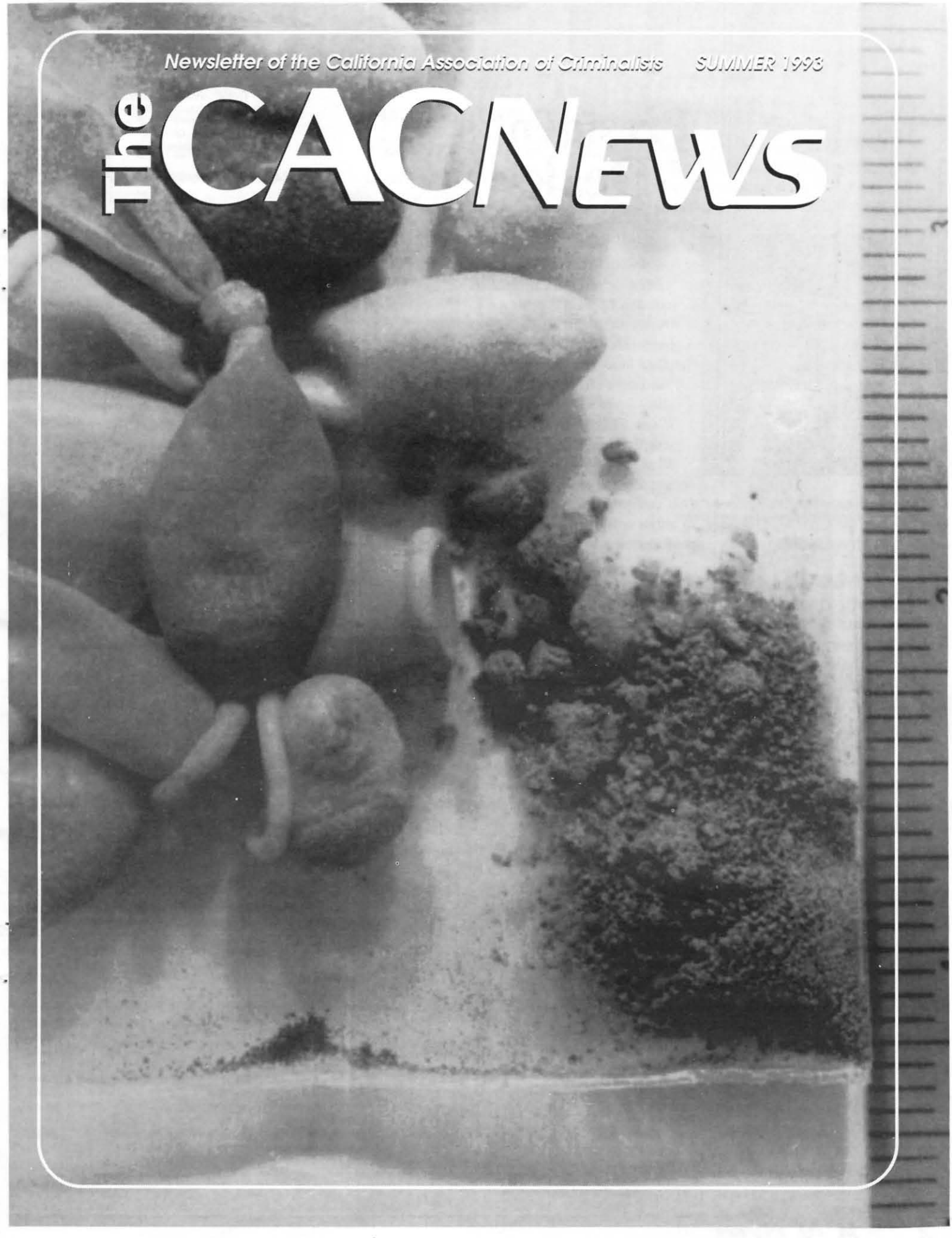
Newsletter of the California Association of Criminalists SUMMER 1993

The CAC News



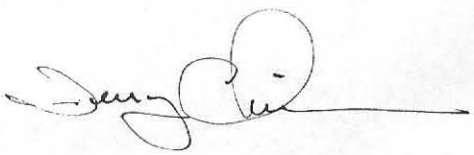
The President's Desk

I wish to thank the California Association of Criminalists for this opportunity for me to repay the debt I owe to this Association. At the Founder's Day luncheon, Lowell Bradford talked about when he and Jim Brackett were in Santa Clara County as two of the 16 criminalists in the state. The CAC did not exist, each case presented new and exciting challenges but "it was lonely" there was only Jim to talk to. That's why the CAC was founded, to allow criminalists to meet and discuss new findings, new approaches, new ideas and ideals.

