California Association of Criminalists NEWSLETTER

JUNE 1980

CONTENTS

This mailing contains several documents which require your attention. These are, in order of importance:

1. The current draft of the revised ethics procedures. John Murdock needs your response by 1 August so that proper notification can be given prior to the Fall Seminar.
2. The committee assignment questionnaire. Bob Ogle needs this to make assignments for the upcoming year.
3. The membership pin questionniare.

Note also that this Newsletter has another hypothetical ethical dilemma posed by Pete Barnett. Pete has consented to contribute regularly as long as there is interest. Reader comment is encouraged and a tear sheet questionnaire to vote on this issue's dilemma is provided.

MESSAGE FROM THE PRESIDENT

I would like to take this opportunity to thank the previous year'a Board of Directors for the fine job of keeping the association alive and well during the year. A special thanks is due to Jerry Chisum for his outstanding leadership during two years of office. One year as president is enough to bend the spirit of a strong person, let alone two years in the hot-seat! Thanks for a job well done, Jerry. I hope that I can continue the forward progress that you have sustained during your two years of presidency.

During the coming year, we have a great deal of work to accomplish. I would like to see the study groups begin to put together a laboratory handbook of procedures for the various tests performed on physical evidence. The handbook would include flow charts which would act as guides for training newer criminalists and also act as a reference for other criminalists in their day-to-day work. The procedural guidelines should also include the rationale for the different tests and an explanation of the various conclusions which can be drawn from the tests. This handbook will require the cooperation of both the Training and Resources committee and the study group members. For this reason, I will appoint members to the Training and Resources committee who are actively involved in the study groups.

I want to have the new procedure for handling the ethics allegations instituted during the coming year. The new procedure represents an improvement in dealing with ethics matters by providing a more efficient approach while also improving the ability of an accused member to respond to charges. Many hours of time were donated by the ad hoc committee to revise the ethics procedures, particularly by John Murdock, and I would like to voice the thanks of the association for their efforts.

I will make every effort to place newer members of the CAC on the various committees, in order to get some "new blood" involved in the association. This will serve to both give the association some needed impetus and give some of the older members some needed rest (a form of Geritol). In order to assess your interest in serving on a committee, the questionnaire for committee interest is being printed here. Please fill out the questionnaire and send it to me. The questionnaire will be read and acted upon! Please check the committee(s) you are interested in and send it in.

Robert R. Ogle, Jr., President

STUDY GROUP ACTIVITIES

1. Southern Drug Group

The topic of the April meeting was a paper by Duer, et. al., "A necessary condition for drug identification," (Microgram Feb. 1980). A subcommittee of the group consisting of Jim White, Jerry Nelson, and Hiram Evans, is drafting a rebuttal to the paper. At the June meeting, the group will be discussing procedures for the identification of cocaine.

2. Southern Arson Group

An April meeting was planned to compare the samples of charcoal lighter fluid that were passed out in February.

3. Southern Serology Group

The March meeting was a tour of the City of Hope medical center. At this meeting, Jim White was chosen as chairman for the upcoming year. At the April meeting, Keith Inman reviewed papers presented at the AAFS meeting and there was a discussion of the Nation ruling; the latter involved reviewing what procedural changes labs were making to comply. Plans for the June meeting include a Nation update, collection of standards of unusual types, and a comparison of methodologies.

4. Northern Biology Group

The March meeting continued the discussion on Nation begun at the February meeting. Group members shared their experiences with various methods of preservation; the responsibilities of the police and the legal community vis-a-vis preservation were also discussed. A draft statement summarizing the discussion was subsequently prepared and circulated for review. The plans for an April meeting to discuss the draft fell through; the topic will be picked up at the July meeting.

5. Proposed Trace Group

Elsewhere in this Newsletter, Steve Shaffer reviews the response to his questionnaire regarding the formation of a Trace study group.

CAC COMMUNICATION WITH LEAA

Last September, Jerry Chisum at the Board's direction wrote the director of LEAA expressing concern that the termination of the grant which supported the blood stain analysis courses might indicate a general withdrawal of LEAA support from all Forensic Science related activities. Included in this letter was a request for clarification regarding allegations made against the Beckman bloodstain analysis system (BAS) project.

A response was received from Harry Bratt, acting director of NILECJ, assuring us that the LEAA-NILECJ program plan continues to include support for the Forensic Sciences. With respect to the BAS project, he stated that an independent investigating body of three scientists found no evidence to support the allegations. Further, he indicated that the BAS final report, the allegations against it, the report of the review group, and all supporting documentation would be available to interested parties through the National Criminal Justice Reference Service.

EMPLOYMENT EXCHANGE

1. Positions Open - Washington State Crime Laboratory

There will be twelve positions for Criminalists. Applications will be accepted as of June 25, 1980. The closing date for application will be July 30, 1980. Minimum qualifications include a B.S. degree with a minimum of 20 semester hours or 30 quarter hours of chemistry; and, for Criminalist I - one year fulltime paid technical experience in an analytical laboratory; Criminalist II - two years fulltime paid technical experience, one year of which must have been in a forensic science laboratory with demonstrated experience and expertise, particularly on controlled substances; Criminalist III - four years fulltime paid technical experience, three years of which must have been in a forensic science laboratory with experience and expertise in criminalistics. Interested parties should contact: Washington State Department of Personnel, 600 South Franklin, P.O. Box 1789, Olympia, Washington 98504, (206) 753-5368.

2. Position Wanted - Mary Cambridge

She received a Master of Forensic Science degree from George Washington Univ., Washington, D.C., Sept. 1979, and seeks a forensic science related job. Contact Mary Cambridge, 826 San Rafael St., Sunnyvale, Calif. 94086, (408) 738-8777.

RAY PINKER MEMORIAL LIBRARY

Following Ray Pinker's death last year, it was suggested that his contribution to the profession and to the CAC would be appropriately memorialized by the establishment of a library in his name at Los Angeles State University. This library would parallel in the South the Kirk collection at Berkeley. The plaque dedicating the library (which unfortunately did not reproduce well enough for printing) has the CAC seal above the following inscription:

> In recognition of his many talents and original contributions to the field of criminalistics, as a founding member of the California Association of Criminalists, for his moral & ethical professional standards, and in memory of the warmth and friendship shown to his colleagues and associates, this library is established this ninth day of May, nineteen hundred eighty, as the Raymond H. Pinker Memorial Library by the members, past and present, of the California Association of Criminalists.

