Bills Rocks and Minerals
Sphalerite

Fig. 1 *Black jack Locality: Idarado Mine, Telluride, Colorado.* © *Robert M. Lavinsky*
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https://commons.wikimedia.org/w/index.php?search=sphalerite+257298&title=Special:MediaSearch&go=Go&type=image

Fig. 2 *Ruby jack Elmwood mine, Carthage.*
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Historically, miners would refer to sphalerite as blende, or zinc blende. Miners had other nicknames, for instance "black jack" (**Fig. 1**) and sometimes "ruby jack" (**Fig. 2**). The "black jack" nickname was so popular that dozens of mines around the world named themselves Blackjack mine. In America, there are several, for instance there is a Blackjack mine in Santa Catalina Island, another at Gumboot mountain, Washington and a third at Galena Illinois (**Fig. 3**). It is interesting that there are no mines with a title of Sphalerite mine, perhaps "black jack" sounds better. The "ruby-jack" nickname is a reference to the very dark ruby red colour of some crystalline sphalerite.

Sphalerite is a zinc, iron sulphide with a chemical composition expressed as (Zn,Fe)S. The percentage of iron is variable depending on conditions at the time of deposition, but is usually 25 percent, or less. Zinc is the major component, and for this reason sphalerite is principally processed to extract the zinc. However, other rare elements may be present in the ore. For instance cadmium, germanium, and indium may be present as trace elements, and extracted as by-products if their abundance is economically viable. In fact, the zinc component of sphalerite is the most significant source of cadmium, germanium, and indium, all widely important in modern technology. In older reference books there is no mention of germanium or indium, in sphalerite/zinc blende, but cadmium is described as not being more than five percent of the ore.

Although sphalerite was mined in the Central Wales Orefield, it was not as economically important as the mining of galena, at least not until the late 1800s, and early 1900s, when more use was made of zinc in the production of brass, and in the process of galvanising (see **Fig. 4**). Several reasons determined the economic value of mining and processing sphalerite in the second half of the 1800s. There was fierce competition from the Belgian mines in the mid 1800s, which exploited the

Fig.3 *Blackjack mine. Galena, Ill, US.*
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Brass types

Class	Proportion by weight (%)		Attributes
	Copper	Zinc	
Alpha brasses	> 65	< 35	Alpha brasses are Malleable, and can be formed into shape without heating. Golden appearance
Alpha-beta Brasses	55-65	35-45	More suited for hot working. With 45% of Zinc, this type of brass has the highest strength.
Beta brasses	50-55	45-50	Can only be worked hot, so are suitable for casting. These are the least golden brasses.

Zinc is a major component of brass, The most malleable type with the least amount of zinc is used to make thin metal objects such as trays, bowls, and plaques. Brass with the higher ratio of zinc is used to manufacture cast objects such as taps and fittings, coat hooks, door furniture, etc. There are other types of brass, with varying proportions of zinc, but the three above are the most common types in use

Fig. 4

massive reserves of the La Calamine paleokarstic deposit. Central Wales was well known for it's galena (lead ore), which was mined together with similar quantities of sphalerite. However the galena contained about 75 percent lead, and the sphalerite about 50 percent zinc. It is obvious that it was more economical to process the galena than the sphalerite, because of transport and process costs. Add this problem to the Belgian competition, and the production of zinc from sphalerite became increasingly uneconomical.

Mineral collectors have found some specimens of sphalerite in the spoil heaps of the Central Wales Orefield, however there are major problems with finding really good specimens. The first problem is that by their very nature sulphide mineral deposits are often deposited in close proximity to other minerals, and also mixed with the host rock, as a result of the common occurrence of hydraulic brecciation. There were solid seams of sphalerite, but the miners were very efficient at recovering as much as possible, so not much ended up on the spoil heaps

Another problem for collectors is that it has been many years since the mines closed, so the spoil heaps have become overgrown with vegetation, and they have also been scavenged to make forest/farm tracks. It has become increasingly difficult to find good specimens under these conditions. I started looking for specimens in the late 1990s. At that time conditions were obviously a little better, so I did manage to find just a few reasonable specimens, but it is now quite difficult to find anything worthwhile. The specimens shown in **Figures 5, 6** and **7** are some that I have collected in central Wales.

Fig. 5 *Sphalerite from Dylife, Central Wales.*

Fig. 6 *Sphalerite with quartz from Bryn-y-rafr. Central Wales.*

Fig. 7 *Sphalerite in brecciation from Dylife, Central Wales.*

There is a wide range of colouration in sphalerite, dependant on the amount of iron and other impurities. A colourless to pale green, almost pure variety, with less than 0.1% of iron is named cleiophane, and was first reported from Franklin, New Jersey, USA (**Fig. 8).** It has sometimes been referred to as white blende. At the other end of the colour scale is an opaque black variety named marmatite, which has a high content of iron (**Fig. 9**).

***Fig. 8** Sphalerite variety Clieophane. St.Lawrence County, NY, USA.*
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***Fig. 9** Marmatite,*
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These two rarer varieties, cleiophane and marmatite, are not recognised by the International Mineralogical Assocation, but full details of both together with illustrations can be found on the MINDAT website. The more common colours of sphalerite can be roughly divided and referred to. For instance the nickname for darker coloured sphalerite is "black jack", and for the red, brown, and orange varieties the nickname is "ruby blende", or "ruby jack" There is an exotic variety of rock called schalenblende, which is a mixture of sphalerite with other minerals, i.e. galena, pyrite, wurtzite (**Fig. 10**). In cross section schalenblende shows concentric rings of sphalerite alternating with rings of one or more of the other minerals. Because it is composed of several minerals it is classed as a rock, however, it deserves a mention here because of it's striking appearance which makes it a desirable for use in jewellery.

Fig.10 Schalenblende gmina Olkusz, Poland.
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Other colour varieties of sphalerite for instance the yellow variety earlier mentioned is in complete contrast to the specimen of bright ruby (**Fig. 11**) and there are many colours in between. Well formed crystals of all colour varieties of sphalerite can be used to make jewellery. Central Wales specimens tend to be very dark in colour, more likely to be more fragmented, and closely associated with Galena and quartz (**Fig. 12**). Although the Shropshire Orefield produced a similar suite of ores as the Central Wales Orefield, sphalerite only contributed to about 7.5% of the whole. At Snailbeach mine, spoil has been spread out over a small field, and specimens of sphalerite are available to collectors **(Fig. 13)**.

***Fig. 11** Ruby coloured sphalerite. Cantabria, Spain.*
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***Fig. 12** Specimens from Dylife.*

Fig. 13. Specimens from Snailbeach.

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