California Association of Criminalists

NEWSLETTER

DECEMBER 1980

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This mailing includes the following items:

1. Board meeting minutes, 15 August 1980
2. By-laws revisions approved at 1980 Fall Seminar
   NOTE - A QUORUM QUESTIONNAIRE IS ENCLOSED - YOUR RESPONSE IS REQUESTED
3. 1980 Salary surveys
4. Roster corrections and additions
5. Yosemite Seminar abstracts

Submit material for the March 1981 Newsletter to George Sensabaugh; submissions should be typed single spaced so that retyping is not needed. The production staff for this issue were P. Kalish, V. Golden, L. Sensabaugh, J. Sensabaugh, and L. sensabaugh.

ASSOCIATION ACTIVITIES

1. Northern Section Meetings

The September section meeting was hosted by Forensic Science Associates; John Thornton chaired an organizational meeting for the CAC Trace Study Group. The October meeting was hosted by the Alameda County Lab; Bob Cooper, Pat Zajac, and Robert Hinkley gave a presentation on their lab's handling of the physical evidence aspects of the Chowchilla Kidnapping case. No meetings were scheduled for November or December. The January meeting will be hosted by the San Rafael DOJ laboratory.

2. Southern Section Meetings

The September meeting was hosted by the LAPD crime lab; a talk was given by Doug Roberts of Pacific Optical on microscopy and photomicroscopy.

3. Study Group Meetings

The Southern Serology Group (Chr. Jim White) met October 2 at Orange Co. to discuss "The training of others to collect bloodstain evidence;" Faye Springer and Keith Inman described the training sessions they give. The December meeting also met at Orange Co.; the serology papers presented at the Yosemite meeting were reviewed and the typing of ADA under multisystem conditions was on the agenda for discussion. The agenda for the January meeting includes discussion of several facets of rape materials collection and analysis.

The Northern Biology Group held no meetings during the fall.

The Northern Trace Evidence Study Group (Chr. Steve Shaffer) was organized at the Sept. Section meeting. John Thornton, Steve Shaffer, Marty Blake, and Chuck Morton met in October to plan future meetings. A group meeting was held at the Yosemite seminar at which were distributed a review of McCrone's Particle Atlas, Vol 5, by John Thornton and a listing of soil minerals, safe insulation components, and paint pigments excerpted from the Particle Atlas. Steve Shaffer discussed the tools meeded to perform micromanipulation tasks. Plans were made for subsequent meetings: Jan. 22, 1981: Lecture/Discussion on Micromanipulation with Dr. Walter McCrone. U.C. Berkeley (Announcement elsewhere in this newsletter). Feb, 1981: Roundtable discussion on equipment useful in trace evidence work. March or April, 1981: Discussion of microscopy equipment by manufacturer's representatives. Persons interested in participating in the activities of this group should get in touch with Steve Shaffer.

The Arson Study Group (Chr. Grace Fitzpatrick) met once during the fall. Participating laboratories are collecting and analysing flammable liquid standards. A principle goal of this effort is to determine whether fluids of different brands can be distinguished. Ultimately the group hopes to compile a bibliography of methods.

The Southern Controlled Substances Group (Chr. Terry Fickes) held no meetings. Howerver the DEA has passed along information that a methyl derivitive of fentanyl has appeared in California and there have been several OD deaths.

Neither the Northern nor Southern Firearms Groups met during the fall.

CALL FOR NOMINATIONS

The Nominations Committee wishes to solicit your input for suggested persons to fill the following CAC offices at the May, 1981 meeting to be held in Los Angeles. The positions are as follows:

President-Elect
Treasurer
Editorial Secretary
Regional Director-North
Regional Director-South

Please submit your recommendations to

Carol Harralson, Criminalist
Contra Costa County Sheriff's Crime Laboratory
709 Castro Street
Martinez, California 94553
(415) 372-2962

Barry Fisher, Chief Criminalist
L. A. County Sheriff's Crime Laboratory
2020 W. Beverly Boulevard
Los Angeles, California 90057
(213) 974-4673

Dr. Walter C. McCrone to Address Northern Trace Evidence Study Group

Dr. McCrone will be teaching a Basic Polarized Light Microscopy course in Berkeley on January 19-23, 1980. He has consented to address the Northern Trace Evidence Study Group on the subject of Micromanipulation in a lecture/demonstration on the evening of January 22.

There is limited space available in Stephens Hall at U. C. Berkeley, necessitating limiting the number of people attending to twenty. Those people who have had a Basic Course from Dr. McCrone, Skip Palenik, or someone else wherin this subject has been discussed are asked not to attend so that others may have benefit of the lecture. This includes people enrolled in the January Course. If you have not had one of these courses in the past and would like to attend Dr. McCrone's lecture/demonstration, please contact Marty Blake at Oakland PD. to researve a space. Space will be allowed on a first-come, first-served basis. Marty Blake's phone number is (415) 273-3386 . We regret that it is necessary to limit the number of attendees, but in view of the size of the room and the lecture/demonstration nature of the presentation, it seems best to do so.

MEMBERSHIP ADDITIONS AND ELEVATIONS - Yosemite Meeting

1. New Student Affilitates

Barabara Crosby	Sacramento State
Karen Guenther	U C Berkeley
Diane Hillburg	Sacramento State
Ralph Maloney	U C Berkeley

2. New Provisional Members

Roger Ely	Fresno County
Henry Greenberg	Los Angeles County
Daniel Gregonis	San Bernardino County
Robert Keister	Orange County
Thomas Kotowski	Ventura County
Kip Moorehead	Orange County
Craig Ogino	San Bernardino County
Skip Palenik	McCrone Assoc.
Douglas Ridolfi	Los Angeles County
Pamela Smith	DEA - National City
David Sugiyama	Contra Costa County
Robert Thompson	Washoe County
Katherine Vukovich	Los Angeles P.D.

3. Elevations - Provisional to Member

Barbara Carter	Los Angeles Coroner
Melvin Garrett	Phoenix P.D.
Sze-Ern Kuo	Los Angeles P.D.
George Levine	DOJ - Santa Barbara
Gregory Matheson	Los Angeles P.D.
Susan Narveson	Phoenix P.D.
Margret Shoumaker	Phoenix P.D.
Darryl Tate	DOJ - Santa Barbara

4. Reclassified - Provisional to Corresponding

Masaru Ueyama	Tokyo

Enclosed in this mailing is a roster update containing the addresses of the new provisional members and other address changes.

MEETING ANNOUNCEMENTS

1. Conference on Identifying Human Remains, 29-30 January 1981. Florida Atlantic University, Boca Raton, Florida. For further information, contact Dr. M. Y. Iscan, Dept. of Anthropology, Florida Atlantic University.

2. Canadian Society of Forensic Sciences, 24-28 August 1981. McMaster University, Hamilton, Ontario. The first two days will be devoted to practical workshops and seminars. The plenary sessions and scientific papers will be presented on the final 3 days. For further details, contact Dr. J. A. J. Ferris, Hamilton General Hospital, 237 Barton St. E., Hamilton, Ontario, Canada L8L 2X2, or Brian M. Dixon, Centre of Forensic Sciences, 25 Grosvenor St., Toronto, Ontario, Canada M7A 2G8.

3. Southern Association of Forensic Sciences, 14-16 May 1981. For further information, contact R. E. Cooper, Northwest Louisiana Crime Lab, 1115 Brooks St., Shreveport, LA 71101.

4.

California Association of Criminalists

Spring 1981
Semi-Annual Seminar
Host: L.A. County Sheriff's Crime Laboratory
Friday, Saturday, Sunday
May 15-17, 1981
Pasadena Hilton Hotel
Rates: $44. single; $48. double
A spouse's leisure time program is also being planned.

FOR INFORMATION, CALL:

Barry Fisher (213) 974-4673

Ed Rhodes (213) 974-4611

EMPLOYMENT OPPORTUNITIES

1. Opening: Criminalist I, San Mateo County Sheriff's Office. Requires degree in criminalistics or chemistry or 2 years experience with related degree. Applications accepted 9-23 January 1981. For information contact Paul Dougherty, San Mateo County Sheriff's Dept., Hall of Justice, Redwood City, CA 94063 (415) 364-1811 ex. 2253.

2. Opening: Serologist, Nebraska State Patrol. Requires B.A. or B.S. in chemistry, biology, or a related subject. Contact Lieut. Moon, Nebraska State Patrol, 14th and Burnham, Lincoln, Neb. 68502 (402) 477-3951.

3. Opening: Criminalist II, Los Angeles County Sheriff's Office. Requires B.S. or B.A. in criminalistics, chemistry, biochemistry, or related field and 2 years professional experience in criminalistics. Send resume to Barry A. J. Fisher, Criminalistics Laboratory, Los Angeles County Sheriff's Office, 2020 W. Beverly Blvd., Los Angeles, CA 90057 (213) 974-4673.