Contributions to the Pinker Library will be accepted by Jack Cadman, Calif. State Univ., Los Angeles, 5151 State University Drive, Los Angeles 90032.

ETHICAL DILEMMAS

Peter Barnett
Forensic Science Associates

Continuing with the "ethics dilemmas" started in the April Newsletter a new "case" is presented in this article. Following the suggestion of Jerry Chisum, this month has a slight change of format: Several possible resolutions of the problem will be suggested. Readers are asked to choose the appropriate response and send their response to the author. I will compile the responses, and comments, and these will be published in next month's newsletter, together with a new "case". Everyone is urged to respond, and to send interesting cases to either the editorial secretary or to the author. These will be written up and published in future newsletters.

Two responses were received pertaining to the case presented in the last issue; they follow the presentation of this month's case.

The facts in the case for this Newsletter are as follows: A consultant is retained by a district attorney's office to work on a particular aspect of a major case in which the local laboratory, which has worked on other aspects of the case, does not have the necessary expertise. The consultant hired by the D. A.'s office has, in the past, been the subject of allegations which, if true, would cast doubts on the competence or credibility of the consultant. The fact that the consultant is being hired is known to the criminalists in the government crime laboratory who are also aware of the allegations which have been made. Are these criminalists under any obligation to advise anyone involved in the case of the allegations?

Possible resolutions to this dilemma must take into account the criminalists ethical responsibilities, as well as the right of the defendant to confront witnesses against him. The law is clear that the "prosecutor" has a duty to advise the defendant of any information relevant to the credibility or reliability of prosecution witnesses. Does, or should, this requirement extend to the publicly employed ("prosecution") criminalist?

Four solutions are proposed:

1. The criminalist should do nothing, unless directly asked by the D. A. The criminalist has no responsibility to oversee the D. A.'s office. The fact that the defendant may be deprived of an opportunity to "confront" a witness against him is of no concern to the criminalist because it is the D. A.'s responsibility to check out his own witnesses.

2. If the criminalist feels the allegations are true (or they have been proven true in some forum) the criminalist should advise the D. A. as to the nature of the allegations. Presumably, the criminalist is in a better position, at least than the D. A., to evaluate the allegations and should be able to decide if they should be communicated to the D. A. Once the D. A. is informed, the criminalist's responsibility ends.

3. The criminalist has a responsibility to his "client", the D. A., to communicate any information he has to the "client". It is not the responsibility of the criminalist to determine when information is material to the defendant's case. This decision must be reached by the D. A., defense counsel, and/or the Court. The criminalist should not take it on himself to decide when any allegations concerning the consultant are material to the defense.

4. The criminalist should communicate his information to either the judge or the defense attorney. It is the responsibility of law enforcement to make this information known to the defense. The government criminalist, being an agent of law enforcement, has an individual responsibility to ensure that this material information is provided to the defense.

After considering the above please use the form attached to indicate which is the best alternative. Any additional comments are welcomed.

I would select alternative _____.

The controlling section(s) of the CAC Code of Ethics is _____

_____

_____

_____

Comments:

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

A RESPONSE TO "ETHICS: A CASE DISCUSSION"

from Benjamin W. Grunbaum

I am writing in response to Peter Barnett's invitation for comments on his recent article, "Ethics: A Case Discussion" (CAC Newsletter, March 1980).

After sketching a hypothetical case, Mr. Barnett postulates four alternative courses of action. In brief resume: a consultant criminalist working for the defense discovers a fiber embedded in a bullet. He removes it, examines it, and concludes that it is incriminating to his client. Mr. Barnett selects and defends a course of action as follows: the fiber is replaced into the bullet and the physical evidence is returned to the investigating agency. The consultant will not report the finding except to avoid perjuring himself on the witness stand.

The alternative espoused by Mr. Barnett appears to be counter to several specific items in the CAC Code of Ethics:

II. I. "Where test results are capable of being interpreted to the advantage of either side of a case, the criminalist will not choose that interpretation favoring the side by which he is employed merely as a means of justifying his employment."

III.G. "It is not the object of the criminalist's appearance in court to present only that evidence which supports the view of the side which employs him. He has a moral obligation to see to it that the court understands the evidence as it exists and to present it in an impartial manner."

III.H. "The criminalist will not by implication, knowingly or intentionally, assist the contestants in a case through such tactics as will implant a false impression in the minds of the jury."

IV.C. "It shall be regarded as ethical for one criminalist to re-examine evidence materials previously submitted to or examined by another. Where a difference of opinion arises, however, as to the significance of the evidence or to test results, it is in the interest of the profession that every effort be made by both analysts to resolve their conflict before the case goes to trial."

IV.D. "Generally, the principle of "attorney-client" relationship is considered to apply to the work of a physical-evidence consultant, except in a situation where a miscarriage of justice might occur. Justice should be the guiding principle."

If I understand Mr. Barnett correctly, he appears to be arguing that the private consultant has some sort of duty to guarantee the defendand that his investigation of the physical evidence will not be used against him. I would have supposed that it is the responsibility of the court to decide when a defendent's rights are violated by the presentation of certain physical evidence, and the right of the jury to decide whether or not the evidence is incriminating.

The Code of Ethics rather clearly defines the manner in which a criminalist must serve the interest of justice, as follows:

"It is the duty of any person practicing the profession of criminalistics to serve the interest of justice to the best of his ability at all times. In fulfilling this duty, he will use all of the scientific means at his command to ascertain all of the significant physical facts relative to the matters under investigation . . . These findings of fact and his conclusions and opinions should then be reported, with all the accuracy and skill of which the criminalist is capable, to the end that all may fully understand and place the findings in their proper relationship to the problem at issue."

Mr. Barnett's hypothetical case and the course of action he advocates seem to have some important legal, moral and ethical implications. I join Mr. Barnett in urging responses from the membership. I also recommend that the Association make some sort of formal interpretation of the Code of Ethics as it would apply in this hypothetical case.

