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## Do Forensic Science Graduate Programs Fulfill the Needs of the Forensic Science Community?

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**ABSTRACT:** This research project was designed to address a number of issues which were felt to be vital to the construction of a meaningful graduate program in forensic chemistry. The purpose of the project was threefold: (1) to determine the current status of the graduate forensic science educational service in the United States; (2) to determine the effectiveness of forensic science graduate programs in providing new employees having appropriate skills and educational background; and (3) to assess the roles of local, state, national, and academic laboratories in forensic science research. The results indicate that graduate degree programs are generally well-focused, but that many managers do not require such training background for applicants. It was also found that, in the perception of forensic science practitioners, forensic science research should be performed in all settings including the practicing labs and academic and Federal research labs, but that funding and release time should be increased to allow for greater efforts and better research.

**KEYWORDS:** forensic science, education, research, laboratories, accreditation, administrators, curriculum, funding, graduate program, internship, laboratory managers, practitioners, serology, trace analysis

For many years, the forensic science community has placed a great deal of weight on the importance of forensic science education for the continued improvement of the practice of forensic science. Many authors have cited the need for advanced degrees in the forensic sciences, and two of the surveys performed on the subject have demonstrated that the majority of those employed in the field feel that this educational process is of primary importance [1,2]. However, while there is general agreement regarding the need for these programs, there is room for debate among those in the field and those involved with the administration of these programs as to the curriculum to be offered, the placement of emphasis on the production of "survey" courses within the curriculum (that is, required or elective), and emphasis on the role of the academic institutions in the performance of basic forensic science research.

The past several years have witnessed a decline in the number of graduate programs available in the forensic sciences [3]. When this state of affairs is compared to the optimistic outlook in 1980 [1], a question arises regarding the reason for the decline in the number of graduate programs in forensic science. Clearly, when the funding provided by the Law En-

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forcement Assistance Administration (LEAA) was discontinued in 1978, after about ten years of funding at nearly the \$1 billion level per year, it was necessary for many institutions to generate new avenues of funding.

In addition, declining enrollment in graduate programs may be a direct result of the generally low-paying opportunities available for initiates in the field. While the median salary for new M.S. graduates in chemistry was near \$27 000 in 1985 [4], that is, a 13% increase over the 1984 figure of \$24 000 [5], a quick survey of the offers expressed in the want ads for forensic science positions in the past six months revealed that the median starting salary would fall between \$22 000 and \$25 000 for a similarly trained individual in forensic science. Also, many students graduating from the program at Northeastern have found that they are often overqualified for Criminalist I positions and underqualified for Criminalist II jobs, thus leaving them in a void. This situation has been discussed in different terms by more than a few managers in the forensic science laboratories [6].<sup>2</sup> These scientists generally claim that they would rather hire a B.S. chemist and train that individual at the laboratory than hire an M.S. forensic science graduate (who is also perceived by those managers as having a somewhat deficient understanding of rigorous chemical principles) at a higher salary.

Another subject of debate within our student body, and in forensic science literature to a small extent, is the role of the academic programs in forensic science in providing the facilities and capital for basic forensic science research. Several factors in the status of research in forensic science must be considered. First, high case backlogs are the rule, not the exception, in forensic science, and there is generally little time or money available to allow for research in this environment [7]. Thus, the onus is placed on others to perform the basic research required for the improvement of the discipline. Three large national laboratories, the Drug Enforcement Administration (DEA), the Bureau of Alcohol, Tobacco and Firearms (ATF), and the Federal Bureau of Investigation (FBI), have the funding and facilities available for the basic research in forensic science. However, it is clear that these three organizations cannot be solely responsible for fulfilling all the research needs of the entire forensic science community. The DEA laboratory reported a decline in the amount of time devoted to research from 4 to 1.5% for the 1978 to 1982 interval, and the ATF's decrease ranged between 5 and 7% for the same period [7]. As a matter of practice, academic institutions are heavily involved in basic scientific research, so it seems only logical that graduate programs in forensic science should be actively involved in such research. However, the fact remains that far less than what is expected is actually performed in the academic atmosphere [7].