4. Openings: Florida Department of Law Enforcement. For further information contact Jeffery Long, Personnel Officer, Florida Dept. of Law Enforcement, P.O. Box 1489, Tallahassee, Florida 32302 (904) 488-4814.

5. Opening: Serologist/Drug Chemistry, Montgomery County Crime Lab, Maryland. Requires B.S. or B.A. in chemistry, biology, or related science; two years experience in serology and drug identification; court qualification. Contact Charles W. Ebert, Montgomery County Police Dept., Personnel Management Division, 2350 Research Blvd., Rockville, MD 20850 (301) 840-2525.

6. Opening: Serologist, Virginia Tidewater Regional Laboratory. Requires B.S. or B.A. in a natural or physical science, forensic science, police science, or related area, and three years experience. Contact Warren G. Johnson, Director, Bureau of Forensic Science, P.O. Box 999, Richmond, VA 23208 (804) 786-2281.

7. Openings: Criminalist II, Serologist/Criminalist I, Drug Analyst/ Criminalist I, Dade County Crime Laboratory, Florida. All require B.S. or B.A. in chemistry, biology, criminalistics, or related area and two years experience. Contact Edward Whittaker, Commander Crime Laboratory Bureau, Dade County Public Safety Dept., 1320 N.W. 14th St., Miami, FA 33125 (305) 547-7368.

8. Openings: Forensic Chemist, U.S. Army Laboratory, Frankfurt, Germany. As many as five positions may open in 1981. Requires B.S. or B.A. in chemistry or equivalent field and three years experience. Contact Chief Chemist, Chemistry Division, U.S. Army Criminal Investigation Laboratory - Europe, A.P.O. New York 09757.

9. POSITION WANTED: YOKO RIVIERE
B.S. Criminalistics from Cal State Long Beach, 1980. Intern, L.A.S.O. Contact at 3410 Poppy St., Long Beach, CA 90805 (213) 630-4394.

10. Opening: Sr. Criminalist, Idaho Department of Health and Welfare. B.S. or B.A. in criminalistics, chemistry, or pharmacy typically required plus experience. Application deadline 2-27-81. For further information contact Richard Groff, Bureau of Laboratories, State House, Boise, Idaho 83720 (208) 334-2231.

Ethical Dilemmas

Peter Barnett
Forensic Science Associates

The C. A. C. Code of Ethics includes a number of specific sections which proscribe certain types of behavior. Some of these have been pertinent to situations discussed in previous articles in this series. It must be recognized, though, that there are many situations which, while not being specifically described as a violation, leave one with an uneasy feeling that an ethical violation has occurred. The first paragraph of the Code of Ethics states, "It is not to be construed that these principles are immutable laws nor that they are all-inclusive. Instead, they represent general standards which each worker should strive to meet." After describing the general duties and responsibilities of a criminalist the preamble to the Code of Ethics concludes with the following paragraph:

> "In carrying out these functions, the criminalist will be guided by those practices and procedures which are generally recognized within the progession to be consistent with a high level of professional ethics. The motives, methods, and actions of the criminalist shall at all times be above reproach, in good taste, and consistent with proper moral conduct."

The sections of the Code of Ethics which follow that paragraph enumerate and give examples of unethical behavior which the criminalist must avoid. There are, however, situations in which the actions of a criminalist are not "consistent with a high level of professional ethics", but nevertheless are not specifically proscribed by the Code of Ethics. Such action is as much a violation of the Code of Ethics as an action specifically described in the Code of Ethics. The following situation is an example of such a violation:

A case in which a through laboratory work-up has been conducted by a law enforcement laboratory is submitted to a consulting criminalist for re-examination on behalf of the defendant. At trial, the defense does not call his consultant as a witness, and the original criminalist does a competent job in presenting the evidence to the jury. As sometimes happens, the trial results in a hung jury, with a mistrial declared. A new trial is scheduled.

Prior to the second trial the prosecuting attorney submits to another consulting laboratory a portion of the evidence for re-examination. The rather routine analysis that is called for duplicates the results of the original examiner. In his examination of the submitted evidence, the district attorney's consultant notes that there are initials on the submitted items which he recognizes as those of a professional colleage - the defense consultant (he infers).

In conversation with the D.A. after preliminay examination of the evidence the prosecution's consultant is asked by the D.A. if he recognized the initials on the evidence. When he replies that he does, he is informed that the D.A. intends to ask him to identify the initials on the stand. Clearly, the D.A. intends to, by this method, inform the jury that the evidence had been re-examined by the defense criminalist and by implication of the defense consultant's non-appearance, the re-examination has confirmed the origianl analysis. It is apparent that the only reason the D.A. submitted the evidence to the consultant was to further his goal of "sneaking in" the fact of the defense consultant.

There are two sections of the Code of Ethics that touch on this problem: Sections III (H) says that a criminalist "will not by implication ... assist the contestants ... through such tactics as will implant a false impression in the minds of the jury." Section IV(D) says that the "principle of 'attorney-client' privilege (applies) ... except in a situation where a miscarriage of justice might occur." These sections are not exactly applicable however, to the instant situation for reasons which are (or should be apparent.

The issue of the defendant's right to investigate the case on his own behalf has been addressed in this space previously. Surely this right is without substance if the results of such investigation can be used to convict the defendant. Clearly, the D.A. is using a subterfuge to imply to the jury that the defense's own laboratory analyses indicate the defendant's guilt. (This may be illegal or unethical for the D.A., but the ethical problem for the criminalist cannot be ignored.)

Although there are no specifically applicable sections of the Code of Ethics the actions of the D.A. clearly subvert the principles of justice which "it is the duty of any person practicing the profession of criminalistics to serve .. at all times" (paragraph 3 of the Preamble to the C.A.C. Code of Ethics).

There are several courses of action the criminalist might take:

1. If he saw through the D.A.'s subterfuge before actually doing any analysis he could have refused the case. He could then. perhaps, refuse to work on the case or testify.

2. If subpoened, he should inform the D.A. that he does not recognize the defense criminalist's initials.

3. When requested to testify he should make clear to the D.A. his distaste for such a subterfuge. There is no legal reason, or basis, however, for him to refuse to testify.

4. The criminalist need not be concerned with the problem, since it is a legal question and can be resolved by the Court.

Indicate below your resolution for the December dilemma:

I would select alternative_____

The controlling section(s) of the C.A.C. Code of Ethics is_____

_____

_____

Comments:

Send to: Peter Barnett
Forensic Science Associates
P.O. Box 8313
Emeryville, CA 94608

It is apparent that not all members of the association take the same view of what constitutes unethical conduct. While it is unlikely that there ever will be unanimity of opinion as to all possible questions of unethical behavior, the open discussion of these issues should lead to a clearer understanding of all members of the association as to what type of behavior the association expects of them. It is through this type of discussion that each member will have a gauge upon which to base any decisions that may be necessary as to the proper course of action in a particular situation. It is hoped that more members will take the time to send in responses to the ethical dilemmas which are presented.

Two responses were received from the problem presented in the September newsletter. Steve Shaffer responds that he would select alternative 2 and that the controlling sections of the CAC Code of Ethics are II.d, II.c, II.e, II.h, III.g, III.h, and IV.c. Steve comments, "It occurrs to me that the defense consultant's obligation to silence may be limited to the actual results of his work. It may not extend to the fact that the consultant was hired, and possibly not even to the fact that his results are not in agreement with the prosecution criminalist." Steve recommends revealing to the laboratory supervisor which of the criminalists in the laboratory was involved, and, in a general sense, the nature of the errors committed without going into the details of the specific differences of opinion. Steve concludes, "If the laboratory director refuses to take any action whatever, he too may be in violation of the Code of Ethics, Section III.h, and perhaps IV.c."

Dave Sanchez proposes a fifth alternative which is to have the consultant advise the defense attorney of his suspicions and of the ethical problems that result. Dave then suggests that the consultant ask the defense attorney to release the consultant from any privilege so that the defense consultant can present the information, presumably, to the laboratory supervisor. If the defense attorney does not agree to waiving the privilege, Dave suggests that a future time be determined at which point the privilege can be waived and the criminalist can then pursue the matter.

AN IDENTIFICATION FEATURE FOR REMINGTON BRAND, CALIBER .22 RIMFIRE BULLETS

Bruce Moran

Orange County Sheriff-Coroner

Determination of manufacture brand and caliber of expended bullets by class characteristics such as weight, diameter, bullet style and number, location and description of cannelures is nothing new. Recent observation of alphabetical letters on the base portions of expended and unexpended Remington brand, Mohawk caliber .22 Long Rifle rimfire bullets aroused my interest as a more conclusive means of differentiating Remington brand, caliber .22 bullets from other brand caliber .22 projectiles.

