pp. 255. Waterlow and Sons, London. 10/-.
- HOBBS, WILLIAM H. *The North Pole of the Winds*. Pp. viii + 376. 24 illustrations. Putnam's. \$5.00.
- MERRIAM, JOHN C. *The Living Past*. Pp. xi + 144. 15 plates. Scribner's. \$2.00.
- STRANG, RUTH. *An Introduction to Child Study*. Pp. xii + 550. Illustrated. Macmillan. \$2.75.

⁵ Merrill, *Memoirs Nat. Acad. Sci.*, Vol. 14, 1st Memoir, p. 8, 1925.