patches and streaks of a mineral resembling tetrahedrite, and minor amounts of chalcopyrite. A polished section shows large irregular areas of tetrahedrite with inclusions of chalcopyrite. Larger areas of chalcopyrite contain corroded crystals of pyrite. Tetrahedrite appears to be contemporaneous with chalcopyrite.

In polished section, the Ahlfeld specimen, material 4, shows abundant coarse laths of bismuthinite, contacting and intergrown with bent, twisted, and shredded laths of franckeite. Sphalerite, with small lath-like inclusions of a weakly anisotropic tan coloured mineral, possibly stannite, and finely disseminated chalcopyrite are accessory. Apparently this specimen is not typical of the Bolivian occurrence.

The specimen from Cerro Bonete, Bolivia, material 5, is a compact mass of silvery-gray ore, 2×1×1 in., lacking visible cleavage and coated with a partial film of limonite. Polished sections show a homogeneous white mineral with distinct twinning, weak pleochroism in cream to gray, and strong anisotropism in yellowing-white, blue, green, and brown. The microscopic properties and an *x*-ray powder photograph of this material are identical with those of benjaminite from the type locality, Round Mountain, Nye County, Nevada.

These observations suggest that previous workers were dealing with non-homogeneous material which consisted of such minerals as matildite, aikinite, benajminite, tetrahedrite, with chalcopyrite, sphalerite, pyrite, and galena. An intergrowth of matildite ($Ag_2S \cdot Bi_2S_3$) and aikinite ($2PbS \cdot Cu_2S \cdot Bi_2S_3$) roughly accounts for the composition and physical properties of the original material from Colorado, while the properties of benjaminite $Pb(Cu,Ag)Bi_2S_4$(?), which gives a distinctive *x*-ray powder pattern, agree reasonably with those of the reported alaskaite from Bolivia. Unless others can support the individuality of typical alaskaite from Colorado by microscopic and *x*-ray observations, the above notes must lead to the disqualification of this supposed species.

HYDROCARBON WITH CINNABAR IN BRITISH COLUMBIA

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Hydrocarbons, although occurring as minor constituents in many mercury deposits in various parts of the world (Halse, *Imp. Inst.*, Monog. Min. Res., 40–90, 1923; Ross, *Econ. Geol.*, **37,** 453, 1942), have been recorded from only one deposit in British Columbia (Cairnes, *Geol. Surv. Canada*, pap. **43–15,** 37, 1943) and have not been described. This note describes an occurrence of hydrocarbon with cinnabar observed by the writer at the Phillips' prospect near the Manitou mercury mine in the Tyaughton Lake Area of southwestern British Columbia.

Phillips' main cinnabar showing, described by Stevenson (*B.C. Dept. Mines*, Bull. **5**, 84, 1940) and by Cairnes (1943), is exposed in a large open cut on the eastern side of Tyaughton Creek valley about one-half mile south of Mercury Creek. The deposit occurs in rocks of the Fergusson Group of pre-Upper Triassic age, consisting mainly of chert, argillite, and greenstone. The eastern contact of a large body of serpentine and carbonatized serpentine lies about 250 feet west of the deposit. In the vicinity, small bodies of feldspar porphyry of probable Tertiary age intrude the serpentine and the rocks of the Fergusson Group.

The open cut exposes mineralized greenstone which dips eastward at 60 degrees, flanked on its hanging wall by highly contorted argillite and ribbon-chert. The greenstone is a rusty weathering, slightly amygdaloidal rock consisting of fine-grained ferruginous carbonate, albite, chlorite, and iron ores. The cinnabar occurs disseminated in this rock in places, in small calcite amygdules, and in irregular veinlets composed mainly of white calcite and smaller amounts of grey quartz, black hydrocarbon, and sericite cutting the greenstone. These veinlets range from 1 to 5 mm. wide and are generally crustified with calcite margins and quartz centers. Hydrocarbon occurs in places within these quartz centers as lenses that reach a maximum width of 4 mm. and a length of 20 mm.

The hydrocarbon is a very brittle, jet-black substance with a brilliant vitreous lustre and a perfect conchoidal fracture. Its hardness is approximately 3 and its specific gravity, determined from three samples, ranges from 1.364 to 1.398 and averages 1.376. The substance does not soften when heated in air, but ignites and loses more than 95% of its weight. A spectrographic analysis made with graphite electrodes, which of course could not detect C, H, or O, revealed no other major constituents and only traces of Si, Mg, Fe, Al, Ca, and Cu.

The crustification shows that the calcite, accompanied by cinnabar in places, was deposited early and was followed by quartz and then by hydrocarbon. It was seen microscopically that deposition of most of the sericite occurred after most of the quartz and before most of the hydrocarbon. It was also seen microscopically that slight overlap in deposition of calcite and quartz, of quartz and sericite, and of hydrocarbon and quartz had occurred and that minute amounts of quartz, cinnabar, calcite and sericite had been deposited in lunate contraction fractures in the hydrocarbon.

The widespread occurrence of bitumens as minor constituents of cinnabar deposits presents a problem. According to Schuette (*T.A.I.M.M.E.*, 410, 1931):

> "Generally, where bitumen is found in a quicksilver mine the underlying rocks are sedimentaries containing organic matter. Heat developed in these rocks by proximity of the mineralizing magma, by the strain attendant on fissuring or by the hot ascending ore-bearing solutions, no doubt initiates distillation and stimulates migration of organic bituminous matter. This ascends in the same fissure with the ore-bearing solutions and is trapped and deposited in the same horizon as the cinnabar."

Ross (*Econ. Geol.*, **36**, 140, 1941), however, considers this to be unsatisfactory as a general explanation. He has observed that:

> "In the Terlingua region bituminous material is perceptible only within the lodes and is almost everywhere present irrespective of the character or stratigraphic position of the wall rocks."

Although information pertinent to the problem of the genesis of hydrocarbon in Phillips' mercury deposit is meagre, it seems to favor Schuette's hypothesis. The black argillite of the Fergusson Group at the deposit, at the adjacent Manitou mine where Cairnes (1943) noted "a little unidentified hydrocarbon mineral" and at other places in the region, is distinctly carbonaceous (Cairnes, *Geol. Surv. Canada, M*em. **213,** 10, 1937; Stevenson, 79, 1940). Moreover, it may be significant that methane issues from drill holes in some gold mines in the vicinity of Fergusson Group sediments in the nearby Bridge River Area.

RED GOLD FROM THE SAN ANTONIO GOLD MINE, BISSETT, MANITOBA

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Two specimens of quartz-carbonate-sulphide ore submitted to the author by Mr. J. Gordon Bragg, assistant geologist of the San Antonio Gold Mine, Bissett, Manitoba, contain splotches of a coppery-red metallic mineral which, except for its colour, resembles gold; in one of the specimens, typical yellow gold is very close to the red metal. In both specimens the metals are in contact with or closely adjacent to pyrite and less abundant chalcopyrite. The mine geologists concluded from the colour alone that the red metal is cuprian gold. With the idea of checking this conclusion and, if it proved correct, of determining the approximate Au:Cu ratio, the author took *x*-ray powder photographs of a few small fragments of the red mineral from both specimens and of the yellow gold from the one specimen. During preparation of the powder samples, the unexpected observation was made under the binocular microscope that the red metal is red only on the surface; a gouge with the needle shows