An inquiry was made with Carl Beck and Gilber Whipple of the Remington Arms Company, Consumer Service Department, 939 Barrum Avenue, Bridgeport, Connecticut, 06602, telephone number (203) 333-1112 as to the origin and uniqueness of such markings. Remington was quite helpful in responding to my requests and supplied me with the following information:

> The origin of the letters is a result of a swaging process during caliber .22 bullet manufacture. Each machine has several stations for simultaneous production and is given a letter designation for quality control purposes. The swaging pin at each station is first electrically etched with a letter, the swaging pin in turn impresses the configuration on the base of each bullet. The system is used to identify a malfunctioning station. The pins eventually wear and are occasionally replaced with a newly etched pin.
>
> It was learned that all the letters of the alphabet are used except the letters J and Q. The letters appear on all caliber .22 rimfire bullets except the following: .22 WRF, .22 Win Auto, .22 Rifle Match, .22 Pistol Match and 5 mm rimfire. Remington does not produce lettered markings on any other caliber bullet except caliber .22 rimfire ammunition. Remington manufactures all of their own caliber .22 bullets. It does not make purchases from other manufactures. Remington also indicated that to their knowledge no other manufacture used such a lettering system.

Caliber .22 bullets manufactured by Browning, CCI, Federal and Winchester-Westeren were examined and found to be absent of such markings. As a result of the above inquiry and observations it appears that the presence of such lettered markings on caliber .22 bullets is somewhat unique and can be used in addition to other class characteristics to identify Remington brand bullets. I would be interested in comments or observations any other examiners have about these markings.

One Example of a Covert Tagging System

Stephen A. Shaffer*
Allen J. Boudreau*

The nature of the covert tagging problem is well stated in the paper by Kind, et. al., and it may be said that our objectives in developing the system reported here were much the same as those given by Kind, particularly with regard to traceability and identifiability. We were less concerned in the particular case with transferability and with recordability.

The particular case involved the theft of a relatively large quantity of alfalfa seed from a seed processing plant. The theft was being achieved by after-hours packaging and removal of fifty-pound sacks of seed. The quantities removed, although substantial, were carefully controlled to insure that they fell below the tolerances established within the plant for expected losses upon cleaning and packaging of the seed. The persons involved were obviously knowledgeable and rather sophisticated in their approach to the theft. We considered the possibility of tagging the seed itself, but the necessity of readily detecting the taggant in the field and the quantity of seed that would have to be non-destructively tagged made that option impractical. We therefore settled upon tagging the sacks in which the seed was packaged.

At any time there were large quantities of filled and unfilled sacks in the plant and access to the plant was limited to very brief night-time entry so that none of the employees or guards would be aware of the operation. This made it necessary to rapidly tag large numbers of filled and unfilled bags. It was also desired to know which of the bags were filled before and after the tagging operation when they were recovered later. All bags inside the plant upon entry were to be tagged, whether filled or unfilled.

The taggant we used was the chemical phenolphthalein. It was applied by spraying from garden-type sprayers carried by officers who entered the plant with a representative of the company during the night. The sprayers used hold several gallons of liquid and enabled the officers to tag thousands of sacks in a matter of a few minutes. The phenolphthalein was applied in a solution of methanol which evaporated to leave the appearance of the bags unchanged. In addition to the bags themselves, we wanted to tag the thread which was used to sew the filled bags closed. We had therefore procured a large skein of the thread which was used to sew the filled bags closed, soaked the skein in the dye solution, oven dried it, and supplied it to the officers who were to enter the plant. While in the plant they substituted the tagged skein for the one on the sewing machine, thereby allowing us to subsequently recognize sacks filled after the entry.

* Criminalists, Fresno County Sheriff's Department, Post Office Box 1788, Fresno, California, 93717.

For visualization in the field during the investigation, the officers were provided with small spray bottles of dilute ammonium hydroxide. When a marked bag was sprayed with the base a vivid pink color developed immediately. The color would fade quickly with the evaporation of the ammonia, allowing the officers to monitor the movements of the marked sacks without the knowledge of the suspects. A more permanent visualization was possible, when desired, with dilute sodium hydroxide.

Upon completion of the investigation, arrest of the suspects, and confiscation of the marked bags as evidence, positive identification of the taggant was required. This was accomplished by excising a small portion of the marked bag or thread, extraction of the phenolphthalein, and spectrophotometricly analyzing the extract. Purification of the extract was not necessary.

The system worked well, providing needed proof of the source of the stolen seed and of the involvement of the various parties to the crime.

Reference

Kind, S. S., et. al., "The Individuality of Tagging Powders - The Lycode System", J. For. Sci. Soc., 18: 3 & 4, 165-170, 1978.

SAN JOAQUIN VALLEY FLOOR SOIL MINERALS
PART I - INTRODUCTION

Stephen A. Shaffer
Criminalist, Fresno County Sheriff's Dept.

In response to dissatisfaction with my lack of success in comparing Fresno County soils, I have embarked upon a study designed to enhance my ability to differentiate soils of the kind that I encounter. I am engaged in this study on a time-available basis and I expect that it will be some time in coming to fruition due to the extent of the study. This paper reflects in part material I presented at the 56th Semi-Annual Seminar in Yosemite. I intend to use the Newsletter and Seminars to publish periodic updates on the progress of the study.

This communication details some of the background information and the thinking that went into formulating a plan of study. It is my opinion that whatever value there is here lies in the outline of the thinking about the problem of soil identification and comparison work. I believe that the problem is general and the approach valid for soils of urban origin as well as the rural soils that I encounter. The emphasis here is placed upon evaluation of the information present within soils and the establishment of the criteria of value for the soil type one encounters prior to doing case work with the soils. One thereby establishes the extent and limits of ones ability to make valid and supportable statements about the relative similarity/dissimilarity of the soils encountered in specific cases.

In addition to indicating the aspect of soils that I intend to study (heavy mineral characterization) I will make a brief attempt to point out the many aspects of soils which remain to be addressed. While I am not able to take up those aspects in the present study, I am hopeful that pointing them out will encourage others to address them.

Origin of the Problem

It is well known among criminalists that a question often arises as to the significance of soil collected as evidence in criminal cases. There are well established methods for the comparison of evidence soils with exemplar samples from one or more sites (1,2). The interpretation of the results of these comparative techniques is less clearly defined, and is usually limited to a statement of "consistency" worded in one way or another to avoid the question of true significance. In an attempt to assess significance in the soil comparisons I have undertaken in Fresno County, I have always gathered reference samples of soil from points surrounding the suspected origin of an evidence sample. These samples are collected from known points varying in all directions and in distances from the suspected origin of up to two miles. (Bear in mind that I am dealing with rural areas). Using color and density distribution of the light minerals as the primary criteria for comparison, I have not yet encountered an evidence soil which I could distinguish from the exemplar soil, or from any of the reference soils collected. A typical report might therefore be summarized as follows.

> The evidence soil was examined and compared to the exemplar soil collected at the scene, and further compared to reference soils collected over a wide area surrounding the scene. The soils were compared on the basis of color and density distribution of the light minerals and all were found to be indistinguishable. This indicates that, on the basis of the comparisons made, the evidence soil could have originated from the same location as the exemplar soil, from anywhere else within the range covered by the reference soils, or from an unknown wider area.

This will of course be interpreted by the investigator and/or District Attorney as virtually equivalent to the more concise statement that "The soil evidence is worthless." The correct interpretation of this statement is that the conventional methods of color and density comparison do not provide the necessary discrimination ability for soils of the type that I encounter. Whether or not other techniques might provide this discrimination ability remains at this point an open question.

One aspect or characteristic of soils essentially ignored in the color comparison and totally ignored in the density comparison is the heavy mineral content of the soils. Heavy minerals are conventionally defined as those with a density greater than that of bromoform, 1.89 g/cc. These are normally observed as a clump of dark-colored mineral grains at the bottom of the density gradient tube. There is data to support the value of the heavy minerals for identification and comparison purposes (3,4). The heavy minerals present in San Joaquin Valley floor soils are the object of this study.

Optical mineralogy, or the use of the polarized light microscope for mineral identification, would seem to be the method of choice for the examination of these minerals (5,6). This method has the advantage of providing rapid, non-destructive identification and quantitation of the minerals present in a given sample. It has the disadvantage that a range of skills is required of the examiner which has, until recently, been possessed by few practicing criminalists. As a result of a renewed interest in polarized light microscopy, and the teaching of this subject in recent years by the McCrone Research Institute, among others, more bench criminalists are now in possession of the required skills. In addition to its value in the examination of the heavy minerals, the technique merits consideration as a replacement for the density gradient tube in the comparison of the light minerals.

Prior to entering into an explanation of the study I've begun, I would like to consider the broader question of soil comparisons, place this study in perspective, and perhaps point out some additional areas in need of study. There is an abundance of potential information contained within a soil sample, and we have a long way to go before anyone can speak of a comprehensive examination of soil evidence.

