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The Desirability of a Ph.D. Program in Forensic Science

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ABSTRACT: The results of a national survey to determine the need for and desirability of a Ph.D. program in forensic science revealed that crime laboratory scientists and administrators favor the establishment of such a program by a margin of almost three to one. Seventy-nine percent of laboratory personnel who had already received doctoral degrees also favored establishment of a Ph.D. program. Forty-five percent of all those responding to the questionnaire who do not already hold a Ph.D. indicated interest in such a program, but only 6.1% would consider leaving their present positions to matriculate.

KEYWORDS: forensic science, criminalistics, education

Criminalistics as a scientific field is greatly dependent on adequate facilities and modern sophisticated equipment, scientifically based, accurate methods for analysis of physical evidence, and adequately trained personnel to perform the analyses and provide courtroom testimony.

The problem of education and training of forensic science personnel cannot be overemphasized. Without doubt, there is a marked insufficiency of laboratory personnel who are qualified to examine physical evidence; this lack, together with the ever-increasing crime rate, has resulted in very high case loads and long delays before evidence is even examined [*1*].

In a report published several years ago, the status of forensic science degree programs in the United States was investigated [*2*]. It was found that more than 600 criminal justice programs around the nation offer course work in criminalistics, but far fewer degree-granting programs exist. In 1975 there were only 21 colleges or universities in the United States offering degrees in criminalistics/forensic science. Nine of these offered only a bachelor of science degree, seven offered both bachelor of science and M.S. degrees, one offered M.S. and Ph.D. degrees, and one offered B.S., M.S., and D.Crim. degrees. The D.Crim. degree, then offered by the University of California at Berkeley, is no longer being granted. In its place a Ph.D. degree is awarded following the completion of an interdisciplinary academic program.

An important development in forensic science education is the current trend in the establishment of forensic science curricula in the high schools. For example, in New York State over the last two years forensic science programs have been developed in at least seven high

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schools. These programs have been set up in cooperation and consultation with faculty from local colleges and universities.

Forensic science educational programs have several important goals: to develop in students competence and confidence in forensic science techniques, to develop an understanding of the scientific method in general and forensic scientific investigation in particular, and to develop an understanding of the role of science with respect to the law.

The forensic science curriculum at the college level differs from school to school. We suggest that during the first two years of the curriculum course work should include general biology, general chemistry, physics, organic chemistry, biochemistry, physical chemistry, and calculus. The curriculum during the second two years should include courses in courtroom procedure, instrumentation, and criminalistics. The last should be a two-semester course including training in serology, ballistics, photography, toxicology, light microscopy, glass examination, and other relevant topics. An internship at a participating crime laboratory is also recommended. At the graduate level the curriculum should include analytical chemistry, genetics, immunology, forensic medicine, document examination, fingerprint analysis, polarizing and other forms of light microscopy, scanning electron microscopy, tool mark comparison, bullet comparison, fiber comparison, optical crystallogrophy, fusion microscopy, arson investigation, collection and analysis of physical evidence, and courses on the identification and individualization of paper, paint, ink, wood, pollen, and soil. Seminars on special topics (such as forensic psychiatry, lie detection techniques, voice print analysis) and individual research projects are an essential part of the curriculum. Students should also be required to write a thesis on an original research project. The curriculum for the master's degree should include as many of these subjects as possible, but the curriculum for the Ph.D. degree should cover each of these subjects (and others) in depth with an emphasis on the development of research skills [*3*].

One area of great importance, which unfortunately is not seen as an educational priority and is therefore stressed least and left almost completely unfunded is forensically oriented basic research [*4,5*]. Basic research in forensic science could include the development of novel and superior scientific techniques that would enable the bench scientist to approach the problem of identification and individualization of physical evidence from a stronger position. For example, the development of a method that would allow the forensic serologist to positively identify a minute bloodstain as human blood in one step would clearly be an advancement over current procedures in which a presumptive catalytic test, a confirmatory crystal test (which requires a significant quantity of blood), and then a serological test are employed to accomplish the same goal.

Programs that emphasize skills and knowledge for applied research seldom address the need to train individuals to engage in basic research. Although some view the M.S. degree as a terminal degree, traditionally the master's degree program is designed to provide a solid educational foundation for individuals wishing to pursue more advanced graduate work. The Ph.D. degree program provides the education necessary to prepare individuals for research, teaching, and administrative positions. The Ph.D. program should develop in the student the ability to be a creative scholar and to perform research based on novel concepts and hypotheses. It seems reasonable that the broad, highly technical discipline of forensic science would benefit greatly from the input of Ph.D.-level personnel in both technical and administrative capacities.

In a recent paper, Peterson and Angelos [*6*] reported on the results of a survey of college-level faculty conducted by the Joint Commission on Criminology and Criminal Justice Education and Standards. Practically all respondents possessed a baccalaureate degree and about 75% held a master's degree. Twenty-four percent of the faculty who were classified as forensic science faculty (61 individuals) were pursuing higher degrees. Of these, 40% were seeking a Ph.D. degree in a basic science discipline and 20% a doctor of education degree. It would be of interest to determine if these 24 Ph.D. candidates would have chosen a forensic

science Ph.D. program if one existed rather than a more conventional basic science program.

We undertook this national survey to determine if crime laboratory scientists and supervisors feel that a Ph.D. program is necessary or desirable. More than 200 questionnaires were sent to various crime laboratories chosen at random throughout the United States. Of these, 177 responses were received from individuals representing 91 crime laboratories. Individuals were informed that all answers would be kept confidential and that they did not have to identify themselves or their laboratories. Of the 177 respondents, 14 did not identify themselves but did provide their laboratory affiliations.

