

## SOME UNREPORTED SULFIDE OCCURRENCES IN EAST TENNESSEE

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### ABSTRACT

Recent investigations by the Division of Geology have resulted in the examination of several unreported sulfide mineral occurrences in East Tennessee.

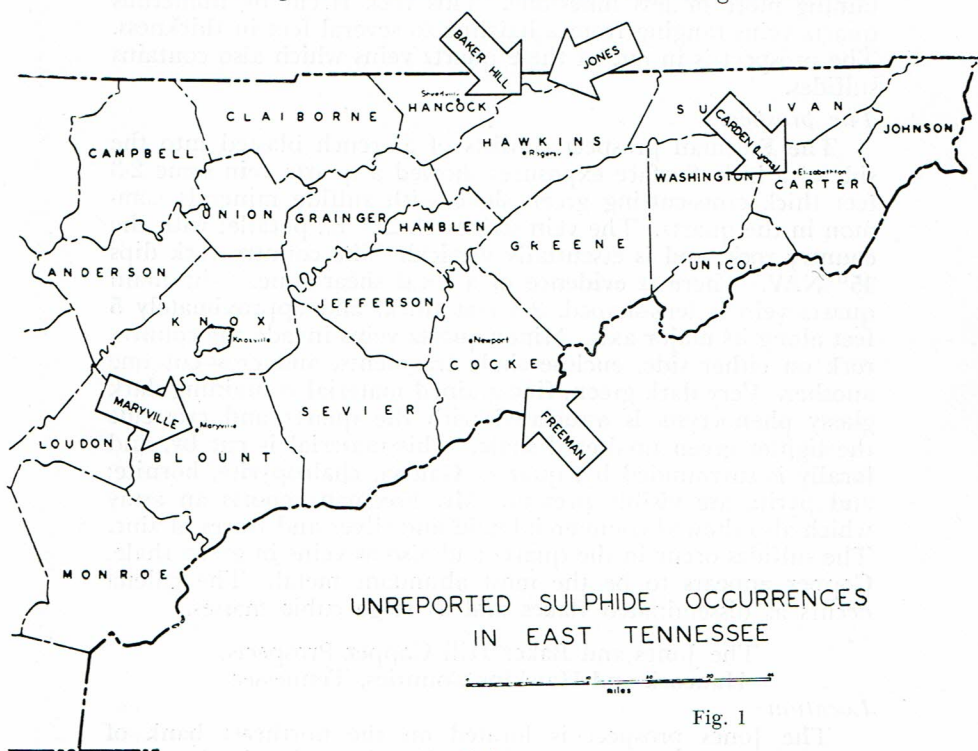
Two occurrences of chalcopyrite in the Mascot formation in Chestnut Ridge, Hawkins and Hancock counties, are discussed, and an occurrence of chalcopyrite and galena in vein quartz in Coker County.

A zinc-lead prospect in the Conasauga group in Carter County and an occurrence of sphalerite near Maryville, Blount County, are described. The latter occurrence is in the Kingsport formation, and is the Mascot-Jefferson City type of mineralization. The area near this prospect has been studied geochemically and an anomaly found.

### INTRODUCTION

Several previously unreported occurrences of sulfide minerals have come to the attention of the Division of Geology recently. It is felt that these occurrences, whether commercial or non-commercial, are of interest.

Acknowledgment is made to Messrs. Oscar Rogers of Hart-



ford and E. C. Jones of Klyes Ford for bringing the Freeman and Jones Prospects, respectively, to our notice. Mr. Huston Carden, Louisville, Kentucky, showed us the Carden (Lyons) prospect.

#### The Freeman Prospect

##### *Location*

The Freeman prospect is located 3.3 miles N.30°E. of the village of Hartford, Cocke County. The prospect is on the west side of the Hartford-Del Rio road at 1870 feet elevation just south of Gulf Fork, 700 feet southwest of the confluence of Gulf Fork and Teague Branch. The area is represented by USGS-TVA 7½' quadrangle 173-SE, Waterville quadrangle, at Tennessee coordinates 546,700N., 2,857,200E.