Soils and Identification

All of the properties, characteristics, and constituents which make up soils represent potential information of value in our attempts to compare them. All of the potential criteria for comparison of soils stem either directly or indirectly from the ingredients of the soils as we encounter them, which may be broken down as follows.

1. Minerals, resultant from the weathering of parent rock.
2. Chemicals of non-mineral origin, e.g., fertilizers, pesticides, etc.
3. Flora, such as pollens, seeds, twigs, etc.
4. Fauna, such as microorganisms, insects, etc.

The underlying hypothesis here, as in all of identification and comparison work, is that there will be some variation shown in the characteristics of samples taken from different origins. Further, through an assessment of the population of interest with respect to the nature and extent of the variation shown, we are able to determine which particular properties or characteristics, if any, show the types of variation necessary for our work. Based upon this foundation then, we may assess the characteristics exhibited by specific examples from the population and make some statement regarding the question of common origin of the samples.

I would like to emphasize that it is the nature of the variation shown in the parent population that determines the type of information we are able to glean from an examination of samples taken from that population. I illustrate this point by calling to your attention two different types of questions that may be asked about an evidence soil sample. The questions are "Do these soils share a common origin?" and "Where did this soil originate?" The first question requires knowledge of how two soils from different although perhaps nearby origins can be reliably distinguished from one-another. The second question requires knowledge of the distribution of the various characteristics throughout the population, and some form of mapping of these distributions. Both require knowledge of the variation shown in the population for various characteristics, but they call for different approaches in the assessment and interpretation of the variation shown. Note that one question requires that the samples be treated as discrete points with individual characteristics while the other requires that the samples be located within a continuum of variation.

Soils in the San Joaquin Valley

The San Joaquin Valley is an extended alluvial plane made up of the sediments of several river systems of various sizes and extents. On the geologic time scale it is nearly all recent (Holocene) Quaternary alluvium ranging in age up to approximately 10,000 years ( ). The plane is made up of two sets of parallel alluvial fans, one set from rivers draining the Sierra Nevada Range and one set from rivers draining the Coast Ranges. The individual alluvial fans are not distinct or clearly marked. Instead they are intertwined and overlapped with adjacent fans. The two sets are separated by the San Joaquin River over the northern two-thirds of the valley. In the southern third the east-west separation of the fans is also indistinct, there being no central north-south running river in this part of the valley.

Variability of Soil Minerals

The exposed soil at any point is a product of several variable factors, including but not limited to the following.

1. The source river for that deposit;
2. The exposed parent rock in the areas of the river drainage that contributed detritus to the river at the time of the deposit;
3. The velocity of the water movement at the time of the deposit;
4. In-situ weathering and modification of the deposit; and
5. Homogenation and/or modification by man.

These factors may be expected to contribute qualitative and quantitative diversity to the soils in the mineral types shown, and also qualitative differences in the appearance of grains of a given mineral type taken from different locations.

In the present study, I will examine the mineral content of San Joaquin Valley soils with particular regard to several types of variation which may be expected. Specifically, the following types of variation will be examined.

1. The variation shown in replicate samples taken from the same source. This is essentially a measure of the experimental error, but may also be regarded as an indication of the method, sample size, or handling of the sample which is necessary to achieve a desired level of experimental error.
2. The variation shown as one moves radially out from a central point. The critical question here is when is this variation consistently and significantly greater than that shown in intra-sample replicate analyses, as determined in 1 above. This establishes the individualized unit area for soils examined by the technique(s) chosen.
3. The variation shown as a product of geographical origin. Using the average interval established in 2 above, samples will be collected according to a systematic plan designed to reveal information about the potential utility of mapping soils according to mineral content. At this point I consider it unlikely that I will be able to actually map the entire San Joaquin Valley floor, however I will be able to address several questions regarding the utility of mapping. For example, I will examine mineral content of soils as a product of river origin, as it varies across the valley floor, as it varies across a single river fan, and across boundries between fans, etc.

Quantitative variation may be expected in the relatively few minerals that go to make-up the bulk of the individual soil samples. Quantitative and qualitative variation may be expected in the relatively larger number of minerals that constitute the remainder of each sample, the minerals present in trace quantities. Experimentation will be relied upon to reveal the type of information revealed by quantitative vs. qualitative data, and by the relatively abundant vs. the relatively rare minerals. From the practical point-of-view there are considerable advantages to be had by reliance only on the more abundant minerals. Lesser skill is required of the examiner if only a dozen or so minerals need be identified instead of perhaps several dozen. Also, small samples may be reliably quantitated with regard only to the more abundant constituents.

Outline of the Present Study

The first requirement to begin the wider study is the ability to rapidly identify the minerals present in a sample. For convenience I have split this part of the study with respect to eastern and western valley floor soils, i.e., those originating in the Sierra Nevada and those originating in the Coast Ranges. I have further split the study according to abundance of minerals of given types which are observed. More abundant minerals are taken as a group and trace minerals as a separate group. My approach to this task is the following.

1. Survey several soil samples to recognize those minerals which make up the bulk of the samples.
2. Isolate examples of these primary mineral constituents.
3. Identify, through detailed optical mineralogical examinations, these minerals.
4. Determine the optical characteristics necessary to rapidly spot and positively identify the primary constituent minerals.

(I have completed this part of the study for eastern valley soils and reported upon these results at Yosemite. However, I believe that there is a natural division between the introductory material discussed in this communication and the optical mineralogy. I have therefore decided to hold that portion of the report back until I have completed further work in that area, and then to report another segment of the study together as a unit).

As the study continues, my steps will be approximately as follows.

5. Survey a wider selection of soils to recognize and isolate those minerals which constitue the trace minerals which may be encountered.
6. Isolate, identify, and characterize these minerals.
7. Determine replicate sample variation shown in typical samples of valley floor soils.
8. Determine the individualized unit area for soils as indicated by their heavy mineral content.
9. Devise a sampling system to address the geographical origin and mapping questions, based upon the results obtained in 7 and 8 above.
10. Collect and analyze these further samples.
11. Interpret the results.

With this extensive introduction, I hope that interested criminalists will be prepared to understand the reasoning behind the work I am undertaking, and to place that work in some perspective with regard to the general subject of the forensic examination of soils.

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A PHOTOGRAPHIC TECHNIQUE FOR TAPE LIFTS

John Murdock
Contra Costa County SO

[Ed. Note. The following is reprinted with modification from Forensic Photography Vol. 4, No. 11, Feb. 1976, with the author's permission. Forensic Photography ceased publication several years ago.]

The clerk in a West Pittsburg, California, U.S.A. "Short Stop" Market was shot and killed during a robbery. Two surface shoe impressions consisting of dust were found on top of the front counter. The counter surface was slightly pebbled. Both impressions were photographed with panchromatic black and white film using oblique light from an electronic flash unit. Each surface impression was then lifted with frosted fingerprint tape. The tape lifts were placed onto the white glossy surface of latent fingerprint cards.

A pair of tennis shoes was subsequently submitted for comparison purposes. Enlargements were prepared of the photographic negatives taken at the scene. While some matching detail was present the amount of agreement with test impressions prepared with the submitted shoes was not sufficient to effect an identification.

The writer's attention turned to the tape lifts. They were photographed with Polaroid 4x5 Land Film type 51/high contrast. This film is sensitive to blue light only and is intended to yield blacks and whites only, with no intermediate gray tones. It has a print resolution of 28-32 lines/mm. The resulting photographs were rephotographed with the same film. The effect was startling. There was a tremendous enhancement of the detail present in the tape lifts of the surface dust impressions. The revealed detail was sufficient to establish a match with the left shoe of the suspect. In addition, several matching points were found with test impressions made by the suspect's right shoe. These examination results would not have been possible without the enhancement afforded by the high contrast Polaroid film.

This technique illustrates how forensic photography can be used to enhance detail which is present in shoe impressions of very low contrast. It also reinforces the value of using latent fingerprint tape to lift surface impressions. The Evidence Technician or Scenes of Crime Officers should be advised of this technique so that they can effectively appraise the evidential value of surface impressions. A surface impression which might be ruled of no value by the unaided eye might be elevated to evidential value status by the technique discussed above.

ANATOMY OF AN AMPHETAMINE LAB

F. A. J. Tulleners
California Department of Justice
Riverside Regional Laboratory

ABSTRACT:

The operation and synthetic routes used by an illicit Amphetamine Laboratory will be described. This lab, located in a remote desert area, may have been one of the largest clandestine Amphetamine labs ever uncovered.

The manufacture of Amphetamine was via Phenyl Acetic Acid to Phenyl-2-Propanone and then to Amphetamine. The lab was designed in three functional areas.

a. A synthetic area
b. A storage/workshop area
c. A salting out area

The synthetic area with its high value equipment was capable of rapid off-site deployment.

I. BACKGROUND:

The appearance of chunk Amphetamine in the Riverside and Orange County area led the investigators to believe that there was a new clandestine lab in the area. The chunk Amphetamine consisted of slightly off white low density pure Amphetamine Sulfate.

