THE INTELLIGENT USE OF THE MICROSCOPE. pdf

1: Microscopy - CreationWiki, the encyclopedia of creation science

The intelligent use of the microscope by Charles Wolfran Olliver, , Chemical Pub. Co. edition, in English - 1st American ed.

Compound Optical Microscope Optical microscope image of onion cells - X magnification Compound optical microscopes can magnify an image up to X, but have a very limited depth of field. Therefore, they are typically used to examine smears, squashed preparations, or a thinly sectioned slice of some material. An optical microscope involves passing light through a series of lenses, to be detected directly by the eye, captured in a photograph, or projected on a screen. The maximum resolution that one can image is determined by the wavelength of the photons that are being used to probe the sample; nothing smaller than the wavelength being used can be resolved. Visible light has wavelengths of nanometers; larger than many objects of interest. Typically, on a standard compound optical microscope, there are three objective lenses: Advanced microscopes often have a fourth objective lens, called an oil immersion lens that involves placing a drop of oil on the cover slip, and then immersing the objective in the oil. An oil immersion lens usually has a power of X. The actual power or magnification is the product of the powers of the ocular eyepiece or projection lens, usually about 10X, and the objective lens being used. An electron microscope is an electron-optical instrument in which a beam of electrons is used to produce an enlarged image of a minute object on a fluorescent screen or photographic plate. Electron microscopy is used when items or features are too small to be imaged by light. Electron microscopy can magnify very small details with high resolving magnifying at levels up to , times. Scanning Electron Microscope SEM - works by bombarding the object with the primary electron beam and then measuring the angles and energies of the secondary electrons scattered by the atoms on the surface of the object. It is used to produce images with a characteristic three-dimensional quality. The method is for determining the surface structure of a solid by measuring the angle and energies of electrons scattered by the atoms on the surface of a sample. Transmission Electron Microscope TEM - works much like the light microscope, but generates in image by sending an electron beam through a very thin slice of the specimen. The resolution limit is around 0. Reflection Electron Microscope REM - sends an electron beam through the specimen but then uses the reflected beam of elastically scattered electrons to produce the image. Scanning Transmission Electron Microscope STEM - bombards a very thin slice of material with electrons and then forms its image from secondary electrons scattered from this thin slice. This method can achieve resolutions comparable to that of TEM while producing three-dimensional images. History of Microscopy Drawing of the structure of cork as it appeared under the microscope to Robert Hooke from Micrographia , which is the origin of the word " cell " The origin of the microscope is a matter of debate, but many give credit to the Dutch spectacle-maker Zacharias Janssen for inventing the first compound microscope in the late s. Galileo Galilei further improved upon the technology in the year , by designing one with a convex and concave lens. The phase contrast and electron microscopes were both first invented in the s. The phase contrast microscope was developed by the Dutch physicist Frits Zernike for which he was awarded the Nobel Prize in The first transmission electron microscope was built by Ernst Ruska.

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How to use a Microscope to Help Solve Gold Metallurgy How to use a Microscope to Help Solve Gold Metallurgy View Larger Image The assistance that can be obtained from the microscope in solving ore-dressing problems has been increasingly appreciated in the recent years, as attested by the frequency of papers on the subject. Further progress resulted in the use of metallographic equipment and magnifications up to diameters. However, it is only recently that full use has been made of metallographic microscopes with useful magnifications up to diameters wherein particles 0. Such work requires skillful preparation of the specimen before the full capacity of the microscope can be made use of. Photomicrograph of a polished surface of a cyanidation residue reveals a an inclusion of gold G measuring approximately 2 by 3 microns, locked within a grain of arsenopyrite Ar ; b two minute gold particles G enclosed in a grain of pyrite Py , the larger of the two inclusions being only about 5 microns in width. The latter technique is of especial value in connection with cyanidation of gold and silver ores, because in certain ores some of the gold occurs as minute blebs or stringers in pyrite, the inclusions often being as fine as 1 micron in diameter. Typical Gold Metallurgy Problems A sample of auriferous-pyrite concentrate assaying 4. Preliminary tests on this sample indicated that this material was very refractory. Subsequent tests, in which the raw concentrate was reground to â€” mesh and cyanided for a long period of time with a strong solution, failed to improve the extraction materially. The lowest cyanide residue contained 0. At this stage in the investigation it was decided to submit a sample of the above residue to the microscopical laboratory for the purpose of determining the form and manner of association of the gold. It was noted that the gold occurred as metallic gold completely encased in pyrite and that the size of the gold particles was about 1 to 3 microns. Inasmuch as minus mesh is about the present economic limit for grinding, it was useless to proceed with further tests along the lines of finer grinding and cyanidation of the raw concentrate. Thus at an early stage in the investigation, the intelligent use of the microscope saved much useless work by narrowing down the lines of attack and pointing to a practical solution of the problem. In this case either roasting prior to cyanidation or direct smelting of the concentrate was definitely indicated. For further information on the subject, the reader is referred to the latter paper, which gives an excellent description of a modern microscopic laboratory for such ore-dressing investigations, with practical examples, methods used, and bibliography. An interesting paper by R. Head presented at the February, , meeting of the A. The following is an extract: Repeated studies of tailings from flotation and cyanidation of gold ores has established the fact that surface contaminations on gold particles are often directly responsible for high gold losses; comparison of gold particles isolated from flotation concentrates and the resulting tailings have shown that the clean gold has been recovered and the tarnished or contaminated gold invariably lost in the tailing. Obviously, it is not possible to make such a comparison of gold ores treated by cyanidation, as the clean gold has been taken into solution; but when the gold found in cyanide tailing has a tarnished or coated surface, one may infer, with a reasonable degree of certainty, that the clean gold has been extracted. This premise is supported by experimental evidence obtained by isolating particles of tarnished gold and exposing them to cyanide solution in small parting cups. In one such experiment, tarnished gold particles picked from a cyanide tailing showed but slight evidence of dissolving at the end of 27 days. In this test, a cyanide solution of 1. The proof of cyanide attack was manifested by a noticeable thinning of the gold particles at the edges. It is not known whether the gelatinous film is of secondary origin, resulting from a reaction between the cyanide and some substance or substances adhering to the gold surfaces in the form of a coating, or is an original constituent of the surface contamination which has been made visible through the dissolving of a small amount of gold at the margins of the particles.

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I think the intelligent microscope might turn us into more intelligent pathologists if we are willing to take that risk and learn how to use it. Just a few references. These are personal opinions.

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9: The Intelligent Use of the Microscope - Europe PMC Article - Europe PMC

Today the advent of molecular testing of tissue sections, coupled with digital whole slide imaging and analysis using an 'intelligent microscope,' is bringing about changes in Pathology of even greater magnitude, that will again 're-invent' how we practice Pathology.

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