bar 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 that the interior is golden yellow. A cursory search of the literature brought to light no previous description of a red-coated native gold, and therefore attempts were made to discover the nature of the present material.

Since the red surface coating is very thin, it is impossible to select it alone for *x*-ray or other analysis, and consequently the two above-mentioned powder samples of the red mineral consisted of the red coating with, of necessity, a much larger proportion of the yellow interior. The *x*-ray powder patterns of all three samples, the two red-surfaced metals and the all-yellow one, are identical with that of pure gold and with each other. Thus all three metals consist essentially of gold. A closer examination of the powder patterns of the red gold showed no additional lines which might have helped in identifying the red coating. Nor was a polished section of any assistance: no rims could be discovered around the gold, all of which appeared typically yellow. Etch tests of the red gold in the hand specimens were then made using the standard $FeCl_3$ and $HgCl_2$ etching solutions, but both gave negative results. Finally, spectrographic analyses were carried out on fragments of both the red and the yellow gold which had been picked visibly free from sulphides. These analyses were kindly carried out by Dr. Wm. Leach, Professor of Botany and Chairman of the Department in this University. The yellow gold spectrum showed prominent Au, Ag, Cu, and Fe, and the red gold spectrum prominent Au, Ag, and Cu but no Fe.

These results suggest that the yellow gold sample, containing both Cu and Fe, was contaminated by chalcopyrite although the presence of one or both of these elements within the gold is not entirely impossible. In the case of the red gold, however, the absence of Fe is proof that no chalcopyrite was present in the sample, and that the Cu must be a part of the red gold. The logical conclusion is that the Cu makes up the red coating, either as the more or less pure metal or, because of the negative etch tests, more likely as a Cu-Au alloy. Such a coating must be very thin since its quantity in the *x*-ray samples was less than the method can detect.

If, as the results indicate, the red coating is copper or Cu-Au, why its unusual occurrence on yellow gold? Perhaps the copper has been "naturally electroplated" on the gold as a result of some electrochemical action occurring in the crystallizing solution at the time of deposition. Whatever the explanation, the existence of copper-plated gold is unusual, and especially so when it occurs as it does in places, within millimetres of ordinary yellow gold.