BARNETT'S HYPOTHETICAL AND THE ETHICAL DEFENSE EXPERT

John I. Thornton

The discussion by Peter Barnett of the ethical dilemma posed if the defense criminalist discovers new evidence upon re-examination of the evidence (CAC Newsletter, March 1980) represents something of a riptide in the confluence of law and science. The defense criminalist is forced into the uncomfortable position of choosing the least objectionable course of action from an array of rather disgusting choices.

Strategem I, that of discarding the evidence, is clearly indefensable (no pun intended). I would propose a Law of Conservation of Evidence -- evidence may be transmogrified, but it can be neither created nor destroyed.

In the hypothetical issue posed by Mr. Barnett, I would concur that Strategem IV would be the least objectionable course of action. But it would be myoptic not to recognize or be alert to the dynamics and the intricacies of this dilemma. By way of illustration, let us perturb the issue a bit. Suppose the defense criminalist had decided that solubility testing and pyrolysis-GC was appropriate for the fiber found on the evidence bullet. Following photography of the evidence fiber in place, all of the fiber was consumed in the analysis.

The fiber no longer exists in any discrete sense. In its place are photographs, notes on its solubility behavior, and strip chart recordings documenting its pyrolysis products. Strategem IV no longer applies since the fiber has been consumed.

If the bullet is returned without this data, the net effect would be that of Mr. Barnett's Strategem II, i.e., retaining the fiber, and those considerations attendant to this strategem (previously discussed by Mr. Barnett) would apply. Mr. Barnett has rejected this Strategem, for valid reasons. If the bullet is returned with this data, the net effect would be that of Strategem III, with those attendant considerations. This Strategem, too, has been rejected.

The defense criminalist is now caught between an expectoration and a defecation. What, then, would be the proper procedure to follow? If the burden of proof was shared equitably between the prosecution and the defense, Strategem III would, from a scientific standpoint, appear to be the most appropriate course of action. But the burden is not shared; a basic tenet of Anglo-American jurisprudence is that the prosecution has this burden. The defense must strive to assure that the constitutional rights of a defendant are not abridged. There is no obligation on the part of the defense to speed the defendant on his or her way to prison. In California and possibly some other jurisdictions, there is one exception to this doctrine. The defense cannot suppress evidence which is the "instrumentality of the crime." This is narrowly interpreted by the courts as meaning firearms, knives, vibrators, poisons, clubs, etc. If the defense becomes aware of evidence of the instrumentality of the crime, there is an obligation to come forward with this evidence and present it to the prosecution. But for this single exception, no obligation exists for the defense to do so.

This dilemma and others like it must be resolved then in favor of the legal considerations, and by ratiocination Strategem II would then seem to be the only possible action. This is not truly in consonance with scientific fairness and is likely to be regarded with some apprehension on the part of the ethical criminalist. Nevertheless, it is the defense attorney who is ultimately responsible for orchestrating the overall defense strategy. To protect the scientific integrity of the criminalist, the fact that destructive testing is to be performed should be communicated emphatically to the defense attorney. Then the criminalist can do what is known in transactional analysis as "Allowing Someone To Own Their Own Problem." This approach may not be totally or even partially satisfactory to every criminalist, but the constraining reality is that in issues such as these, it is the legal, rather than the scientific, considerations which will prevail.

TRACE EVIDENCE/MICROSCOPY QUESTIONNAIRE

TABULATION OF RESULTS

Stephen A. Shaffer

Following is a tabulation of the responses received to date on the Trace/Microscopy Questionnaire. At this writing (June 11) I have received 52 completed questionnaires and, in view of the responses to the various questions, I am confident that viable and productive study groups could be established in both Northern and Southern California. I understand that one preliminary meeting has already been held in Southern California and that furtner meetings will be held beginning in the fall.

In responding to the questionnaire, some people marked more than one answer for some questions, and some did not respond to some of the questions. In tabulating the results I counted one response for each mark placed by the respondent regardless of the number of responses checked for a single question. A number of good suggestions were made in writing on the questionnaires which I appreciate but which are not incorporated directly into the tabulation. Notes on some of these suggestions follow the tabulation. Perhaps interested parties can consider these suggestions, together with any further of their own, and be prepared to discuss them at the first organizational meetings of the groups.

Those questions in the tabulation marked with an asterisk (*) inter-relate to one another and the responses are correlated following the tabulation. Those marked with a parenthetic number indicate that there is a note regarding responses to that question following the tabulation.

The results:

1. Administrative: 14. *(1)
   Bench: 41.

1A. Administrator/Director willing to grant paid time:

   Yes: 14. *
   No: 0.

1B. Bench Criminalist willing to devote time to the group:

Yes:	29.
Yes, but only on paid time:	9.
No:	2.

2. Study groups useful: Yes: 52.
No: 0.

3. Unmet need for Trace/Micro. Study Group: Yes: 50.
No: 0.

4. Participated in LEAA/McCrone workshop: Yes: 17.
No: 35.

5. College level courses in...

Trace: Yes: 26. (2)
No: 24.

Micro: Yes: 29. (2)
No: 21.

6. Interest level in participating:

A.	Not interested:	5.
B.	Would, but can't (commitments):	11.
C.	Would, but can't (distance):	1.
D.	Would, but...:	1.
E.	Will, if...:	11.
F.	Will, if lab director says "yes" to #1A:	5. *
G.	I'll be there:	20.

7. Host Laboratory - Fixed: 13.
Rotating: 29.

8. Meeting Frequency:

Weekly:	0.
Bi-Weekly:	1.
Monthly:	20.
Bi-Monthly:	22.
Semi-Annually:	3.
Other:	1.

9. Moderator - Fixed: 23.
Rotating: 20.

10. Candiate moderators:

Mentioned 9 times:	Thornton
Mentioned 6 times:	DeHann
Mentioned 5 times:	Reeve, Rhodes, Shaffer
Mentioned 4 times:	White, M. Blake
Mentioned 2 times:	Gonzalez, Morton, Springer
Mentioned once:	Bailey, Baird, Barnett, Bashinski, Berger, Bradford, Cassiday, Chism, Coddington, Cranston, Deeg, Dougherty, Haag, Laskowski, Ojena, Ragle, Sagara, Schoor, Skalsky, Stoney, and Waller

11. Topic areas:

No response:	1.
Specific response:	25.
"All of the above":	19.