##### *Geology*

The prospect is situated in rocks mapped as Snowbird formation by Rodgers (1953, Mt. Guyot quadrangle). Rodgers' map indicates that the area is between the Gatlinburg fault on the northwest and the southwestern extension of the Houston Valley fault on the southeast. The country rock here is fine-grained, olive-green shale with well-developed fracture cleavage, containing more or less limestone. This rock is cut by numerous quartz veins ranging from a hairline to several feet in thickness. The prospect is in one of these quartz veins which also contains sulfides.

##### *The prospect*

The Freeman prospect consists of a trench blasted into the side of a hill. Surface exposures showed a quartz vein some 2-3 feet thick cross-cutting green shale with sulfide minerals common in the quartz. The vein strikes N. 22° E., parallel with the country rock, and is essentially vertical. The country rock dips 45° N.W. There is evidence of a local shear zone. The main quartz vein is lens-shaped, 2-3 feet thick, and approximately 5 feet along its major axis. Minor quartz veins invade the country rock on either side, enclose shale fragments, and cross-cut one another. Very dark green, fine-grained material containing dark glassy phenocrysts is associated with the quartz and crosscuts the lighter green unaltered shale. This material is cut by, and locally is surrounded by, quartz. Galena, chalcopyrite, bornite, and pyrite are visibly present. Mr. Freeman reports an assay which also showed commercial gold and silver and traces of zinc. The sulfides occur in the quartz and also as veins in green shale. Copper appears to be the most abundant metal. The galena occurs as disseminated flakes and as large cubic masses.

The Jones and Baker Hill Copper Prospects,  
Hancock and Hawkins Counties, Tennessee

##### *Location*

The Jones prospect is located on the northeast bank of Clinch River approximately 195.5 miles above the river's mouth

in Hancock County, on land owned by E. C. Jones. The prospect is situated at 806,400N., 2,886,300E. (Tenn. Coord.). This area is shown on the Looneys Gap (179-SW) 7½' quadrangle.

The Baker Hill prospect is located on the west side of the Tenn. Highway 70 cut through Baker Hill; 500 ft. south of the Hancock-Hawkins County line. The prospect occurs at 798,800N., 2,873,300E. (Tenn. Coord.). This area is shown on the Kyles Ford (170-SE) 7½' quadrangle. (This is probably the locality referred to by Safford)<sup>1</sup>.

These two copper prospects are in the same strike belt and on cursory inspection appear to occupy very nearly exactly the same stratigraphic position. They are approximately three miles apart.

### *Geology*

The two copper prospects are both in the upper part (Mascot formation) of the Knox dolomite in the strike belt next north-west of the Copper Creek fault. Both prospects are within 100 ft. of the top of the Knox dolomite. The host rock is a very cherty dolomite which strikes N. 60° E. and dips 50° SE. The beds enclosing the copper minerals at the prospects are markedly more siliceous than the adjacent beds. A similar copper show is reported from an abandoned quarry near Nickelsville, Virginia, by R. A. Laurence. This is presumably in the same strike belt. No local controlling structure was observed at either prospect, but the topographic quadrangles show features which suggest the possibility of cross faults.

### *Mineralization*

Surface indications at both prospects consist of green stains and blue copper minerals. Closer inspection shows blebs of chalcopyrite, rosettes of azurite, and amorphous masses of malachite. The mineralized beds are approximately five feet thick and contain (by estimate) considerably less than 0.5% sulfides. The host rock is notably siliceous, and at the Baker Hill prospect is exposed by current highway work. Some of the chert in this interval is suspected to be of hydrothermal origin. Such chert is not bedded, but is brecciated in appearance, and is darker than the usual Mascot chert. Very little "recrystalline" dolomite was observed at either locality.