This study was designed to address three important, underlying questions which have their roots in the discussion presented thus far. First, it was important to learn whether or not the curricula of the graduate programs in forensic chemistry reflect the needs of the laboratories presently practicing forensic science. Second, it was important to delineate entrance requirements, curricula, staffing, and facilities of the graduate forensic science programs in the United States. Finally, the survey endeavored to determine the role of educational institutions, national, state, and local laboratories in the performance of forensic science research, as perceived by laboratory managers, graduate program administrators, and forensic science practitioners.

## **Study Design, Results, and Discussion**

### *Survey of Laboratory Managers*

To ascertain the areas within forensic science which should be emphasized in any curriculum and to assess the needs of forensic science laboratories throughout the country (as perceived by a cross section of laboratory managers), we mailed 156 surveys—22 Federal, 87

<sup>2</sup>R. Saferstein, personal communication, 1983.

state, 10 local, 1 private, 24 county, 2 university—to a random population of managers. The names were chosen from laboratory managers listed in the 1985 membership directory of the American Academy of Forensic Sciences (thus assuming that each individual was a practicing forensic scientist). Roughly 15% (23) of the surveys were returned by laboratory managers holding bachelor degrees in biology and chemistry, master's degrees in chemistry, criminalistics, and forensic science, and Ph.D.s in chemistry, biochemistry, and analytical chemistry. The survey included a sample curriculum offering and asked the laboratory managers their opinion of how well the curriculum reflected the needs of the forensic science laboratory, of the placement of emphasis within the curriculum, and of the relative importance of specific skills for applicants. In addition, the managers were asked to describe their preference between applicants having forensic science graduate degrees and those with traditional academic backgrounds and their opinion as to whether or not an internship is an essential component of a graduate program.

The laboratory managers were almost equally divided (ten "yes," nine "no") about the ability of a forensic science graduate program to provide a better source of new employees than those coming from a traditional chemistry background. Two respondents were ambivalent on the matter and preferred to judge new employees on a case-by-case basis.

As illustrated in Fig. 1, the managers said that chemical knowledge was the most important ability they considered when evaluating potential employees, followed by instrumental knowledge and laboratory procedures, while toxicology, crime scene, and law/court procedures were not heavily weighted in their consideration of an applicant. Clearly, skills acquired during study in conventional undergraduate chemical curricula are most important, and this explains the finding that many managers are satisfied by hiring B.S. chemist graduates.

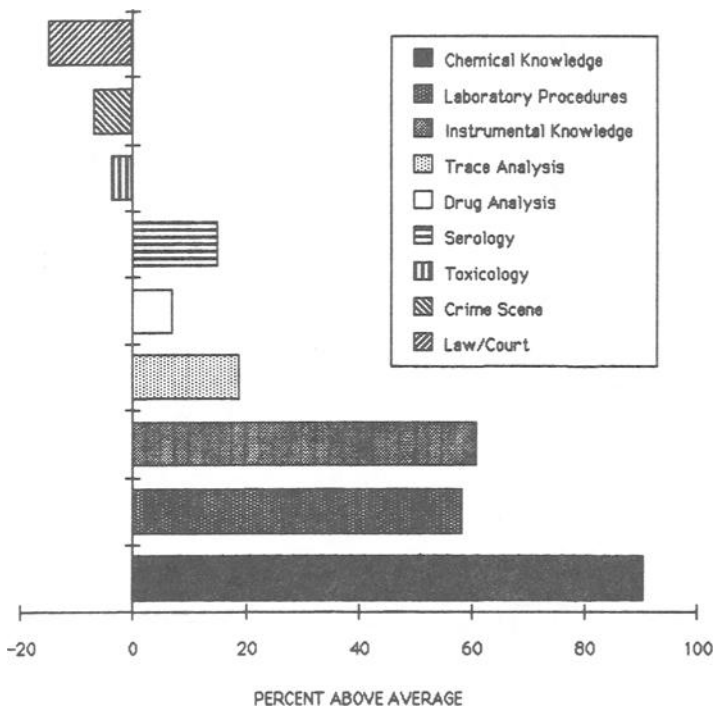


FIG. 1—Relative importance of skills in new employees.

