Because of the inconclusive evidence in this case concerning Napoleon, it falls more into the category of historical speculation than ex post facto crime detection. The evidence in a recent crime case involving hair was more decisive. In this investigation hair samples were taken from the head of a man injured in a hit-and-run accident and matched with hair caught in the windshield wiper of a car owned by a primary suspect. It was a difficult case because hair taken from different parts of the same head may differ slightly in composition. Highly efficient analysis was required to remove the question of "reasonable doubt" from the jury's mind on identity of the hair in establishing the guilt of the suspect.

As you are aware, the illicit use and transport of drugs and narcotics has increased substantially in the last few years. Neutron activation analysis plays a part in the control of such traffic by determining the trace inorganic constituents of various drugs such as opiates, synthetic narcotics, marijuana, and barbituates. Marijuana samples, for example, can be successfully compared by establishing the elemental composition of the stems, seeds, leaves, and debris. From this information it can be determined where the marijuana was grown. Measurement of trace elements in heroin usually provides the identifying characteristics that can be used to determine whether heroin units seized at different times and locations are the products of the same illicit operation. This has been an important factor in a number of court cases.

Activation analysis has also been used to curb the distribution of illegally distilled spirits. Sometimes this is done by comparing chemical composition of bottled samples, but not always. In one case a man was convicted of operating an illegal distillery in Georgia, and the crucial evidence was based on the fact that mud samples from the defendant's truck, picked up in Brooklyn, N. Y., exactly matched other mud samples from a Georgia road leading to the still. Just as activation analysis can be used to identify ancient trade routes through comparison of pottery fragments and clay sources, it also can be used to identify modern trade routes in illicit goods.

Although activation analysis is a valuable tool in scientific crime detection, it should not be regarded as a forensic panacea. It is only one of several analytic techniques used to combat crime. Actual case work has shown that it works well in support of chemical analysis and microscopic examination and in that way can add points of identification and strengthen the overall evaluation of evidence. And, of course, the