Acid hot springs throughout the world have as the dominant member of their microflora a single species of alga, which often carpets the sides and bottom of these pools with a bright blue-green layer (Tilden 1896, 1898; Setchell 1901; West 1909; Geitler 1926; Copeland 1926; Negoro 1943; Emoto and Hirose 1940; Emoto and Yoneda 1940). Microscopic observation of such material gives the picture shown in Fig. 1; an unicellular alga, with a chloroplast filling most of the cell, multiplying by formation of four daughter cells within the mother cell wall, which ruptures to release the daughter cells.

The taxonomic position of this alga has long been in question. Tilden (1896) first placed it among the blue-green algae under the name of Chroococcus varius, later considered it better classified as a green alga, Protococcus botryoides f. caldaria (1898). Setchell (1901) called it Pleurocapsa caldaria, thus placing it among the cyanophytes. West (1904) returned it to the chlorophytes. Geitler (1936) proposed a new genus of Cyanophyta for it, naming it Cyanidium caldarium. In the same year Copeland (1936) gave it another new name, Pluto caldarius, also considering it to be a cyanophyte. It is difficult to determine which of these names has
Studies with Cyanidium caldarium, an anomalously pigmented chlorophyte

priority, but GEITLER's designation was probably the first and has been more generally accepted. HIROSE (1950) proposed that the genus Cyanidium be transferred to the Chlorophyta, and ALLEN (1954) suggested that the alga might be renamed Chlorella caldaria because of its close morphological resemblance to members of the genus Chlorella.

Further study has indicated that the characteristics of this alga are sufficiently unusual to deserve generic rank, and this suggested name is withdrawn in favor of GEITLER's name, Cyanidium caldarium, which will be used in the present paper.

Two strains of Cyanidium, one from the 'Lemonade Spring', The Geysers, Sonoma County, California, and the other from an acid hot spring in Yellowstone National Park, Wyoming, were isolated in pure culture. The Lemonade Spring had a temperature of 70—75°C and its water contained ca. 0.1 N sulfuric acid. The Yellowstone spring had a pH of 3—4; its temperature is not known (I am indebted to Prof. A. C. GIESE for collection of the Yellowstone material).

Both of these cultures had the morphological features and developmental history indicated in Fig. 1. The presence of a distinct chloroplast in Cyanidium makes it unlikely, as was pointed out by HIROSE (1950), that the alga is a member of the Cyanophyta. Moreover, Cyanidium has a rigid cell wall and a vesicular nucleus similar to that of Chlorella (personal communication from Prof. SPENCER W. BROWN). Its mode of reproduction by formation of autospores is also similar to that of green algal species of the genus Chlorella. Its reserve carbohydrate stains blue with iodine and hence is presumably starch. These characteristics place it clearly among the chlorophytes.