The managers were not overwhelmingly in favor of an internship as part of a graduate program (14 "yes," 5 "no," 2 "undecided"), and they suggested the following curriculum changes to prepare the student for employment in the field:

- (1) emphasize and strengthen chemistry requirements.
- (2) drop survey courses in criminal justice and nonscientific forensic topics in favor of more class time with trace and serology, and
- (3) include report writing and computer courses because they will become increasingly important in the future.

Even taking these inclusions into account, however, many respondents questioned the ability of graduate programs to produce students with specialized knowledge and training, that is, immediately productive forensic scientists who could hold their own at the laboratory bench as well as in the courtroom.

#### *Survey of Graduate Program Administrators*

The success of forensic science graduate programs depends upon how well they compete with other programs of graduate study and avoid the problems encountered by the administrators of now defunct programs. To determine the success of these programs, we mailed 17 surveys to Academy members at the 9 remaining institutions offering graduate programs in forensic science and 1 survey to the University of Pittsburgh, which graduated its last forensic science M.S. students in June 1982. These surveys requested information on entrance requirements, curricula, facilities, teaching staff, and the position of the program within the institution. In addition, the survey requested information about funding for teaching assistants and research programs and about members' positions on specialized accreditation requirements and a national coordination of course offerings.

Although individuals at only five academic institutions responded to the surveys that were mailed, the responses elicited still allowed us to glean some knowledge. Overall, respondent programs had homogeneous entrance requirements, curricula, and facilities. The programs were able to meet their basic instrumentation needs within their own departments and permitted ready access to the more advanced instrumentation available at the university. In addition, the majority of the programs have a small complement of tenured instructors and a number of adjunct lecturers for specialized subjects and are variously sponsored by departments of criminal justice, public health, or chemistry. Regardless of the different positioning of the programs within the institutions, however, funding for teaching assistantships and research was meager.

Other workers have obtained similar findings. For example, Peterson and DeForest [8] have shown that nearly half of the forensic science graduate degree programs are located within criminal justice departments. The funding needs of forensic science research are substantially different from those for social science research, and this may prove to be an insurmountable burden for host departments, thereby limiting to some degree the amount and scope of research performed.

Peterson and Angelow [9] also have found that most faculty in forensic science graduate programs spend the vast majority of their time teaching, leaving little time for research. In addition, our finding that adjunct (less than full-time) faculty play a major role in the operation of such programs seems to bode ill for research, since these faculty have even less time for research than full-time professors.

There was no clear accord on the question of specialized accreditation requirements, but there was unanimous agreement that the programs should not be coordinated nationally to make offerings of different specialized courses available at the various institutions. It appears, therefore, that graduate programs will continue to offer similar curricula covering a wide range of topics. However, it is possible that an accreditation program, emphasizing

basic skills in the forensic sciences, may be implemented in the future. Coordination of such a program might logically be the responsibility of the American Academy of Forensic Sciences or American Society of Crime Laboratory Directors (ASCLD), or of a group of administrators from the academic institutions.

### *Survey of Forensic Science Practitioners*

Of forensic science laboratory practitioners (a group composed of entirely different individuals than those participating in the other two surveys), 42 Federal, 156 state, 60 local, 36 private, 61 county, and 10 university were queried as to funding for research, topics of research, and caseload release time allowed. Most of the respondents held M.S./M.A. degrees.