As a result, a multi agency task force (five agencies) was formed under the co-ordination of Special Agent, Mike Harman, California Department of Justice. Information developed from the street seizures of the chunk Amphetamine led to the surveillance of a possible clandestine cooker (chemist). On the second day of the surveillance one of the cookers was followed to an isolated complex in the desert near Barstow. During the next 13 weeks of surveillance the task force observed the various suspects in the act of constructing a laboratory. During the course of this investigation, the task force was able to develop a conspiracy case which involved about five people at various locations throughout Southern California (one of the persons involved was a Riverside lawyer). The investigators recovered various purchase receipts from different chemical supply houses. These purchase receipts listed some chemicals that could have been used in the manufacture of Methaqualone. The receipts served as a basis for the issue of the subsequent search warrants.

II. SEIZURE:

On May 14, 1979 as the two cookers were preparing to leave the Barstow lab with what appeared to be a chemical product, they were stopped and arrested by special agents of the Department of Justice. In their possession, they had about 20 pounds of Amphetamine. At the same time search warrants were being developed for the search and seizure of 12 locations and the other co-conspirator. The search warrants turned up the aforementioned Barstow Lab, a previously used smaller laboratory in Riverside County, (the laboratory area was behind a false wall), pill presses, chemical storage areas in Riverside County with 750 plus pounds of Phenyl Acetic Acid and Amphetamine at houses in the Lytle Creek area of San Bernardino County and Diamond Bar area of Los Angeles County.

III. THE BARSTOW LABORATORY

The Barstow lab consisted of a remote desert area of about five acres. This land was surrounded by a 6' high cyclone fence. Inside this compound were two watch dogs, a house, a water cistern, and a barn. To the barn was attached a 8' by 30' horse trailer.

1. The horse trailer was semi-permanently attached to the barn. Essentially the entire horse trailer/barn compound was an Amphetamine laboratory. This complex could be conveniently broken down into three areas:

   A. Synthetic preparation area (the horse trailer)
   B. The chemical storage and maintenance area (the center of the barn)
   C. The salting out area (one side of the barn)

   Figure 1 is a top view of this particular layout. The horse trailer was vented through the center portion of the barn such that the exhaust came out under the peak area of the roof.

   The location of some of the equipment and chemicals are shown by figure 2. In particular item No. 67/68 are 55 gallon drums of Acetic Anhydride. Item No. 65 and 66 are 55 gallon drums of Formamide, items No. 73 and 74 are cardboard drums of Phenyl Acetic Acid. Item No. 155 is Sodium Acetate.

   Table 1 gives a detailed description of each of the items listed on figure 2. In all about two hundred items of chemicals and laboratory equipment were recovered at this facility.

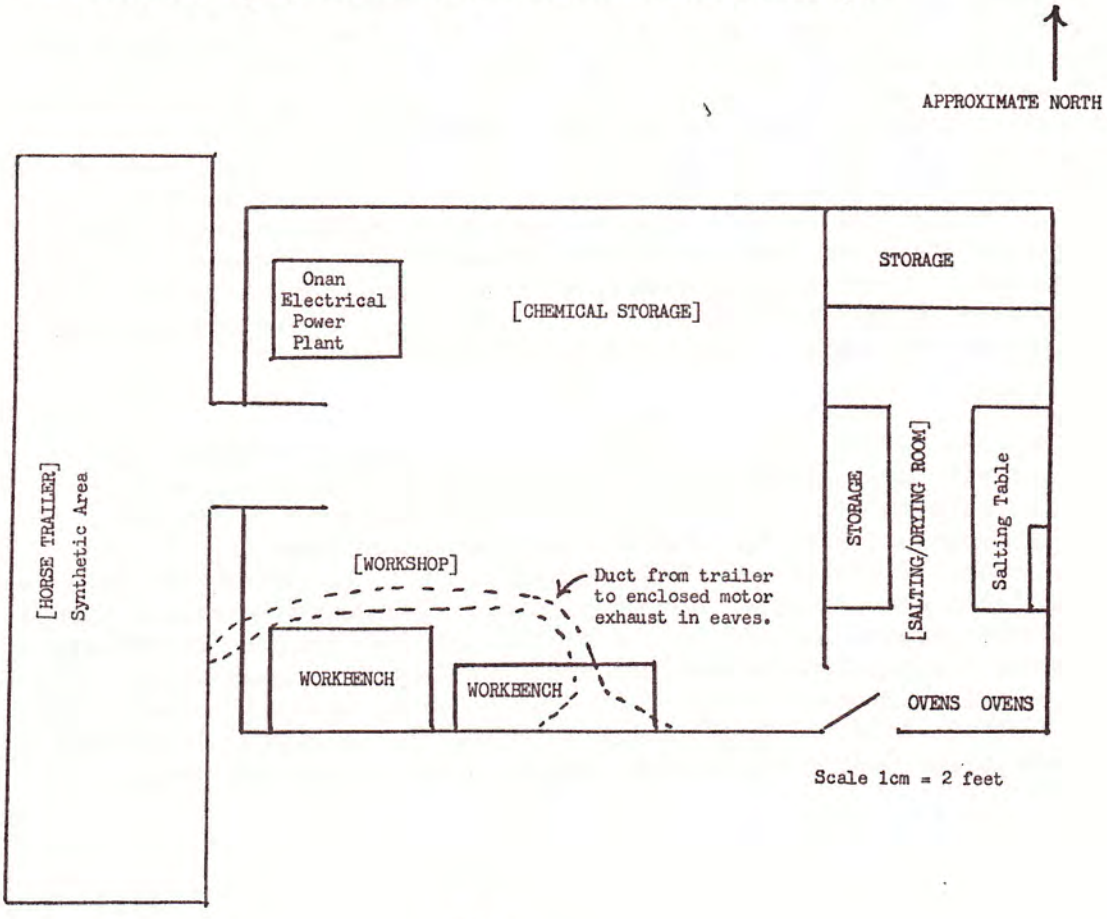


Fig 1.