Correlation: Questions number 1, 1A, 1B, and 6 (Option F) are somewhat interrelated. Fourteen people responding to question 1 marked "Administrative" while fourty-one marked "Bench". All fourteen who checked Administrative also checked "Yes" in answer to question 1A, indicating a strong commitment on the part of the supervisorial respondents to grant their people paid time to pursue the activities of the study group.

Nine people responding to question 1B marked "Yes, but only on paid time." Administrators from three of the seven laboratories represented by "Yes, but..." answers responded (LASO, San Mateo, and Orange County). No response was received from the administrators of four other laboratories represented by "Yes, but..." answers (DOJ labs at Salinas, Fresno, and San Luis Obispo, and the Arizona DPS lab at Phoenix.) Five administrators from four labs indicated that they would grant their people paid time but no one from their labs indicated that they would participate only on paid time.

In answer to question 6, five people marked option F, "Will, if and only if my lab director answers "Yes" to question #1A above." Administrators for four of these five people said that they would grant paid time (Orange County ((2)), San Mateo, and Contra Costa Counties). Administrators from the other lab (Santa Clara County) did not respond.

Notes:

1) In response to question #1 three people checked both "Administrative" and "Bench" blanks, two noting that their duties were divided.

2) Nine people indicated that they had taken trace evidence classes taught by Thornton, five by Kirk, two by Cadman,

Notes: 2) continued

and one each by Morton, Nicol, and "BCIT" (British Columbia Institute of Technology?). One indicated that they had taken a trace class but did not indicate the instructor. Eight people indicated that they had taken a microscopy class taught by Thornton, seven by the DOJ, five by Gullberg, two by Kirk, and one each by the FBI, Morton, Needham, Sandell, and UBC. Three indicated that they had taken a microscopy class but did not indicate the instructor.

Some of the comments:

"Bi-monthly (meetings) if for 2-3 hours; semi-annually if for an entire day (my preference)." John Thornton.

"I realize that it's a move toward drugs and away from trace, but how about inviting people to contribute photographs (brightfield and polarizing) toward a comprehensive atlas of microcrystalline tests?" John Thornton.

"I wonder if there are that many people actually doing much trace....

"I would suggest an approach which would involve laboratory analysis of samples, followed by round table discussions...

"I would tend to shy away from a series of 'meetings' where everyone sits around a table and talks about what they do. I think it would be more useful, less time consuming, and more fun to hone our laboratory skills. This would probably have the side affect of developing reference collections." Pete Barnett.

(The approach of laboratory work followed by discussion of the work was echoed by John Murdock in a phone conversation.)

"How much can be done by correspondence? A 'trace' newsletter?" Linton Von Beroldingen, Oregon State Police, Eugene.

In response to question #2 (on the value of CAC Study Groups), John Murdock wrote, "I'm certain it's not as good as night or afternoon classes but in the absence of these it's really all we have. If you have well defined and limited goals for each meeting you will in the end achieve something valuable."

In response to question #9 (regarding a fixed or rotating moderator/leader), John wrote, "With so many and varied topics the single person would really serve to coordinate a rotating schedule of individuals. Responsibility for arranging for guest speakers and lectures, workshops in general should be handled by one person." After suggesting several people as candidate moderators, he wrote, "The single or fixed person should probably be from the bay area (referring of course to a Northern Group) - only because he or she would be able to attend most if not all meetings. For example, I was able to attend all of the Firearms Study Group meetings."

One individual added two categories to the list of topic areas, "Field investigation and collection of trace," and, "Gen'l laboratory techniques in the collection, storage, etc. of trace."

In view of the fact that substantial responses have been received from both Northern and Southern California I think it is appropriate that further action be taken to start the study groups. I have written a letter to all of the individuals who were suggested more than once as candidate moderators asking that they give some thought to any role they might be willing to play in an active group. I further asked that the individual from Northern and Southern California who was nominated the greatest number of times contact the others from their region and attempt to arrange at least for a preliminary organizational meeting. The groups may then make whatever arrangements they choose for the continuation of meetings. I will attempt to attend the first meetings of both groups to provide a final run-down of the survey results and anwser any questions I can about the survey itself.

I would like to thank all of the people who have responded to the questionnaire, and to once again encourage any who are interested in a study group to respond. I will include their responses in a final tabulation to be presented at the first meetings of the Northern and Southern Study Groups.

BREATH PRESSURE AND ITS EFFECT ON CONTEMPORARY BREATH TESTING INSTRUMENTS

L. Haag, S. Narveson, A. Raphael and R. Watkins

Phoenix, Arizona

While the infallibility of an analytical technique is neither possible nor legally required, the claims and propositions propounded by attorneys attempting to discredit or prevent the introduction of chemical test evidence collected with breath testing instruments in DWI cases often ranges from the bizarre to the absurd. Other professed problems are more interesting and require some thought and possibly even some experimentation to evaluate before one can render any opinion.

A recent and reoccurring claim made in Phoenix Courts fell into this latter category. It was, in part, an old question with a new twist applied to a different instrument.

The proposition was this: Although the breath sampling value of the Mark IV G.C.I.[1] is vented to the atmosphere, a subject may be able to compress an otherwise larger volume of breath into the 1/4 cc fixed-size sample compartment since this instrument is capable of introducing the breath sample onto the G.C. column while the subject is blowing. Indeed pressure and volume of a gas do vary inversely in accordance with Boyle's Law and if compression is taking place it would *seem* logical to expect that an error to the disadvantage of the defendant would occur.

Attempting to fall back on the argument that "that's never been a problem before and if the instrument were subject to this kind of problem, it would not have been approved by the D.O.T. or the Health Department" is not likely to satisfy many people. Trying to draw upon the long and well-known track record of the Breathalyzer is also doomed to failure because the design of this instrument always returns the breath sample to atmospheric pressure before it is analyzed.

Finding the proposition of elevating a reading by compressing the sample, an interesting one, we chose first to ascertain some idea of the magnitude of the pressures that could be developed by healthy adult subjects, then to calculate the maximum possible amount of compression. It should be recognized at this point that the pressure a person can exert must be added to the atmospheric pressure before attempting to calculate the effect. Stating it another way -- if subject A can expert 2 psi of pressure (over atmospheric) and subject B can exert 4 psi it is erroneous to conclude that the sample B provided is under twice the pressure as A's, rather the relationship would be --

$$P_{atmos.} + P_A : P_{atmos.} + P_B$$

[1]Gas Chromatograph Intoximeter, Intoximeters, Inc. St. Louis, Mo.

