ART. XLVII.—*On the recent formation of Quartz and on Silicification in California*; by T. STERRY HUNT. •

AT the meeting of the American Institute of Mining Engineers in New York, Feb. 19, 1880, Professor George W. Maynard exhibited a remarkable specimen lately obtained by him from the mines of the Gold Run Hydraulic Co. at Dutch Flat in California. It consisted of a mass of milky vitreous quartz, in which a recent fracture had disclosed an imbedded fragment, about half an inch in diameter, of the characteristic so-called *blue gravel* of the region, holding in its paste a worn and rounded piece of gold of several grains weight. Portions of a similar blue gravel adhered closely to certain parts of the mass of quartz. Remarks were made on this specimen by Professors Silliman and Egleston, and by Dr. T. Sterry Hunt, all of whom, after examination of it, were satisfied of the correctness of the opinion expressed by Professor Maynard, that the quartz had made part of a vein formed in the auriferous gravel subsequent to the solidification of the latter.

* The analysis is now being made in duplicate, and when completed will be published in this Journal. W. E. H.

† This communication, which for want of space was excluded from the April number, had been printed and revised before the writer had seen Professor Joseph LeConte's paper on The Old River Beds of California, in the March number of this Journal, where (on pages 179–181), he has so well described the auriferous gravels here referred to, and pointed out the true relations between the blue gravel and the upper and altered portions of the deposit. As regards the process of silicification, it is not, I think, necessary to suppose the infiltration of alkaline waters from the overlying volcanic rock, to explain the solution of silica. As elsewhere pointed out by the writer (page 350 of the present volume), the removal of the silica in a soluble form from the silicates which make up a large part of the gravel itself, does not require the intervention of alkalies. T. S. H.

Dr. Hunt, in commenting upon this occurrence, remarked that it is in accordance with what we already know of the rency of some of the quartz of this region, and cited the microscopic studies of John Arthur Phillips, who has shown that a great part of the siliceous deposit from certain thermal waters of Lake County, California, and from the Steamboat Springs of Washoe County, Nevada, is of the nature of crystalline quartz. Dr. Hunt then gave an account of some observations made by him at the Blue Tent placer mine, in Nevada County, California, in 1877, showing that the process of depositing quartz is there going on in the auriferous gravel of the region, independent of thermal waters, and is connected with the sub-aerial decay of the silicates in the gravel, which is here made up in great part of the *débris* of the crystalline Huronian schists of the region, including much greenstone or diorite-rock. The gravel below the drainage-level is greenish or bluish in color, and contains disseminated pyrites, together with trunks of trees in the condition of lignite, while the feldspar and hornblende of the greenstone are undecayed. Above the drainage-level, however, these silicates are more or less decomposed, the greenstone pebbles becoming earthy in texture, rusty in color, and exfoliating, and the accompanying pyrites oxidized, while the lignite is more or less completely silicified, being sometimes converted into agatized masses, often with drusy cavities lined with quartz-crystals, and at other times only penetrated or injected with siliceous matter which has filled the pores of the exogenous wood, the vegetable tissue of which still remains, often incrustated with crystals of quartz. In still other cases, a slow subsequent decay of the latter, in coniferous woods, has left these siliceous casts in the form of bundles of fibers which have been mistaken for asbestos. The various specimens from this locality illustrate perfectly the theory of silicification of vegetable structures, set forth by the speaker in 1864,* based on his own microscopic studies conjoined with those of Göppert and of Dawson.

The silica by which the tissues are thus successively filled and replaced is, according to the speaker, that which is set free in a soluble form in the decay of the silicates in the gravel. The lignite in the undecomposed and unoxidized portions of this which lie below drainage-level is, as yet, unsilicified. Dr. Hunt acknowledged his obligations to Mr. D. T. Hughes, a member of the Institute of Mining Engineers, in charge of the mine in question, and a skilled and careful observer, who had called his attention to the facts just set forth.

Professor W. C. Kerr stated that his recent and as yet unpublished observations on the fossil woods found in ancient gravels in North Carolina were in accordance with those described by Dr. Hunt.

* See Can. Naturalist, New Series, vol. i, p. 46; also Hunt's Chem. and Geol. Essays, p. 286.