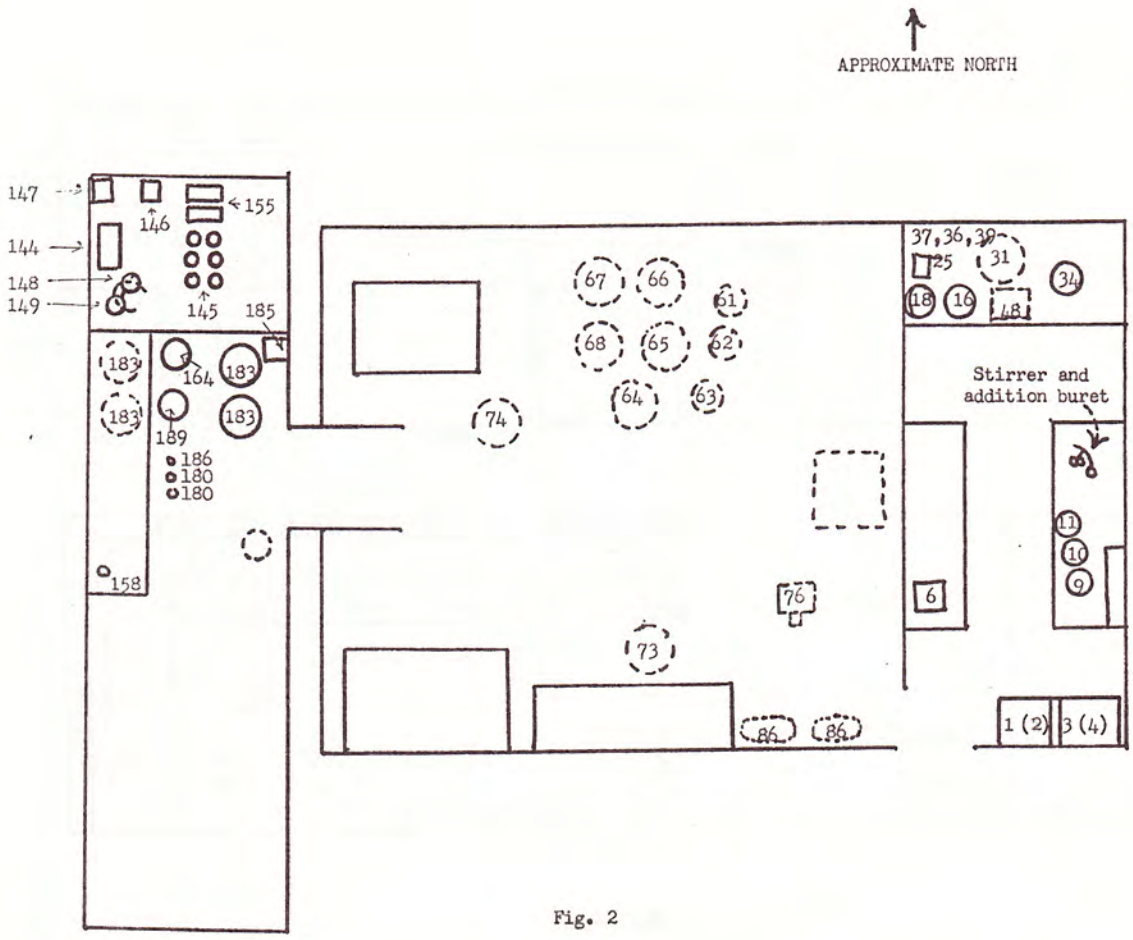
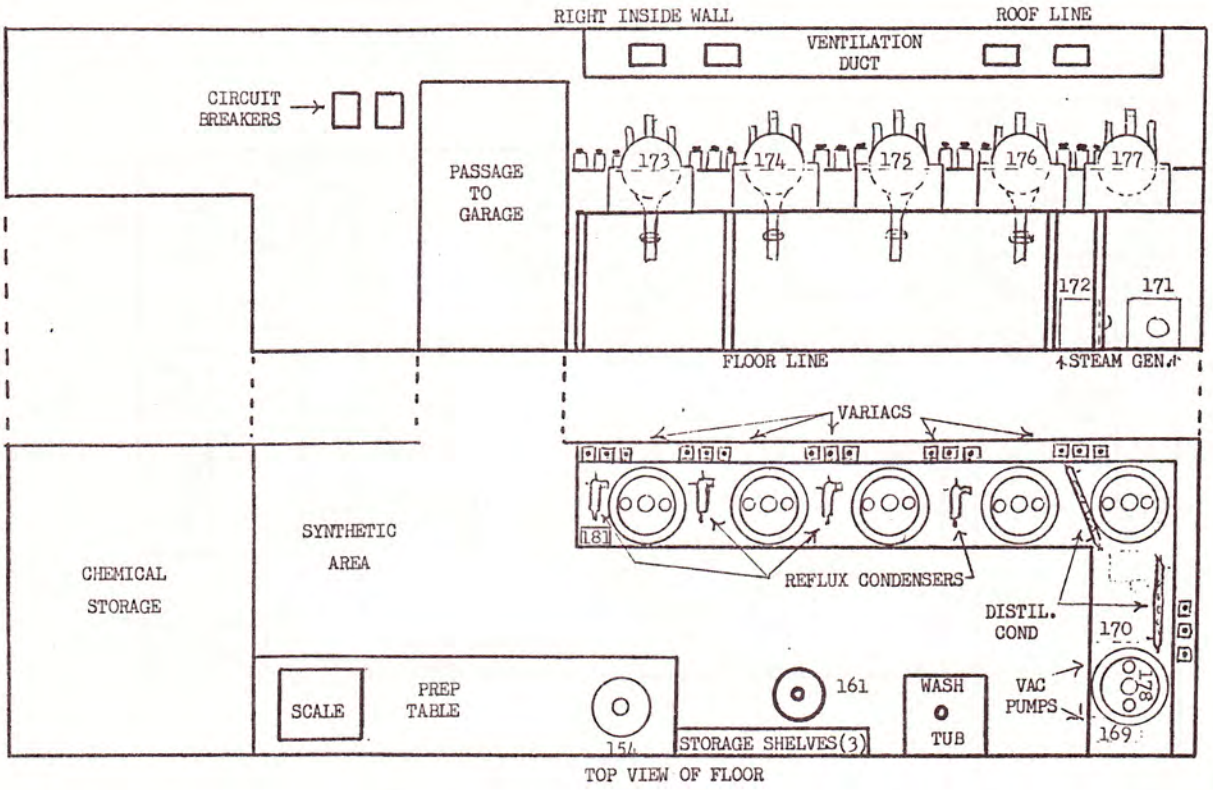


Fig. 2

TABLE 1

Partial List Of Evidence

1–4.	Four Drying Ovens
6.	Amphetamine
9–11.	Sulfuric Acid
16.	White Powder
18.	Sulfuric Acid
25.	Glass Flasks with Side Arms
31.	Acetic Anhydride
34.	Buchner Funnel
36–37.	Gas Mask Filters
39.	Gas Masks
61–63.	Alcohol
64.	55 Gallon Drum of Reaction Residue
65–66.	55 Gallon Drum of Formamide
67–68.	55 Gallon Drum of Acetic Anhydride
73–74.	Drums of Phenyl Acetic Acid
76.	Pill/Tablet Mixer
86.	Ten 50# Bags of NaOH
144–145.	Acetic Acid
146.	Box with Miscellaneous Tubing
147.	Box with Miscellaneous Condensers
148–149.	Ring Stand with Separation Funnels
155.	Boxes of Sodium Acetate
158.	Miscellaneous Glassware
164.	18" Diameter Buchner Funnel
169–170.	Vacuum Pumps
171–172.	Steam Generators
173–178.	50 l. Reaction Flasks
183.	60 Quart Stock Pots
185–186.	Benzene
189.	Miscellaneous Equipment



SCHEMATIC OF LAB TRAILER

Fig.3

SCALE 1 CM = 15 INCHES

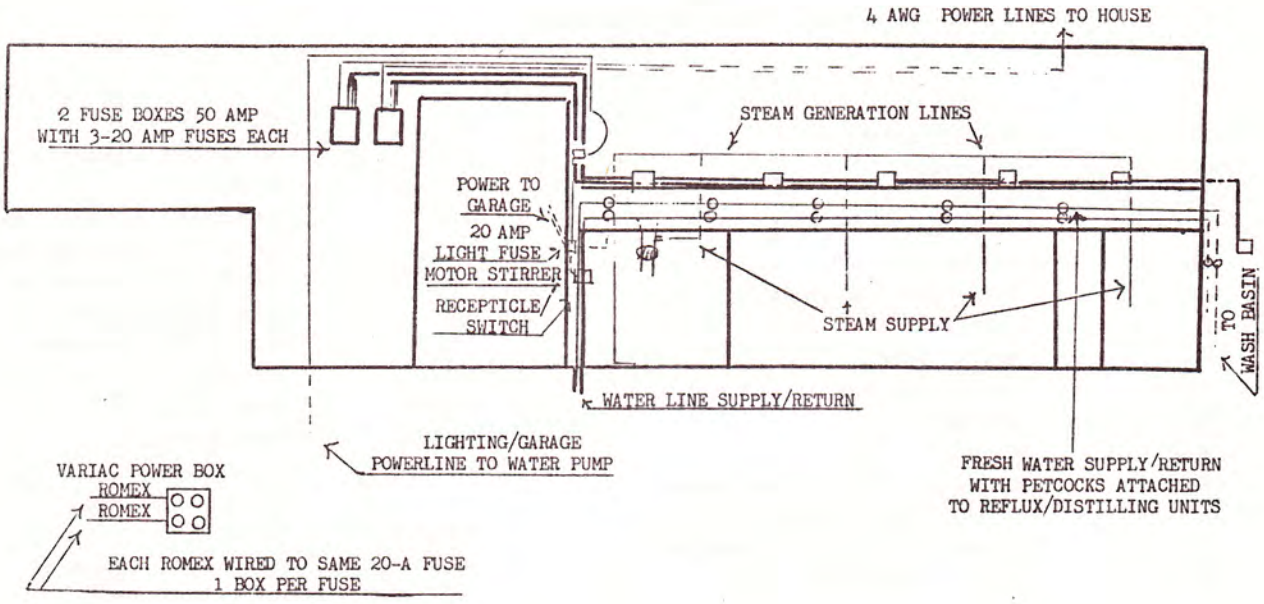


Fig.4

2. The Salting Out Area

The salting of Amphetamines was via Sulfuric Acid precipitation from addition burrets with a motorized stirrer. The resulting Amphetamine Sulfate was placed on window screen material and dried in four Thelco drying ovens.

The 30' by 8' house trailer contained all the high value equipment. The trailer had six 50 liter capacity round bottom reaction vessels (with drain stopcocks) in heating mantles. Each heating mantle required three Variac units. In addition to this there were two electric steam generators and two vacuum pumps. The estimated retail value of the chemical equipment in the horse trailer was approximately $50,000.00. Figure 3 is a top view and a side view of the trailer layout. The trailer was constructed so that it could be rapidly removed from the barn structure with the minimum of effort. The trailer had a well designed system for steam lines, water lines, and power circuits. The voltage/amperage dedicated to the trailer, consisted of two 50 amp fuse boxes essentially wired to code. The primary current consumption would be from the two steam generators and the heating mantles. Figure 4 is a side view of the water, steam, and electric line layout system.