Standard atmospheric pressure at sea level may be expressed in the following units:

29.92 inches of Hg
760 mm of Hg
33.9 ft. water (406.8 inches of water)
14.7 lbs/in^2

If one wishes to convert feet of water into psi multiply by 0.4335. And to convert inches of water into psi multiply by 3.614×10^{-2}.

Standard atmospheric pressure at altitudes other than sea level can be calculated from the pressure lapse rate of 1".0 Hg per 1000 ft. For Phoenix at 1100' the adjusted standard atmospheric pressure would be 28.82 inches of Hg (391.8 inches of water or 14.16 psi).

To calculate the maximum possible amount of compression of a breath sample, the maximum static pressures developed by healthy adult subjects were measured in inches of water pressure over atmospheric. For thirteen people tested the top six values were 120,[2] 90, 85, 80, 70 and 68 inches of water pressure. Taking the peak value of 120 inches and adding it to standard atmospheric pressure at the station (391.8 inches) we obtain --

511.8 inches of water pressure (absolute).

The theoretical effect on the volume of a breath sample would be determined from Boyle's Law

$$P_1V_1 = P_2V_2$$

Taking P_1 as standard atmospheric pressure at the station and P_2 as the maximum static pressure produced by subject "RWB" the volume of breath (V_1) that could be compressed into 1/4cc volume (V_2) is --

$$(391.8)\ V_1 = 511.8\ (.25)$$

$$V_1 = 0.33\ cc$$

Assuming this "compressed" sample also possessed a corresponding increase in its alcohol content and was analyzed the resultant error would be --

$$\frac{(.33 - .25)}{.25} 100\% = \frac{.08}{.25}(100) = 32\%$$

e.g. - a .10% BAC subject would read .13% if this were true and operative.

A more realistic application of this hypotheses can be derived by taking the highest dynamic pressure supplied by a subject to the actual instrument during the normal sampling mode and perform the

[2]That this individual is a practiced scuba diver and runner may account for his ability to develop a substantial pressure (120" water or 4.3 psi). The maximum delivery pressure generated by Dubowski's subjects was 50" H_2O (see footnote 3).

same calculation. A water manometer was T-connected on the breath tube of a MK. IV G.C.I. and the maximum pressure developed was found to be 70" water pressure (same subject that developed 120" static pressure).

P_1 (standard atmospheric pressure at 1100" elev.) - 391.8"

$$P_2 = (391.8 + 70) = 461.8"$$

From Boyle's Law - $$V_1 = \frac{461.8(.25)}{391.8}$$

$$V_1 = 0.29 \text{ cc}$$

Once again assuming that this "compressed" sample contained an attendant increase in alcohol concentration and was analyzed by the G.C.I the resultant error would be --

$$\frac{(.29 - .25)}{.25} \ 100\% = \frac{.04}{.25} \ (100) = 16\%$$

e.g. at .10% BAC subject would read .11$_6$% if these propositions were indeed operative.

By way of comparison Dubowski has also measured inlet breath delivery pressures in 19 men and women and found a range of 8-50 inches H_2O (mean 21.3")[3].

Each of the previous theoretical errors assumed that increased pressure caused an increase in the resultant blood alcohol reading via Boyle's Law.

Henry's Law, however, which dictates the relationship between the concentration of a volatile solute in dilute solutions and the vapor concentration of that volatile substance in the air above the solution at equilibrium and serves as the foundational principle for all breath testing instruments, is independent of pressure. A detailed explanation of the lack of effect of pressure differences on breath test results is given in Mason's article.[4] This is only true, however, when the pressure remains essentially constant. A sudden change, either an increase or a decrease in pressure without sufficient time to allow for the Henry's Law partitioning to take place at the new pressure *does* stand to alter the result. This possibility is mentioned on page 298 of the Dubowski article previously cited (footnote 3). The usual circumstance, however, is the possibility of lowering the test result by the sudden return of a fixed sample volume to a lower pressure (atmospheric) at the moment of analysis after having been delivered at a significantly higher pressure due to back pressure created by sampling system resistance. Conversely if a means were available to suddenly increase system back pressure at the moment of sampling or recording of the result such as in the Intoxilyzer the result could conceivably be elevated.

[3]Dubowski, K. M., "Biological Aspects of Breath-Alcohol Analysis," Clin. Chem. 20:2 294-299 (1974)

[4]Mason, M. F., "A Note upon Barometric Pressure and Breath Alcohol Analysis," Jour. For. Si. 19:2 (1974)

To demonstrate these propositions, the internal vent from the breath chamber of a 4011A Intoxilyzer was ported out the side of the unit. The water manometer was connected to this vent by means of a T so that delivery pressure could be measured and controlled. The Intoxilyzer is particularly well suited for this purpose since it continuously and instantaneously displays the alcohol concentration of the vapor in the sample chamber.

Repeated samples from a simulator solution delivered without restriction by the instruments own internal pump (Calibrator Mode) and by normal blowing through the simulator produced results of .164 - .166%.

Abrupt constriction at the T connector to create a back pressure above atmospheric of approximately 66" of water produced results ranging from .176 to .184% on the digital display. Samples delivered at a constant back pressure of 66" over atmospheric produced the same .165% $\pm$ .001% results as when delivered at near-ambient pressures.

Finally, a sudden return to atmospheric pressure while vapors were being passed through the instrument at the elevated pressure caused a momentary reduction in the displayed result from .166% to .150% - .154%. This was followed by a return to .166% with the continued passage of air through the simulator.

PRESERVATION OF PGM ACTIVITY IN DRIED SEMEN STAINS

Dorothy Northey

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Whole semen samples from six individuals were separately dried on cotton cloth. The cloth was divided for storage under different conditions (rm temp, freezer, and refrigerator). The PGM was readable for all six frozen stain samples using starch-agarose plates (SERI Group I conditions).

