

'The Fluorescent Minerals of Franklin, New Jersey'

Paul Carr commenced his lecture by acknowledging the significance of major contributors to the story of the Franklin minerals and who are associated with the Sterling Hill Mining Museum, the mineralogists Earl Verbeek, who may know more about fluorescent minerals than any one else in the world, Dick Bostwick, for whom bostwickite is named and Tema Hech.

Franklin is in the northeast American state of New Jersey about an hour's drive from New York City. There are two significant towns, Franklin which up to 1913 was known as Franklin Furnace and about four kilometers south is Ogdensburg. Associated with each of these towns is a major mine, the Franklin mine at Franklin and the Sterling Hill mine near to Ogdensburg, the area being known as the Franklin Mining District. All of these names may appear on labels of specimens from this area.

The famous mineralogist from the Smithsonian Institution, Pete Dunn, has written a very substantial two volume tome about the Franklin Mining District and has described the area as one of the world's most magnificent mineral deposits. The statistics tend to bear him out because among other factors 359 different mineral species have been identified from the area. Of those about 90 are fluorescent or about one in four of the total. The area is also the type locality for about 65 species and is the only locality in the world for about 30 species or about one in ten minerals are unique to the District. There are many localities in the world that have produced fluorescent minerals but the Franklin District has produced by far the most species, the brightest, the most vivid and with the greatest variety of colours.

Mining started in the area in the 1620s or 1630s when groups of Dutch explorers were travelling through that part of the state and they came on what they called 'iron beds' of magnetite. In the 1770s smelting of ores for the production of iron commenced with the construction of a furnace at a place initially called Franklin Pond and the establishment of the town of Franklin. In prospecting further through the area workers found traces of several copper minerals including malachite and azurite, and also a red mineral which they presumed to be cuprite. They tried to smelt this red mineral for copper but were unsuccessful, because it turned out to be zincite (zinc oxide), a mineral which was unknown at that time. Gradually a large number of small mines and mining operations became established through the 1800s until 1897 when there was what was called the Great Consolidation forming just the two main mines, the Franklin and the Sterling Hill. Both became very large operations, the Franklin about twice the size of Sterling Hill and about as large as Broken Hill. The Franklin closed in 1954 and Sterling Hill in 1986.

The Franklin and Sterling Hill orebodies had working iron mines nearby, and attempts were made to smelt magnetic franklinite as magnetite, the orebodies soon became recognised as world-class zinc deposits. As an indication of the amount of zinc available Paul Carr showed a picture of a grave headstone in the Franklin cemetery dated 1882 and composed entirely of zinc !. A view was also shown of some workers sorting lumps of ore on a large rotating 'picking table', separating out spurious lumps of timber and tramp steel which would jam the crushers, and presumably also looking for good specimens!. The name 'Picking Table' has been retained as the name of the local journal.

Minerals from the area had been found to be fluorescent reportedly because arcing across electrical switches and heavy motors in use underground produced ultraviolet light which caused fluorescence in some of the minerals being processed or transported nearby. Presumably once the fluorescent properties of many of the Franklin minerals were noted and ultra-violet lamps made available sorting the more significant mineral specimens from the picking table was considerably enhanced. Arc-spark UV

units were available on the picking tables and in the laboratories, specifically for making minerals fluoresce, by the 1920s. In 1968 the New Jersey State Legislature proclaimed Franklin to be the "Fluorescent Mineral Capital of the World."

The Franklin deposits are hosted in a 1,290 million year - old (1.29 Ga) so-called Franklin marble and a number of views were shown of some of the workings and open cuts with some of the host rock and remnants of the ore bodies exposed. The marble was deposited initially as limestone on an ancient shallow sea floor with rifting causing exhalative activity including heavy metal-containing fluids. Later the whole area was subjected to metamorphism and folding.

For a mineral to fluoresce it has to contain what the chemists call an activator, a small but very precise amount of a contaminating element. A number of elements will cause fluorescence in minerals although in the Franklin minerals manganese is responsible for the effect. The amount of an activator that can cause fluorescence is very critical, there being only a narrow range of composition which will produce it. Too much or too little activator will cancel the effect. Obviously many of the Franklin minerals which fluoresce the most brightly must contain the activating element in its most optimum concentration.

The Buckwheat Dump at the Franklin Mineral Museum and the Mine Run dump and surface workings at Sterling Hill are available for legal collecting, for a fee. There are other places where dump rock may be found from Franklin to Sterling Hill, some fenced in and marked, and some not. Illegal collecting at night with portable UV lamps apparently also occurs.

At the conclusion of his lecture Paul Carr spent some time demonstrating to members with the aid of an ultra-violet lamp the vivid fluorescence being exhibited by a selection of mostly Franklin minerals that he had brought in to display to the meeting.