IV. AMPHETAMINE PRODUCTION:

1. Synthesis

The method of Amphetamine manufacture was via the Phenyl Acetic Acid route. Figure 5 illustrates the method which is briefly as follows:

AMPHETAMINE SYNTHESIS

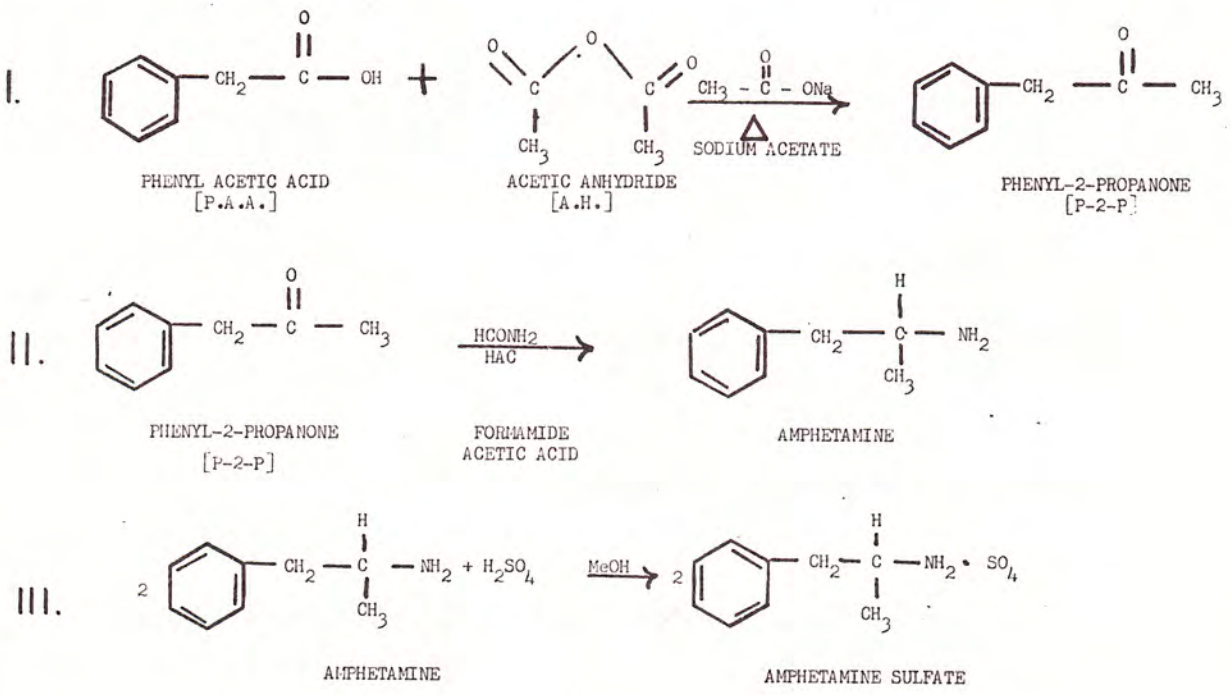
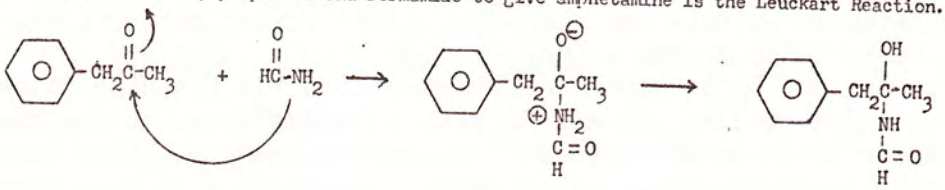
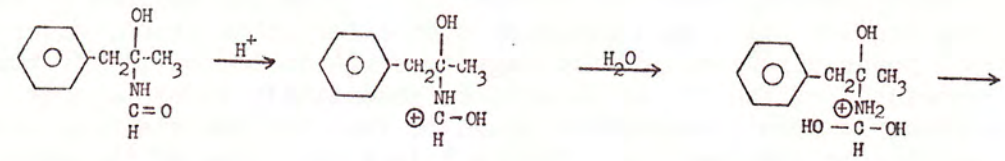


Fig.5

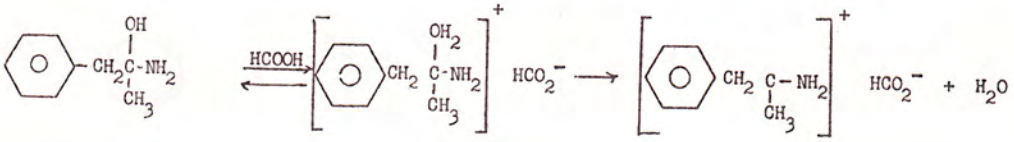
The reaction of 2-phenylpropanone and formamide to give amphetamine is the Leuckart Reaction.

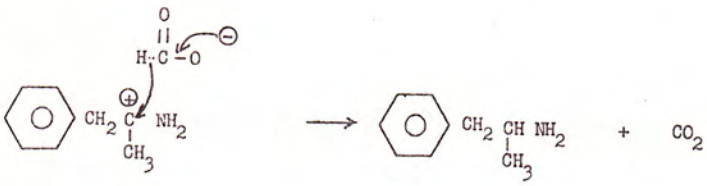


Hydrolysis of the formamide

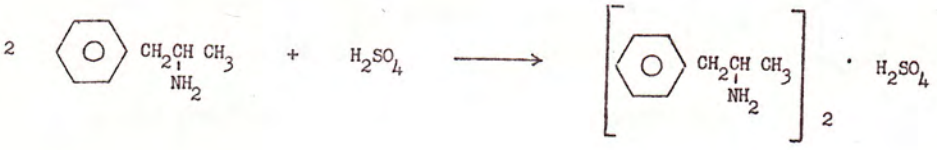


Reduction by formic acid





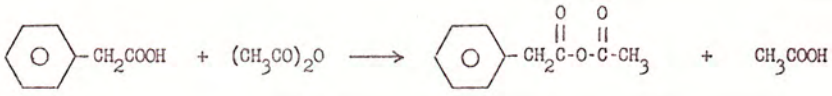
The final step in the synthesis is salt formation



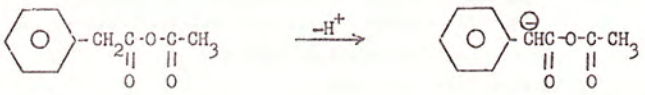
Phenyl Acetic Acid and Acetic Anhydride are reacted with Sodium Acetate to make Phenyl 2 Propanone (P2P). The P2P is then reacted with Formamide and Acetic Acid to obtain Amphetamine. A detailed description of the chemical terms of reactions and the particular reaction mechanisms such as Decarboxylation of the Anhydride, and the Leuckhart reaction of P2P and Formamide, has been written courtesy of Dr. Richard Lynd, Modesto Laboratory in figure 6. Too often reactions are described as cook book procedures without attempting to understand the actual reaction mechanism involved.

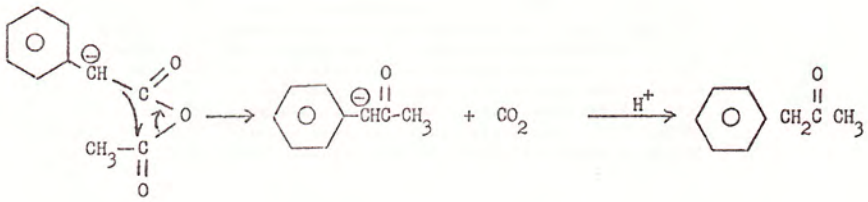
fig 6 Amphetamine Synthesis

The first step in the synthesis of 2-phenylpropanone is the formation of the mixed anhydride.



The next step is the decarboxylation of the anhydride





cont'd

2. Clandestine Recipe

The actual recipe (three typewritten pages) described in detail the procedures required for the step by step cook book procedure of Amphetamine synthesis. These instructions included the various precautions to take and the proper maintenance of the equipment. This particular recipe was scaled for a 22 liter flask (these flasks were found in the storage area of the barn).

3. Yield Percentages

In a discussion with various criminalists/chemists, an attempt was made to determine the weight yield of Amphetamine from a Phenyl Acetic Acid weight. The overal theoretical weight/weight yield is 135% with a practical yield of about 73%. The estimated molar yield is about 30% to 56%.

4. Materials Requirements

For investigation and court purposes an attempt has been made to list the materials required. Thus one can list by chemical requirements per key chemical, i.e., what is required for 100 pounds of Phenyl Acetic Acid to obtain Amphetamine. The latter method of tabulation is an easy description of what ancillary chemicals are required in order to complete the particular production. A description on how to present the chemical materials format is described in Table 2.

OVERALL CHEMICAL REQUIREMENTS, PER RECIPE BATCH:

Phenyl Acetic Acid	10.56 lbs.
Sodium Acetate	5.28 lbs.
Acetic Anhydride	2.11 gal.
Formamide	2.77 gal.
Acetic Acid	.06 gal.
Sodium Hydroxide(1)	29 lbs.
Methanol(2)	8 gal.
Sulfuric Acid	2.2 lbs.