The majority (28, 51%) felt that an atmosphere should exist where the research conducted in this country is the result of a combined effort by academia, state, federal, and local laboratories and national research laboratories. Many others (12, 22%) felt that the state laboratories are the best sites for forensic science research. They stated that state and local laboratories know the problems, have more experience with them on a "grass-roots" level, and therefore should do more research, but that these laboratories lack time and funding. Academic laboratories were posited to have time, and the federal laboratories to have both funding and time, but the respondents thought that these labs conduct too much esoteric research, that is, useless for practitioners who lack the instrumentation or skills to utilize such research. Sensabaugh [7] has forwarded an explanation for similar findings as a perception that "academia lacks a prominent visible presence in a field in which problems originate in the working arena."

It was readily apparent from the survey that there are more laboratories currently not involved in research (26, 47%) than those which are (21, 38%). In addition, those that are conducting research generally receive no additional or supplemental funding or personnel; rather, they draw from their regular budgets in an attempt to meet their financial needs, and they conduct their individual research projects in addition to their casework responsibilities. The sources for the four respondents who had external funding were regional forensic science organizations (two), the state police (one), and the National Institute of Justice (one).

Finally, Fig. 2 demonstrates that the majority of laboratories where research is being conducted are addressing serological topics and trace analysis, followed by drugs/toxicology, arson and explosives, questioned documents, and a number of miscellaneous projects, involving latent prints, firearms, high-performance liquid chromatography, and ultraviolet/visible spectrophotometry (UV/VIS). While there does not appear to be any coordination of these projects among laboratories, it does appear that serology and trace are receiving em-

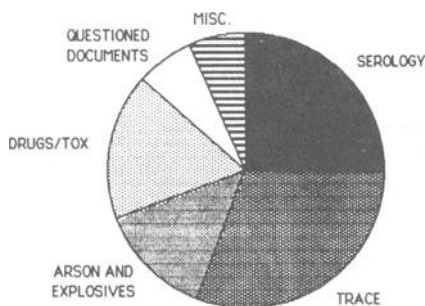


FIG. 2.—Ongoing research projects.

phasis. Sensabaugh [7] has forwarded the view that research in these areas is critical and may be expected to yield substantial impact in the usefulness of such evidence when new techniques are produced.

### Summary and Conclusions

The results of this work suggest that, for those managers preferring applicants with graduate forensic science degrees, the currently existing forensic science programs offer well-balanced training that is correctly focused. However, half of the laboratory managers who responded felt that there is no advantage to obtaining such a graduate degree. It is not clear that significant changes in graduate degree programs would alter this situation to any great extent. On the other hand, while the importance of an internship in the graduate training curriculum is stressed by both practitioners and laboratory managers, internship is an elective in four of the five responding academic institutions.

Surveyed forensic scientists, managers, and institutions all agree on the importance of forensic science research, and many call for quality improvement, for increased funding, and for coordination of U.S. forensic science research by a large national organization, like ASCLD or the FBI Forensic Science Research and Training Center (FSRTC). It appears that an increased allowance for release time would lead to more, and higher quality, research in the state laboratories. Our findings on the role of graduates of forensic science programs seem to echo the concerns of Joe Peterson [10], who has stated that academic institutions must address the problems of "satisfying the expectations of their academic brethren in attracting scarce research resources, and responding to the needs of their professional counterparts in operating forensic laboratories." While there are no clear-cut answers or solutions, the programs themselves could aid their own cause by establishing an accreditation program.

Since the curricula in the respondent institutions are relatively uniform, the material to be taught is clearly not in question. However, what can be argued is the ability of one institution to provide excellent training in all of the areas within the curriculum. If the curriculum could be distributed within a smaller subdiscipline at each institution, research and specialization would allow for better education within that subdiscipline. This would provide for more highly trained graduates, would allow institutions to focus expenditures toward fewer projects (allowing for better research conditions), and would avoid overlap of research efforts. While the initial development of a unified, specialized set of programs might be challenging to coordinate, it is our opinion that the benefits to be realized would justify the effort.

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