### *Conclusions*

The principal feature of interest is the occurrence of chalcopyrite in the upper Knox, and in a strike belt not known to contain other sulfide prospects. This area is well suited to mapping minor structures, and geochemical prospecting. Such work would be of value in further evaluation.

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1. Safford, James M., 1869, *Geology of Tennessee*: Nashville, p. 469.

The Carden (Lyons) Prospect  
Carter County, Tennessee

*Location*

The Carden prospect is on the farm of Elbert Lyons on the west bank of the Watauga River, 0.4 mi. north by west of Sycamore Shoals, and almost directly west of the Bemberg Rayon plants. The area is shown on the Johnson City 7½' quadrangle, 198-SE, at Tennessee coordinates 733,200N., 3,101,500E.

*Geology*

The prospect is on the northwest flank of an anticline which plunges southwest. The host rock is the Honaker dolomite of Middle Cambrian age (Rodgers, 1953, Roan Mt. 30' quadrangle). The rocks near and at the prospect dip steeply, but outcrops are sparse. The Honaker dolomite at the prospect is a silty dolomitic limestone, dove-gray, nodular, with a few beds composed of intraformational conglomerate. Shaly partings are common.

The rocks described above are cross-cut by very dark gray to gray-black, contorted, slickensided, brecciated dolomite containing galena and sphalerite. This dark dolomite and associated sulfides constitute the vein material. It appears that this alteration is confined to a zone 10 ft. thick stratigraphically near the top of the Honaker dolomite. The lack of continuous exposures makes the extent of the alteration difficult to measure. Some local structure superimposed on the regional structure is suggested at the prospect by dips to the southeast and slickensides in the vein material.

*The prospect*

The prospect consists of one old pit and two new pits, all in close proximity. The older pit is caved and shows nothing. The two new pits are small, hand-dug pits which have been shot with dynamite. The blasting served to partly cover and to considerably disrupt the rock exposures. Creep mantle obscures the bedrock nearby, but a small stream 200 ft. northeast exposes a fair section. No evidence of mineralization shows in this exposure.

*Conclusions*

The surface indications at the Carden prospect are those of low temperature hydrothermal sulfide mineralization. Lack of exposures prevented any reliable appraisal. Two channel samples across what appear to be distinctly separate veins showed 1.01% Pb and 2.55% Zn; and 3.25% Pb and 6.30% Zn, respectively. One sample of host rock adjacent to the vein material showed a trace of Pb and 0.85% Zn. One sample of leached ore assayed 14.04% Pb and 9.35% Zn.

The Maryville Prospect  
Blount County, Tennessee

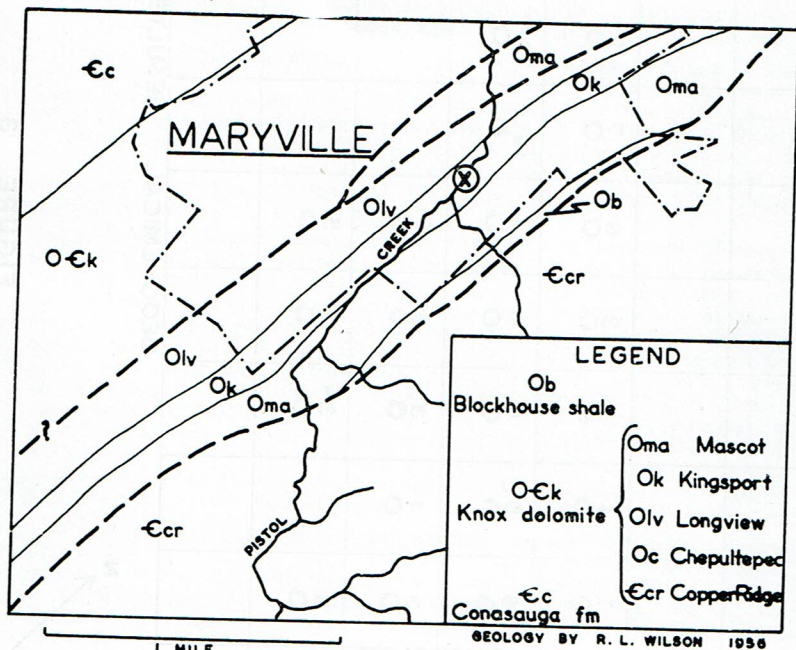
The Maryville prospect was found by R. L. Wilson, Tennessee Division of Geology, in the course of geologic mapping of the Blockhouse area.