(1) Sodium Hydroxide could be reused

(2) Methanol can be reused

CHEMICAL REQUIREMENTS PER 100 LBS OF PHENYL ACETIC ACID:

Phenyl Acetic Acid	100 lbs.
Sodium Acetate	50 lbs.
Acetic Anhydride	20 gal.
Formamide	26 gal.
Acetic Acid	0.6 gal.
Sodium Hydroxide	275 lbs.
Methanol	75 gal.
Sulfuric Acid	21 lbs.

5. Production Capabilities

An attempt was made to determine the production capabilities of the laboratory assuming full equipment utilization and round the clock manufacturing. An assumption was made that it would take about 40 hrs. to produce a batch of Amphetamine starting from Phenyl Acetic Acid.

This particular lab would have the capability to manufacture about 80/90 pounds in a 40 hour period. At a dosage rate of 15 mg. of Amphetamine, the amount would be sufficient to provide the active ingredients for about 2.5 million tablets (see Table 3 for a more detailed description of production capabilities). In actual practice, the amount of Amphetamine seized at Barstow indicated a preliminary production rate of about 1/3 to 1/4 the ideal capacity.

TABLE 3

PRODUCTION CAPABILITIES

Using the evidence recipe, the capabilities of the laboratory equipment, and an estimated yield of 70%, the following production capacity is estimated:

1. Capacity

   Capacity per flask - 9600 gm phenylacetic acid (P.A.A.)
   Number of flasks - 6 x 9600 gm = 57,600 gm P.A.A.
   Yield of amphetamine - (57.6×10^3) (70%) = 40.32×10^3 gm

2. Production Times - Phenyl-2-Propanone (P-2-P)

   a. Step 1

   Mix - ½ hour
   Stir - ¼ hour
   Reaction - 18 hours
   18 3/4 hours

   b. Step 2

   1 hour

   c. Step 3

   Preparation - ¼ hour
   Heat - 1 hour
   Distill - 6 hours
   7¼ hours

   d. Shutdown

   ½ hour

   Total P-2-P production time is 27½ hours.

3. Amphetamine Oil

   Mix - 15 minutes
   Heat - ½ hour
   Reaction - 4 hours
   Cool - 1 hour
   Mix/Stir - ½ hour
   Distill - 3 hours
   Total - 9 3/4 hours

4. Amphetamine Salt

   Preparation - 3 hours

   Total time = 2 + 3 + 4 = 40¼ hours

5. Thus if all flasks are used for production, 40,320 gm (89#) of Amphetamine Sulfate is capable of being produced in a 40 hour period.

   Unattended reaction times of about 24 hours during this 40 hour processing period are available for cleanup/premixing.

6. Dosage Capabilities

   The accepted commercial dosage of Amphetamine Sulfate is 10 to 15 mg per tablet thus:

   1 gm of Amphetamine Sulfate provides 66.66 tablets at 15 mg per tablet.

   Tablets per maximum batch of 40,320 gm (89#) = 40,320 gm x 66.6 = 2,187,973 or about 2½ million tablets.

V. OTHER SYNTHESIS:

Some chemicals were found for Methaqualone Synthesis, however at the time of arrest the suspects were not involved in this manufacture. However, Methaqualone powder was found on one of the seized pill presses.

VI. LESSON LEARNED FOR FUTURE CLANDESTINE LABORATORIES:

1. Investigation Phase

Attempt to estimate the yield of a clandestine drug lab from the quantity of chemical materials purchased if this particular quantity is known. This may help justify the expense of the investigation and surveillance.

2. Power Consumption

Determine power consumption and the time period of the consumption. This may give a clue as to the amount and type of equipment that is being used.

3. Water

Water usage could indicate the cooling requirements.

4. Vapor Detection

We could have used a sensitive Acetic Acid/Ammonia sniffer or detector.

5. Recognition

Provide investigators with displays/photographs of common chemical equipment and the appearances of chemical supplies. This will aid in lab/agent communications.

6. Production Time

Provide investigators with the approximate production time required for a particular synthesis.

7. Evidence Gathering

Since about 12 locations were involved in the search warrants, prior to a search/arrest, some discussion should be made as to the different numbering systems for the evidence at the varied locations. In laboratory analysis it may be difficult to reconcile five different items No. 3 from five different locations. Ideally each location should be given an alpha designator followed by a sequential numbering system for all the evidence recovered there.

8. Serial Number

Check the serial number of equipment, invoices, and empty boxes. This may indicate additional equipment which has not been recovered or it may tie a particular suspect to a particular location.

INTERCONVERSION OF PGM PHENOTYPES UNDER SPECIFIC CONDITIONS

B. Brinkmann, Beitrage Zur Gerichtlichen Medizin 22: 141(1974)

[Ed. Note. Jim Norris brings the article to our attention. He translated it from the German.]

In the phosphoglucomutase system there exist numerous rare variants, the recognition and differentiation of which is a prerequisite in paternity blood grouping.

Phosphoglucomutase is relatively stable, and one can detect the phenotypes in stored blood samples and stains. In research on the identification of blood samples, especially samples drawn for alcohol, we have conducted a great deal of research. In the so-called application of PGM determinations, such separations were occasionally found to vary from the PGM standards, the reason for these false readings is why the following work was undertaken.

Materials and Methods: Investigation for PGM type of 58 samples drawn for alcohol analysis, preserved with Fluoride, was undertaken. After storage of the samples 3-12 months at 4°C, electrophoresis was performed using horizontal PAA-Electrophoresis. The samples by this time were completely hemolyzed, this allowed them to be used directly as specimens.

Investigation of freshly drawn blood samples of individuals who showed suspicious types was performed. In two of the samples with a phenotype discrepancy a larger volume (50 ml) of fresh blood was drawn and various enzyme degrading treatments were tried: Heat inhibition (Temperatures between 40 and 50°C, incubation time between 10 and 60 minutes. Addition with Iodine-Acetate and urea (Final concentration between 5 and 50 mM. Duration of reaction time 1 to 7 days at R.T.) Addition of GSSG (concentration between 20 and 200 mM). Addition of sodium fluoride (concentration between 0.1 and 1.0 of ‰).

Results and Discussion: In 50 samples the same results were obtained for both samples, in eight samples, however, there was a discrepancy. The fresh blood samples were either phenotype PGM 1 (5 times) or PGM 2-1 (3 times), the corresponding aged comparison sample showed a PGM 2-like pattern with a more or less stronger anodic shift in the converted isozyme, so that a distinction from a PGM 2 would always be possible. (Fig. 1 and 2), the isozymes of this pattern were clearly less intense. In all the rest of the systems (ABP, MN, Rhesus, Hp, Gm (1,2), Inv (1), EAP) there was agreement, so that a mixup of samples and possible influence of the other factors is unlikely.

To the proof of this possibility, therefore, two additional (i.e., larger) samples were again tested. In numerous aliquots of these samples, the effects of the described agents were examined. It was seen that the described effect of the conversion of phenotypes was seen with the addition of fluoride. All the other agents produced partial or complete loss of the phenotypic patterns, there was no pattern alteration. The observed conversion was not immediate with the addition of fluoride, it took three or four weeks at refrigerator temperature. An explanation of this phenomenon can be explained by two mechanisms:

Either, by a direct ionic action on the surface of the proteins with a secondary alteration of the surface charge or an ionic action of the tertiary structure

by forces (Van Der Waal etc.) which cause a change in the secondary conformation. Because of the time dependence of this reaction, this is likely a complex conversion--possibly it follows a course between the two models--but, leaning toward the second model.

In the present stage, it appears important besides to show the reason for the described change, so that one can avoid making errors in typing.

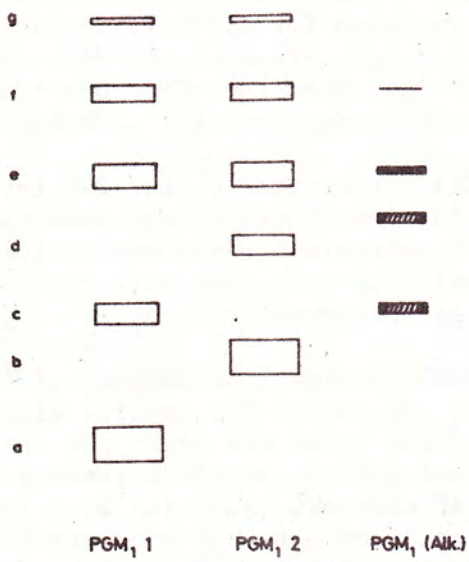


Abb. 1: Schematische Darstellung des atypischen PGM-Musters, welches nach Lagerung entsteht.

Abb. 2: Von links: PGM$_1$ 1 (Blutspur), PGM$_1$ 2 (Frischblut), PGM$_1$ Alk. (Alkoholprobe mit NaF-Zusatz).