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## REFLECTION ON THE STATE OF CRIMINALISTICS

JAMES W. OSTERBURG

James W. Osterburg is professor in the Criminal Justice Curriculum program at the University of Illinois at Chicago Circle. Professor Osterburg was a member of the faculty of the University of Indiana for a number of years following his retirement from the New York Police Department, and served during the 1968-1969 academic year as a visiting professor at the School of Criminology, University of California, Berkeley, when he worked closely with Professor Paul L. Kirk. Professor Osterburg is also a past president of the American Academy of Forensic Sciences.

The substance of the ideas expressed below are based on conversations with the late Paul L. Kirk while the author was Visiting Professor at the University of California, School of Criminology, Berkeley. Some of the ideas have been expressed in his papers; some of the work he considered important, yet still remains to be done, is recorded. The author has tried to combine succinctly the essence of all too brief discussions in this short paper. It is intended as a personal means of honoring his memory. His death will be felt by the discipline. Surely he left his stamp upon it.

Criminalistics is an applied science that is little understood by the vast majority of people, including those in the criminal justice system and the scientific public. It is concerned with the unlikely and the unusual whereas other sciences are concerned primarily with the likely and the usual.<sup>1</sup> Because physical evidence of every imaginable variety may require examination, criminalistics is eclectic and has borrowed from all science that which is applicable to its needs. It has also developed special requirements, scientific and legal, and is a science in its own right. Indeed, it has been defined as the science of individualization.<sup>2</sup> It is principally concerned with the identification and individualization of persons and objects. The following newer scientific instruments or techniques have been employed for these ends:

- Emission spectroscopy
- Infrared spectrometry
- Ultraviolet spectrophotometry
- Chromatography (paper, thin layer, gas and electrophoresis)
- Differential thermal analysis
- Mass spectrography
- Electron microscopy

Electron microprobe

Neutron activation analysis

Computers (for information storage and retrieval)

The following common types of physical evidence or clue materials have been the subject of recent investigation or hold particular promise for further research efforts toward individualization:

Blood, hair, ammunition and firearms, paint, soil, the human voice, and latent fingerprints.

The need for the acquisition of a data base must win recognition, especially as a means of establishing the significance of the qualitative and quantitative composition of substances present in minor quantities or trace amounts. The importance of data relative to these elements lies in their potential as a means of individualizing clue materials as paint, glass, soil, and so on. Trace elements may be present accidentally in a substance or may be there deliberately, by adding a substance for "tagging" purposes. The need for compositional information about a wide variety of substances is based on the point made earlier that criminalistics is concerned with the unlikely or the unusual. There is need for continuing, on-going analysis of common clue materials in order to keep such information current. The theoretical, as well as the empirical, basis for the statistical evaluation and interpretation of the results of instrumental analysis of evidentiary materials is underdeveloped owing to the lack of research funds in the past and the meager, if not negligible, support at present. This situation prevails even though the United States Congress has voted several hundreds of millions of dollars for improvement in law enforcement.

There is a consensus among criminalists that the progress in criminalistics has been technical rather than fundamental and applied rather than theoretical. In short, there is a serious deficiency

<sup>1</sup> Kirk, *Criminalistics*, 140 SCIENCE 357, 368 (1963).

<sup>2</sup> Kirk, *The Ontogeny of Criminalistics*, 54 J. CRIM. L.C. & P.S. 235, 236 (1963).

in basic theory and principles as contrasted with the large assortment of technical procedures. It must be emphasized that research cannot remain undefined as to goals, nor limited to technical progress alone. The most important objective *viz.*, the interpretative, has received and is still receiving the least attention of all. The physical properties which serve for identification and for individualization are not all equivalent in kind or in probative value, nor uniformly significant under varying circumstances. Theories of probability applied to the interpretation of "details"—physical, chemical or morphological—are inadequate for the need. Related statistical studies are limited and, in general, are less than satisfactory. Presently, expert testimony is largely opinion testimony. Great importance must be attached to changing this subjective testimony into statements based on more objective standards.<sup>3</sup>

Concern needs to be expressed that the scientific community does not appreciate the sampling problem in criminalistics. Ordinarily, in the sciences, the analyst is able to obtain samples under almost optimal conditions. The crime laboratory worker, on the other hand, must be content with limited amounts of material which, inadvertently, is left behind or acquired by the criminal. Furthermore, the police officer at the crime scene must recognize the physical evidence and take the proper steps to collect and preserve; both legal and scientific considerations must govern his actions in specimen collection. Moreover, the demands of a criminal investigation may dictate that this whole process be delayed while some other, more immediately promising, investigative steps are taken. Mention must, also, be made of the legal difficulty in obtaining comparison standards if the suspect does not desire to cooperate.<sup>4</sup>

It is both startling and significant to note that the crime scene investigator can render the best staffed and best equipped laboratory impotent by

<sup>3</sup> Osterburg, *What Problems Must Criminalistics Solve*, 59 J. CRIM. L.C. & P.S. 427, 432 (1968).

<sup>4</sup> J. W. OSTERBURG, *THE CRIME LABORATORY: CASE STUDIES OF SCIENTIFIC CRIMINAL INVESTIGATION* xv (1968).

failing to recognize or collect and preserve any physical evidence which might have been present. Thus, the need for more realistic education in the matter of scientific aids and their use by the investigator is recognized and, with some new developments, is now possible.<sup>5</sup>

A possible new role of the university in the education of criminalistics and in basic research must be considered. It is reasonable to assume that if the necessary financial support and university interest is shown it might be possible to assemble at one institution the critical intellectual mass necessary to achieve the objectives and needs of the field. The hospitable and intellectual atmosphere of an advanced institute (such as at Princeton for the hard sciences or Stanford for the behavioral sciences) is a necessary condition for realization of the considerable basic and applied research that must be accomplished before the potential of science is achieved in the administration of justice. An opportunity for personnel of operating crime laboratories to spend time at the research center must be provided so that there is cross-pollination of the permanent research staff and the crime laboratory experts who are on the firing line.

The forensic sciences, and especially criminalistics, are the sole point of contact between science and the administration of justice. There is need to make better use of existing knowledge, to explore, constantly, the latest developments of science for their potential value in crime laboratory operations, and to build up a data bank of information when any new analytical tool becomes available so that the evidentiary results can be expressed in terms of probabilities. This requires the combined efforts of the mathematician and the criminalist. The results should strengthen the theoretical foundation upon which the more practical, technical structure can rest with confidence. The administration of justice will rest on a more solid foundation and merit confidence.

<sup>5</sup> Osterburg, *Police Academies Can Teach the Recognition and Preservation of Trace Evidence*, 14 POLICE 54 (1970).