So what? These stains were prepared between 6-14-77 and 7-22-77. The successful plate was run 3-17-80. Admittedly the results were not readable the first time I ran them, but that was because I used too large a sample (expecting little or no activity). With reduced sample size all were typable. The six samples included three of type 1-1, one type 2-2, and two of type 2-1. All were run as stain cuttings. The corresponding refrigerated samples showed pronounced streaking and were not pursued further.

EFFECTIVENESS OF LONG TERM FREEZER STORAGE OF BLOODSTAINS

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presented at CAC Seminar
Spring 1980, Santa Barbara

ABSTRACT AND SUMMARY

The viability of genetic markers in dried bloodstains stored frozen for up to five years was compared with that of markers in frozen lysate samples and dried stain samples stored at room temperature. Laboratory prepared samples were screened for typable anti A and B, hemoglobin, PGM, Es-D, EAP, AK, and ADA. 100% of the bloodstains stored frozen for 0-2 years were typable in PGM, AK, Hemoglobin, and ABO (Lattes). Of the same 0-2 year old samples, 97% were typable in Es-D, 87% in EAP, and 81% in ADA. Of the stain samples stored frozen for 2-5 years, 100% were typable in hemoglobin and AK, 93% in ABO (Lattes), 85% in PGM, 78% in Es-D, and 77% in EAP. In only two instances were degradative changes observed which resulted in an apparent change in genetic type. One EAP type B lysate stored frozen for 24 months produced a CB type pattern on re-analysis. One ADA type 2-1 stain stored at room temperature for 12 months produced an apparent type 1 pattern, without a detectable 2 band.

PROBLEM UNDER INVESTIGATION

Like most criminalistics laboratories, the Oakland Police Department Crime Laboratory has for years routinely stored frozen lysates for use as standard samples. In addition, our practice has been to prepare and freeze dried whole bloodstains for later comparison with evidence samples. Although we attempt to assign a high priority to analysis of perishable biological evidence, our caseload is such that we frequently are unable to work on a case for weeks after the work is initially requested. In an attempt to minimize the adverse impact of delayed examination on the quality of the bloodstain evidence, we have for the past five years routinely frozen bloodstained articles (or stains removed from the articles) prior to analysis. We also routinely retain frozen evidence stain material not consumed in testing to permit additional referee analysis if required.

Although our experience with freezer storage of evidence stains during this period has supported our original premise that the analytical results obtained on samples stored frozen are markedly better than those obtained on samples kept at room temperature, we had not conducted any systematic study of the length of time we could expect the various markers to survive under frozen conditions. The recent decision in People vs Nation (1) has raised the issue of preservation of perish-

able evidence as the responsibility of the state. Our desire to provide sound scientific advice to our own agency on the potential value of freezing for preservation of biological evidence has motivated us to conduct the present study. The principal objective of the study was to determine the relative effectiveness of room temperature vs frozen storage in ensuring the survival of the genetic markers in bloodstains in "typable" condition.

Information about the potential for typing various genetic markers in stain samples after long term freezer storage is not abundant in the literature. Most studies dealing with stains have considered survival of markers at room temperature only or have considered storage times of six months or less (2). One recent study by Luke , et al, (3) examined frozen lysates up to one year old, but the oldest frozen stain sample tested was only 169 days old.

Many laboratories have reference files of frozen lysates, but as far as we have been able to determine, most do not have available stain samples which have been stored frozen for long periods. Our own collection of stains was not ideal for this study, since most of the older stains had previously been typed only in ABO and PGM. We did, however, have a fair number of samples for which the types were known in the other systems under investigation and which we could examine for any apparent changes in type after long term storage. In addition, stains which had not been previously typed could be screened for the presence of viable markers.

SAMPLES EXAMINED

The samples used for the study were from two sources (a) cadaver bloods received routinely as standard samples in death investigations and (b) clinical specimens received from a local hospital. Samples were stored in a plasma freezer at -35°C and in a household refrigerator freezer.

Set a: Samples consisted of 33 sets of washed red cell lysates and dried whole bloodstains prepared on clean white cotton cloth. Samples were prepared from cadaver bloods collected without any preservative, dried overnight at room temperature, and frozen. Samples ranged in age from 6 months to 58 months. All 33 samples had previously been typed in PGM, 17 in Es-D, 22 in EAP, and 12 in AK. The samples included all the common variants of these enzymes as well as five HbAS and two HbAC variants.

Set b: Samples consisted of 36 whole bloodstains prepared on clean white cotton cloth from clinical specimens collected in EDTA. Stains were dried overnight at room temperature, divided, and stored frozen and at room temperature. The samples ranged in age from 2 months to 48 months. These specimens had been prepared for use as aged ABO standards and had not been previously typed in any of the enzyme systems.

METHODS USED

PGM and Es-D were typed using the BAS, Group I, method of Wraxall and EAP, AK, and ADA by BAS, Group II. (4) For these tests, 20X20 cm glass plates were used, with 22 sample slots ½ cm wide per plate. The sample size was 3 or 4 fine threads, ½ cm long, removed from the stains, soaked in a minimum volume of appropriate reducing agent and inserted directly into the gel with no further preparation.

Samples were scored as to their "typability" as follows:

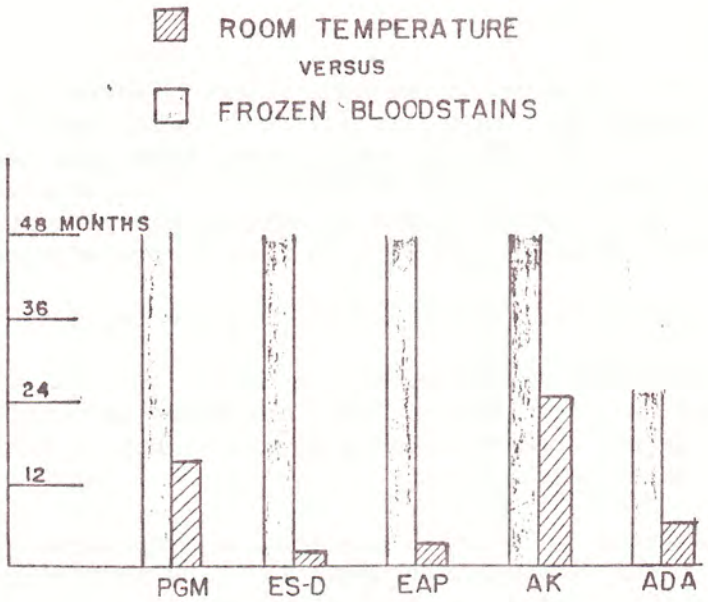
I. typable, clearly readable bands
II. marginal, too weak to call, but bands are visible
III. streaked, some detectable activity, but no bands
IV. no detectable activity.

