



Investigation and Analysis of Artifacts and Antiquities

Description and Terminology of Procedures:

All objects and/or fragments submitted to Orenda Lab are examined utilizing 10X to 600X powered loops, lenses, microscopes, stereo-microscopes, and digital microscopes. Tool signatures are the first evidence arrays to be searched for, examined, and categorized. All tools, whether they are shaped in various types of stone, metals, or other materials make and/or leave impressions in the material of the object being shaped. Hand made tools leave subtle but distinct signatures discernibly significantly different than those made by machine-made and/or machine sharpened tools. Hand made tools manipulated by hand create significantly different signatures than mechanical tools that are driven by a machine of low or high RPM. Orenda has thirty seven years of commercial effort and practical research investigation into these complex and dramatically discernable tool signatures. Orenda has sold (Since 1975) through museums, galleries, and other markets, modern machine made and hand made objects using modern tools or replicas of ancient tools. Microscopy has verified the vast differences between tool signatures on known modern and ancient objects. The finesse required to used ancient tools or modern replicas of them is beyond the modern masters adept at modern tool use only, and certainly the abilities of criminals making fakes or forgeries. Alternating current powered motors with RPM greater than one thousand revolutions per minute create tool signatures that include primary signatures, secondary signatures, and tertiary signatures. Primary signatures are the microscopic grooves (scratches) caused by abrasives in a slurry, embedded in a cutting tool head, or abrasives applied in any manner to the surface of the object being made and/or polished. The abrasions from tools have several features that need adroit discernment. The type of cutting edge pattern is of primary concern. The shatter aspect of the material in the areas where the tool's edges are in constant contact or sporadic contact with the material being worked is another feature that needs close investigation. The degree of polishing is measured utilizing comparison to various types of final finishes. These are delineated by geometric configurations, surface gradient, percussive patterning of the textures or lines, measurements and alignments of marks, angles, and their uniformity or lack of uniformity. Ancient rotary tools, such as the bow drill, pump drill, foot or hand treadle lathe, even with bronze or iron parts, do not exceed one thousand RPM. The protocols and procedures for utilizing ancient rotary tools demanded prep work much more tedious and labor intensive. Only Orenda has accumulated an exhaustive array of data concerning ancient tool signatures and the tools that made them, as well as the technical aspects of how the tools were utilized at their optimum. Secondary signatures of modern high RPM tools are undulations resulting from configurations and dimensions of the grinding or cutting tool's head. The high rate of revolution of the grinding or cutting heads make it almost impossible to create a smooth uniform surface on the material of the object being made using modern high RPM tools. Another type of secondary tool signature is a very distinctive signature created because of the configuration and dimension of the grinding or cutting head and the proportion of the RPM, torque, and the resistance of the material. This causes a pattern of discernible texture. Tertiary signatures are a completely different type of chattering caused by the transfer of the ambiance of the alternating current motor's arbor rotation vibrations. Decompositional wear (also described in mineralogical references as altered stone or alter to) is the phrase used for descriptions of diffusion and exfoliation processes and how they relate to degradation of reactive compounds and/or elements in the composition of minerals, metals, or other materials. Use wear and handling wear are measured by the degree of polish or lack of polish that results from an object's functional use or the processes that took place during the life of the object. The life of an object includes after its manufacturing (hand made), during the period when it was lost, buried, entombed, or cast away; and finally its "post burial" life. For objects that are contrived to imitate authentic objects and their altered surfaces use wear and handling wear are chemically and/or mechanically induced. These different qualities are discernible from authentic results of slow natural processes that may have taken many centuries. Crystalline layering, density, size, shape, group configuration and /or orientation, zone congruity, compaction, refraction, reflection, diffraction, and chemical composition are characteristics associated with decompositional wear and accumulation of deposit formations. Contrary to popular pseudo science minerals can be dated and have been, quite accurately since the 1800's. Radioactive luminescence is even more accurate.