Results and Discussion

As indicated in Table 1, out of 177 responses, 14 indicated that they held the Ph.D. degree, 32 indicated that they held master's degrees, and 38 indicated that they held baccalaureate degrees. The remainder gave no indication of their degree status. Of 123 responses indicating job status, 90 indicated that they were laboratory scientists, 32 indicated that in addition to working in a crime laboratory they were active graduate students, and 1 indicated that he was also engaged in teaching (Table 2).

The first question posed on the survey concerned the perceived need for the establishment of a Ph.D. program in forensic science. As seen in Table 3, almost 73% of those responding

TABLE 1—*Highest degree earned by crime laboratory scientist.*

Response	Number (% of Respondents)
B.A./B.S.	38 (45.2)
M.A./M.S.	32 (38.1)
Ph.D.	14 (16.7)
No response	93 ...
Total	177 ...

TABLE 2—*Job status of respondents.*

Response	Number, %
Laboratory scientist	90 (73.2)
Laboratory scientist also attending graduate school	32 (26.0)
Laboratory scientist also teaching at college level	1 (0.8)
Total	123 (100)

TABLE 3—*Perceived need for a Ph.D. program in forensic science.*

Response	Respondents with B.S. or M.S.: Number, %	Respondents with Ph.D.: Number, %	Total
Yes	118 (72.4)	11 (78.6)	129 (72.9)
No	42 (25.8)	3 (21.4)	45 (25.4)
Maybe	1 (0.6)	...	1 (0.6)
No response	2 (1.2)	...	2 (1.1)
Total	163 (100)	14 (100)	177 (100)

indicated that there is a real need; however, only 41.2% expressed interest in matriculating into such a program (Table 4). This would indicate that about 32% of respondents would not or could not consider matriculation. Some individuals indicated that age was a factor in their answer; other factors that were mentioned included insufficient time and travel distance.

Of the 14 people with Ph.D. degrees, 11 felt that there was a need for a Ph.D. program in forensic science. Two of the three that did not agree specified that there ought to be more Ph.D.-level personnel in the forensic sciences, but that they should be drawn from their individual specialties, such as chemistry, physics, or biology, rather than from a forensic science program. The third Ph.D.-level respondent gave no explanation for her disagreement.

Analysis of some of the additional comments provided some insight into the reasoning behind the responses of several individuals. Some of the laboratory personnel surveyed who did not see a need for a new Ph.D. program had envisioned graduates of such a program analyzing case work alongside other laboratory scientists with perhaps less advanced degrees but with significantly more crime laboratory experience. One individual commented that in his opinion "a B.S.-level (crime laboratory) applicant with 3-5 years experience is as valuable as a less experienced Ph.D.-level applicant." He and several others felt that there was no need to increase the numbers of Ph.D.-level bench workers. On the other hand, some of those who indicated that there is a need for Ph.D.-level personnel did so for two reasons. First, it was felt that the development of ability scientific reasoning and the knowledge of many scientific approaches and techniques afforded by a more advanced education would allow the analyst to learn more from the sample under study than a less well-trained individual could. The second reason offered was the clear need for basic researchers in the forensic sciences, since the laboratory analyst generally lacks the support, equipment, and research training to perform this function. The very expensive research programs conducted by several government agencies are totally inadequate when compared to the need [5].

The survey indicates that crime laboratory personnel, including administrators and laboratory scientists, favor the establishment of a Ph.D. program in forensic science by a margin of 2.9 to 1. Approximately 45% of those responding (who hold either a baccalaureate or

TABLE 4—*Interest in matriculation into the Ph.D. program.*[a]

Response	Number, %
Yes	73 (44.8)
No	89 (54.6)
Maybe	1 (0.6)
Total	163 (100)

[a] The 14 individuals holding the Ph.D. degree did not respond.

TABLE 5—*Would leave current employment to enroll in a forensic science Ph.D. program.*

Response	Full-Time Matriculant: Number, %	Part-Time Matriculant: Number, %
Yes	10 (6.1)	84 (51.5)
No	153 (93.9)	78 (47.9)
Maybe	0	1 (0.6)
Total	163 (100)	163 (100)

master's degree) would be interested in matriculating in such a program (Table 4), but only 6.1% of these respondents would consider leaving their present position to matriculate into a full-time program (Table 5). If a part-time program were available, 52% would consider enrolling as matriculants.

Most respondents (74.8%) indicated that they would require financial assistance in the form of teaching assistantships, research assistantships, or grants to enable them to matriculate on a full-time basis. Despite the overwhelming sentiment for the establishment of a forensic science Ph.D. program, 52% of those responding, including those already holding the Ph.D. degree, believe that obtaining a Ph.D. would not result in a better position or higher salary. Seventy-five individuals (42.4%) think that it would result in either a better position or higher salary and five individuals (2.8%) stated that they did not know. Thus a lack of incentive appears to be one of the primary reasons that only 6.1% (10 out of 163) would consider leaving their positions to join such a program.

The remaining questions involved willingness to travel or relocate if the only available program were situated in the northeastern part of the United States (no specific school was mentioned). Most respondents indicated that these questions were not applicable, however many suggestions and comments were made on this point. Several individuals suggested the establishment of extension programs and correspondence coursework to facilitate matriculation for students located far from the degree-granting university. There is a serious question raised as to the academic merit of such programs. In the opinion of the authors, although correspondence courses can be advantageous in disseminating knowledge, it would not be feasible to conduct an advanced degree program in this mode, especially since the majority of course work in the forensic sciences requires the hands-on approach to education.

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