*Location*

The prospect is located on the bank of Pistol Creek immediately southeast of Maryville at Tennessee coordinates 497,600N., 2,601,400E. The area is shown on the Blockhouse 7½' quadrangle, 148-NW.

*Geology*

Mapping by Wilson (in press) shows that a previously unreported overthrust exists in this Knox group strike belt. This fault places Longview dolomite over other Knox units, and the course of Pistol Creek at the prospect is on the Kingsport formation. (Fig. 2).



(X) - Zinc prospect

Fig. 2

*The prospect*

The prospect was disclosed by construction of a bridge footing at Pistol Creek. The mineralized zone has only a limited exposure (artificial), but a natural outcrop of mineralized Kingsport has been noted about 500 feet northeast of the footing.

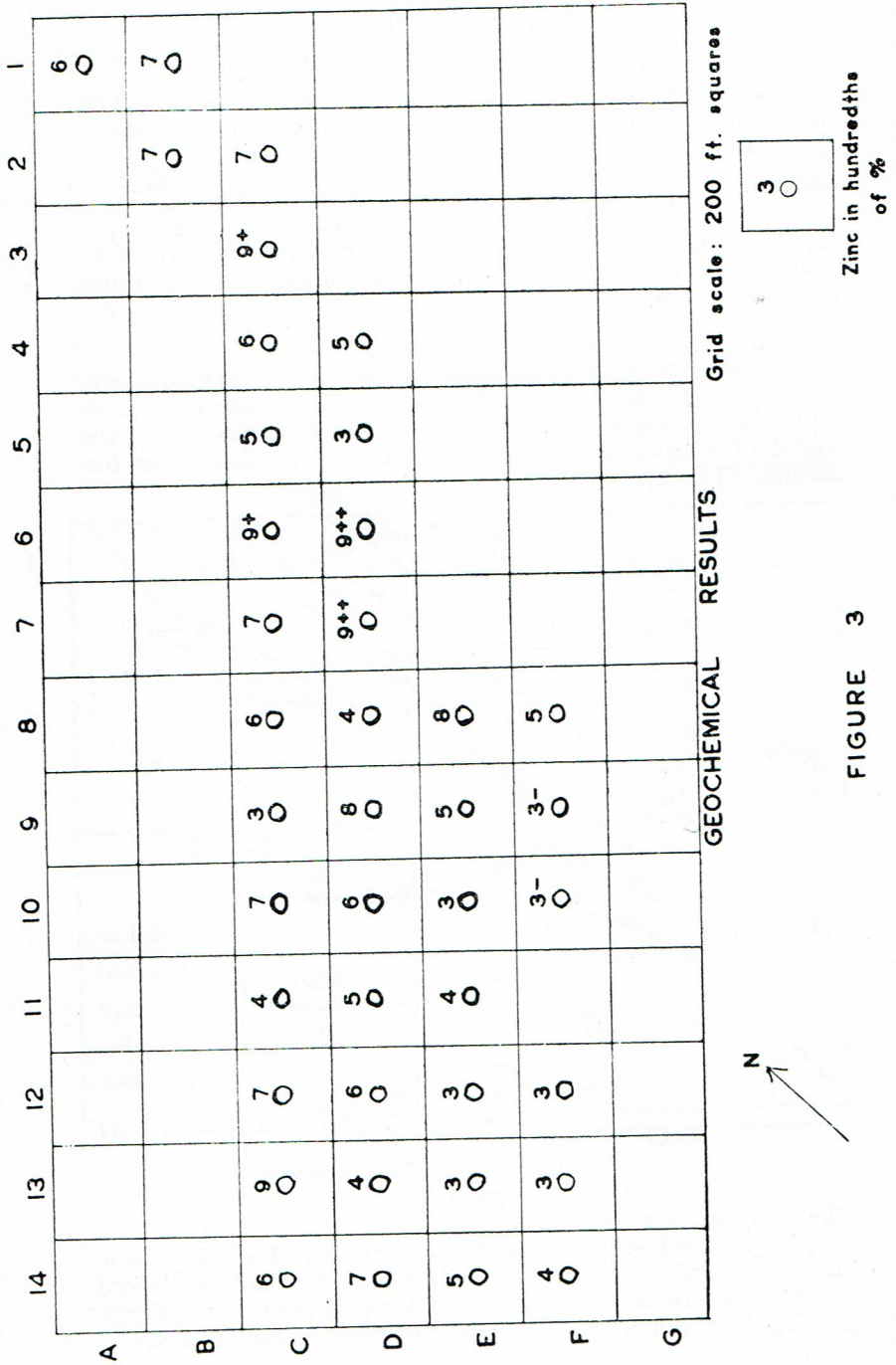


FIGURE 3

The zone consists of brecciated limestone recemented by coarsely crystalline dolomite ("recrystalline") which encloses 3.5% sphalerite. The sphalerite is a clear light yellow variety, and the mineralization is identical to that of the Mascot-Jefferson City district.

F. D. Bloss and R. L. Wilson applied geochemical techniques to the area adjacent to the prospect. Soil samples were collected and assayed using a cold dithizone method. The samples were collected on 200-foot centers to depths of 0.5 foot. Soils above unmineralized areas usually give about 0.03 parts per million for zinc. The results of this geochemical study are shown by Fig. 3.

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#### NEWS OF TENNESSEE SCIENCE

Michael D. Coe has recently been appointed Assistant Professor of Anthropology at the University of Tennessee. He will soon receive his Ph.D. from Harvard University for work conducted in ancient Guatemalan ruins where he found traces of early North and South American cultures.