Hemoglobin was typed using cellulose acetate membranes, with pH 9.2 Tris/EDTA/glycine buffer (Gelman Instruments). Samples were extracted into 0.05M Clelland's reagent to produce a medium red extract. Extract was applied to the membrane with no further preparation.

ABO typing was conducted using Lattes' slide technique. Samples 0.5 cm^2 were extracted into two drops of water and dried drop by drop to form two crusts. Approximately 0.02% red cell suspensions of indicator cells were applied, followed by a cover slip. Samples were observed up to one hour.

RESULTS

As expected, room temperature stored stains remained typable for much shorter periods than frozen stains, (see bar graph appended). Usually (but not always) the activity of the frozen lysate sample appeared stronger than that of the stain. Lysates and stains stored frozen appeared to survive equally long, although if samples were repeatedly frozen and thawed, the lysate samples tended to degrade more rapidly than the stains. The clinical samples (containing EDTA) and the cadaver samples without added preservative did not seem to differ significantly from each other in the degree to which their markers survived. The table below contains data on the fraction of the samples examined at each time interval which were typable. With two exceptions (an EAP-B 24 month old frozen lysate which gave a CB result and one ADA type 2-1 12 month old room temperature dried stain which lost the 2 band), no apparent changes in type were observed. The table in the appendix summarize the results with respect to frozen stains.



PGM

Of the frozen stains examined, ranging up to 58 months in age, 64 out of 69 were typable. 100% of the frozen stains 0-2 years old and 85% of those 2-5 years old were typable. In contrast, the stains stored at room temperature were typable only up to about 15 months. Those frozen stains which were classified as untypable were almost all marginal (II), with some bands still visible but too weak to call. Plates were observed up to one hour to allow weaker samples to develop fully. In general, lysates seemed stronger than stain samples, except in those instances where the stain showed the greatly enhanced activity typical of samples containing PGM of tissue origin.

The length of survival of PGM observed in this study on room temperature stored stains is consistent with previously reported values. Rothwell (5) found 50% of PGM stains were typable after three months at room temperature and found one stain typable after 14 months. Only 50% of the lysates in Rothwell's study were typable after 18-24 months at-20°C. Zajac and Sprague (6) reported persistence of PGM in evidence stains up to 20 months old. Denault et al (2) found a minimum survival for PGM of 13 weeks at room temperature, with some samples surviving more than 26 weeks. Culliford (7) indicates that satisfactory results are obtained on lysates stored 6-12 months at -20°C and on stains stored at room temperature for over three months.

Es-D

The strength of the Es-D reaction often did not seem to have much correlation to the strength of the PGM reaction in the same sample. In some instances, typable Es-D was found where the PGM was not typable. Overall, 61 of the 70 frozen stains tested were typable in Es-D. 97% of the frozen stains 0-2 years old and 78% of the stains 2-5 years old were typable. Of the three room temperature stored stains tested at 2 months of age, only one was typable. None of the older room temperature stains were typable.

Previous reports by Grunbaum, et al (8) indicated successful typing of EsD on evidence samples two months old, while Jay and Philp (9) indicated a maximum survival time for EsD of 30 days at room temperature.

EAP

The potential lability of the EAP isozymes is well documented (10,11), in particular the tendency for type B patterns to shift to CB patterns in liquid samples. Not unexpectedly, the EAP patterns in this study showed more evidence of degradative changes than the other markers. It was critical, especially with the older samples, to monitor the development of the plates between 30 and 60 minutes to best distinguish between B and CB samples, and plates needed to develop at least 60 minutes in order to be certain of detecting A bands in the old BA samples. The following changes were observed in frozen material: one 15 month old B stain which lost the secondary B band, one 32 month old BA lysate which lost both secondary bands, one 56 month old BA lysate which lost only the primary A band, and one 24 month old type B lysate which gave a CB pattern. This last change is the only one which would have resulted in a typing error.

87% of the stains stored frozen 0-2 years and 77% of the stains stored frozen 2-5 years were typable. Overall, 57 of the 70 stains tested could be typed in EAP. In contrast, none of the room temperature stains stored for more than 3 months were typable.

Wraxall and Emes (12) report reliable EAP up to 5 weeks at room temperature, and Grunbaum and Zajac (13) up to 30 days. Denault et al (2) found typable EAP in most samples at 13 weeks with a few samples surviving for as long as 26 weeks at room temperature.

AK

As expected, AK proved to be the most stable marker, both at room temperature and in frozen storage. 100% of the 70 frozen stains stored up to 58 months were typable. The room temperature stored stains were readily typable up to 24 months old, providing a full hour was allowed for development on the older (over 12 month) samples to be sure of detecting the 2 band. The only untypable frozen samples were three lysates which had been stored in Clellands and which had been repeatedly frozen and thawed for use as standards.

AK (continued)

The stability of AK was noted by Rothwell (5) who reported typable AK activity in stains after 13 months at room temperature and in lysates stored at -20°C after 2 years. Denault, et al (2) found AK samples consistently typable after up to 26 weeks at room temperature.

ADA

Results on this marker were incomplete, because technical problems encountered during the study. The technique of using short sample slots to permit screening of more samples seemed particularly unfavorable to the ADA, where samples were already faint against a rapidly developing dark background. One ADA 2-1 stain, 12 months old and clearly typable as a 2-1 on the frozen sample, showed only the 1 band on the room temperature sample. This band was quite strong, and this sample would have been mistyped as a type 1. Since none of our older samples (room temperature or frozen) included a known type 2-1, we could not be certain, even when we observed a strong type 1 band, that the samples were truly "typable". Of all the enzyme markers, ADA seemed most variable in its survival at room temperature. Room temperature stains seemed typable for at least six months and those stored frozen for at least two years.

