With no more items of news the President then invited Professor Laurie Lawrence to deliver the first lecture for the evening on the subject of 'Slag minerals, Ancient and Modern'.

Professor Lawrence has provided notes on his lecture which are reproduced as follows:-

The Silver-Lead Mines of Laurium, Greece

Discovery of the silver-lead deposits at Laurium on the Aegean coast of Greece 75 klm ESE of Athens goes back some three thousand years. The early Greeks probably found that the heavy rock contained within the white marble of the area yielded a bright metal when heated. This may have been accidental, e.g. from forest fires or by using the heavy stone during cooking. They subsequently learnt that by re-heating the metal in the presence of another associated stone, (sphalerite), a further very bright metal was obtained, (e.g. silver).

Little was done with these materials until the Phoenicians occupied this part of Greece several hundred years later. Their interest in the metals led to many small excavations into the Mesozoic marble in search of the ore – often using captured Greek warriors as slave miners. Eventually the deposits reverted back to the Greeks who used the silver to make coins thereby heralding the use of money in commercial transactions. They had little use for the lead but probably traded it with the Romans who had devised methods for making lead sheets and piping. After a period of inactivity during the Dark Ages, (from about 500 to 1200 AD), the Greeks re-commenced mining, eventually handing over to the French who have worked the mines until recent times.

No fewer than four hundred primary and secondary minerals are recorded from the Laurium mines. Masses of cerrusite and of smithsonite several hundred kilos in weight were found on the surface while the very large array of primary ore minerals carrying sulphides of lead, zinc, copper, arsenic, antimony, nickel and cobalt gave rise to a great diversity of sulphates, carbonates, arsenates and silicates. Some fine specimen minerals have been forthcoming – and are still being found. Noteworthy are the bright sky-blue cuprian smithsonite, smithsonite with a tortoise-shell pattern, fine azurite and malachite and especially the nickel arsenate annabergite as bright green tabular crystals covering purple fluorite.

The ore was crushed and separated from the calcite, quartz, fluorite gangue by means of running water and the heavy ore taken to 'smelters'. Nothing remains of the early smelters but the siliceous material was poured off into the sea

Over the aeons of time the chlorine of the sea water, gaining entry into the masses of slag through gas cavities, has reacted with remnants of metal - mainly lead, held in the slag. As a result many cavities are lined with fine though small crystals of rare lead chlorides including hydrous and basic chlorides. Some twenty-eight minerals are recorded from the ancient Laurium slags including laurionite, paralaurionite, penfieldite, georgiadesite, nealite and others including the oxides of lead, massicot, (orange), and litharge, (scarlet-red). Slag minerals can still be found at Laurium at low tide.

Although partly man-made the slag minerals of Laurium are accorded mineral species status, no doubt because of their significance in ancient history and the fact that the final process – reaction with sea-water, has been natural.

Laurie Lawrence
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