The annual meeting of the Association of Southeastern Biologists was held in Knoxville, April 16-18. This was a joint meeting with the Southeastern Section of the Botanical Society of America, the Southern Appalachian Botanical Club, the Southeastern Division of the American Society of Ichthyologists and Herpetologists and the Southeastern Region of the Beta Beta Beta National Honor Biological Society. The opening address was given by Karl Sax of Harvard University; his topic was "The Population Explosion."

Dr. Stanfield Rogers, director of the University of Tennessee Memorial Research Center, has received the third annual award of the American Society for Experimental Pathology for basic research on how tumors and cancers behave and grow. The award, and a \$1,000 honorarium contributed by Parke-Davis, was presented to Dr. Rogers at the pathology society's 43rd annual meeting, held in conjunction with the Federation of American Societies for Experimental Biology in Atlantic City, N. J. The award honors original research by pathologists under 40 years old. Dr. Rogers' experiments began in 1947 at the Rockefeller Institute for Medical Research in New York following service in the Army and completion of his pathology residency at the U T Medical Units in Memphis. These experiments were continued at Duke University and at the U T Research Center. Dr. Rogers is a native of Dyersburg, Tennessee.

Three grants totaling \$99,625 for medical research have been awarded Dr. McChesney Goodall of the U T Memorial Research Center at Knoxville by the U. S. Public Health Service. Dr. Goodall, who specializes in neurophysiology, joined the U T Memorial Research Center Staff last October as research professor and assistant director. He came to U T from the Duke University School of Medicine.