## B63 Forensic Atlases: Mirrors With Memories

*Richard E. Bisbing, BS*, John G. Delly, MS, and David A. Wiley, BS, McCrone Associates, Inc., 850 Pasquinelli Drive, Westmont, IL 60559*

The goal of this presentation is to demonstrate the value of atlases to the forensic scientist and the application of new atlas technology useful to trace evidence examiners.

This presentation will impact the forensic community and/or humanity by demonstrating the value and usefulness of on-line atlases for the identification of materials of interest to criminalists.

Compilations of images and descriptions of various materials into an atlas have been useful to scientists for several centuries. Atlases are needed because it is, in fact, normal and necessary to forget. Therefore, it is normal that an atlas is useful. An atlas is a volume of tables, charts, or plates that systematically illustrates a particular subject with images, drawings, pho- tographs and descriptions; they are compilations of mirrors with memories.

The first atlases of forensic interest pictured physiognomy, a medieval pseudoscience for determining a person's character and criminality based on their facial features. In the 19th Century, atlases such as photographs in a Rogues Portrait Gallery and those with additional descriptions and mug shots that evolved from Bertillonage were popular. They were supplanted, eventually, by fingerprinting at the end of the 19th Century. The sole purpose of these forensic atlases was to remember something seen before, whether a criminal's face or his fingerprints. These atlases also chronicled the events surrounding the plates and images with accompanying descrip- tions. Therefore, a forensic atlas can be better defined: a compilation of images and descriptions whose purpose, in addition to learning something new, is to remember something seen before, whether people or traces.

Scientific knowledge is mostly memory of past experiments and data shared through the scientific literature and cataloged into searchable atlases. Fortunately, new technologies produce searchable digital atlases for the library and spectral atlases as part of an instrument. Using new tech- nologies, forensic science was gifted with two excellent examples of forensic atlases at the end of the 20th Century: AFIS and IBIS. Both contain images and descriptions that are searchable. Trace evidence exam- iners also need atlases, but of microscopic particles.

The first atlas of microscopic particles was Robert Hooke's *Micrographia* in 1665. The Victorians in the late 19th Century were rabid social microscopists and atlases proliferated during their era resulting in scores of beautiful color atlases for the microscopist. The forensic value of forensic atlases became apparent in the early part of the 20th Century with Glaister's atlas (published in 1932) entitled *A Study of Hairs and Wools*, which contained 1700 photomicrographs.

McCrone published *The Particle Atlas* in 1967, a photomicrographic atlas, with one short paragraph (caption) for each photomicrograph. Between 1973 and 1980 McCrone Associates produced six new volumes ultimately with more than a thousand photomicrographs. The six volumes were subsequently converted into a word-searchable digital version on CD ROM in 1992. Dennis C. Ward (FBI) and John W. Colby (www.xk.com) developed a Spectral Library Identification and Classification Explorer (SLICE) in 2000 to answer these questions about microtraces: what are the structural and chemical characteristics; could items have come from the same source; what is it, and has it been seen before?

In the 21st Century, the World Wide Web provides new opportunities for atlases of microscopic particles with technologies that can serve all of the forensic sciences with expanded memory. Images, data and descriptions can be put into a relational database using a browser based front-end application from which reports can be generated from the database to track sample progress, to perform a data peer-review, and to audit data for change control and data security. The images and descriptions are uploaded to another database which is part of the hosting environment and is connected to a web server which displays all the relevant data and images for a given sample.

In 2005, McCrone Associates launched a new online atlas for forensic microscopists, the *McCrone Atlas of Microscopic Particles* (www.mccroneatlas.com). The particle characterizations include images, interpretations and observations, and data from PLM, SEM, EDS, FTIR, RAMAN, and TEM; and, the search algorithm uses keyword, particle name, particle type, a classification system, and elemental composition. The real utility of the site is seen once a particle of interest is found but without the memory to verify its identity; like all atlases, its greatest use is as a means to confirm possible identifications. Although forensic atlases have been useful since medieval times, the internet will increase their value to the 21st-Century forensic scientist through extensive sharing of memory.

**Atlas, Microscopic, Particles**

 ** Presenting Author*