Denault (2) reports survival of ADA activity for 13 weeks at room temperature, with negative results obtained after 26 weeks. Culliford (5) indicates that high levels of ADA are found in stains up to 3-4 weeks of age and satisfactory typing can be obtained on room temperature stored stains up to 3 months old.

ABO

The persistence of anti-A and anti-B was quite variable in the tested stains. Typable activity was detected in some stains stored at room temperature for up to 30 months, while other samples 15-18 months old were not typable. All of the frozen stains 0-2 years old were typable, and 93% (13/14) of those 2-5 years old could still be typed. The samples used in this study were dried on white cotton duck, which is a fairly heavy fabric. The individual threads of the fabric are quite thin, however, and for those markers where thread samples were used, the sample size was not especially large. The 0.5 cm^2 section taken for the Lattes test was a fairly large sample by comparison and the persistence of the antibodies in these samples relative to the other markers should be evaluated in the light of this difference in sample size.

HEMOGLOBIN

All of the frozen samples tested, the oldest one being 59 months old, were typable. These samples included 5 Hb AS and 2 Hb AC variants. Unfortunately, dried samples of AS and AC variants stored at room temperature were not available. One room temperature Hb A sample was clearly typable after three months of storage. A second sample stored eight months at room temperature was marginal. Previous experience in this laboratory indicates that hemoglobin typing of an AS sample is not likely to be successful after 2-3 months of storage at room temperature.

CONCLUSIONS

It is clear from the results of this study that laboratory prepared bloodstains can be effectively stored for years in frozen condition with little loss of potential typing information. Depending on the marker being tested, frozen stain samples are typable 77-100% of the time after as much as five years.

Naturally, contamination, heat and other storage parameters acting on a particular evidence bloodstain prior to submission to the laboratory will have an effect on the survival of the genetic markers in the stain quite beyond the control of the laboratory.

Nevertheless, the laboratory is under an obligation to preserve evidence in its custody and control in the best manner feasible. Even though freezer storage cannot guarantee that a particular marker will survive in a stain in typable condition, freezing can help prevent a marginal stain from rapidly becoming untypable and can, under the best of circumstances, preserve the potential typing value of the evidence stain for years.

TYPABILITY OF MARKERS
IN FROZEN BLOODSTAINS

	1 YR	2 YR	3 YR	4 YR	5 YEARS	
PGM	20/20	16/16	13/17	8/9	7/7	(64/69)
ES-D	20/20	16/17	12/17	7/9	6/7	(61/70)
EAP	20/21	14/17	14/17	4/8	5/7	(57/70)
AK	21/21	17/17	17/17	8/8	7/7	(70/70)
ADA	11/12	6/9	INCOMPLETE			
HB	2/2	6/6	3/3	—	3/3	(14/14)

REFERENCES

(1) People vs Nation; California Supreme Court 8 Jan 80
CRIM 20975 Superior Court # A 016748

(2) Denault, Takimoto, Kwan, and Pallos, (1976), "Detectability of Selected Genetic Markers in Dried Blood upon Aging" Aerospace Report # ATR 75 (7910)-1

(3) Luke, Campbell, Krenzel, and Cowan, (1980), "EAP, EsD and PGM Types in Postmortem Blood: Correlation of Zymograms of Specimens from Heart and Body Cavities" presented at the American Academy of Forensic Sciences, New Orleans, February 1980.

(4) Wraxall, B.G.D., (1978), "Bloodstain Analysis System - Procedures Manual", SERI

(5) Rothwell, T. J., (1970), Med Sci & Law, 10 230, "The Effect of Storage on the Activity of PGM and AK Enzymes in Blood Samples and Bloodstains"

(6) Zajac, P and Sprague, A., (1975), J Forens Sci Soc, 15, 69 "Typing of Phosphoglucomutase Variants in Dried Bloodstains by the Grunbaum Method of Cellulose Acetate Electrophoresis"

(7) Culliford, Bryan, (1974), "The Examination and Typing of Bloodstains in the Crime Laboratory" NILE and CJ, PR 71-7

(8) Grunbaum, Harmon, Del Re and Zajac, (1978), J Forens Sci, 23 89, "Electrophoresis of Esterase D in Fresh Blood and Bloodstains on Cellulose Acetate"

(9) Jay, B. and Philp, W., (1979), J Forens Sci, 24, 193, "A Stability Study of the Esterase D Isozymes"

(10) Wist, A., Stuver, W., Shaler, R.C., (1975) Forensic Serology News, #4, "Confirmation and Study of the Aging Effects Reported by McWright, et al, to Exist in the EAP System"

(11) Zajac, P. and Grunbaum, B., (1978), J Forens Sci, 23, 615 "Problems of Reliability in the Phenotyping of EAP in Bloodstains"

(12) Wraxall, B. and Emes, E., (1976), J Forens Sci Soc, 16, 127, "Erythrocyte Acid Phosphatase in Bloodstains"

(13) Grunbaum, B. and Zajac, P., (1978), J Forens Sci, 23, 84, "Phenotyping of Erythrocyte Acid Phosphatase in Fresh Blood and in Bloodstains on Cellulose Acetate"

The Washington State Patrol Crime Laboratory System has been authorized to establish limited service laboratories in Kelso, Tacoma, Everett, and the Tri-Cities area (Pasco, Kennewick, and Richland). The four laboratories will require personnel to provide controlled substance identification, crime scene assistance, and criminalistics.

There will be twelve positions for Criminalists. Applications will be accepted as of June 25, 1980. The closing date for application will be July 30, 1980.

Minimum qualifications include a Bachelor of Science degree with a minimum of 20 semester hours or 30 quarter hours of chemistry; and, for

Criminalist I - one year fulltime paid technical experience in an analytical laboratory;

Criminalist II - two years fulltime paid technical experience, one year of which must have been in a forensic science laboratory with demonstrated experience and expertise, particularly on controlled substances;

Criminalist III - four years fulltime paid technical experience, three years of which must have been in a forensic science laboratory with experience and expertise in criminalistics.

Salary Range:

Criminalist I - 1258-1533 per month
Criminalist II - 1459-1777 per month
Criminalist III - 1610-2061 per month

Interested parties should contact:

Washington State Department of Personnel
600 South Franklin, P.O. Box 1789
Olympia, WA 98504

Phone: (206) 753-5368