I ran one of the last of the "one man labs" in Bakersfield in the mid 60's. Bakersfield was 120 miles from the nearest other criminalistics laboratory. There were many problems running a laboratory in such an isolated area. Lowell's remarks brought my Bakersfield experience back to me — I felt the loneliness that comes from that isolation. I went to almost every Southern Section meeting and each of the Seminars during the time I was there. Without the monthly contact with the CAC membership, I would have been lost.

The day of the one man lab is gone, now there are several people in each laboratory to exchange ideas and discuss interesting cases. Yet there is an advantage to associate with criminalists from other laboratories. These criminalists have learned other ways to approach problems and have interesting cases to discuss. In today's mobile society, you may be working on the same suspect in different areas of the state or nation.

Everyone can benefit from membership in a professional association. I am proud to be a member of the leading Forensic professional association in the nation. I look forward to this next year as President.



Lisa M. Brewer
CAC Editorial Secretary
Editor

John Houde
Ventura Sheriff's Lab
Publisher

The CACNews is published four times a year (January, April, July, and October) by the California Association of Criminalists, a non-profit professional society dedicated to the furtherance of forensic science in both the public and private sectors ©1993.

Notice to Contributors

This newsletter publishes material of interest to its readers and is pleased to receive manuscripts from potential authors. Meeting announcements, employment opportunities, course announcements, etc. are also solicited.

Advertisements are also accepted, although a fee is charged for their inclusion in The CAC news. The acceptance of any advertisement is at the sole discretion of the Editorial Secretary.

Because of the computerized typesetting employed in The CAC News, the Editorial Secretary requests that where possible, submissions to the News be made in the form of IBM or MS-DOS compatible files on 5.25 or 3.5 inch floppy disks (high or low density). It is preferred that text files from word processors be saved as ASCII files without formatting codes, e.g. bold, italic, etc. An accompanying hardcopy of the file may be submitted along with the disk to illustrate the author's preference for special emphasis. Graphics, sketches, photographs, etc. can also be placed into articles. Please contact the Editorial Secretary for details. FAX submissions are also acceptable. The FAX number for the Editorial Secretary is (408) 298-7501.

The deadlines for submissions to The CAC News are: December 15, March 15, June 15 and September 15.

Meetings

California Crime Lab Directors

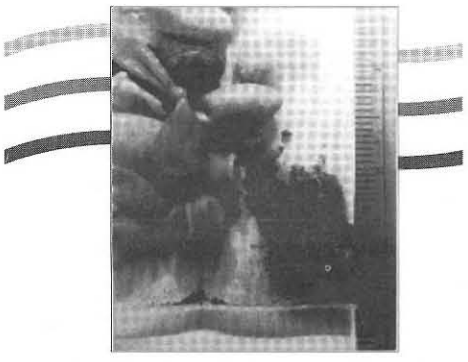
July 22-23, 1993

The July meeting of the CACLD will be held at the Pan Pacific Hotel in downtown San Diego. Some pending topics are: Creative means of dealing with budgetary cutbacks, Public Relations and Managing employees. A special room rate of $79 for single or double occupancy is available through the weekend. All reservations should be placed directly with the hotel and you should mention CACLD when calling at 800-626-3988. For further information, please contact Ron Barry at (619) 692-5631.

Canadian Society of Forensic Science

September 8-12, 1993

The 40th Anniversary and Annual Meeting of the CSFS will be held in Winnipeg, Manitoba, Canada. For further information, please contact: Ron Hrynchuk, c/o RCMP Forensic Laboratory, 621 Academy Road, Winnipeg, Manitoba, Canada R3N 0E7, (204) 983-6399.



On The Cover: *Bread & butter for the drug chemist...Toy balloons filled with heroin, approx 1% pure.*

Northeastern Association of Forensic Scientists

October 14-16, 1993

The 19th Annual Meeting of NEAFS will be held in Springfield, Massachusetts at the Springfield Marriott. The American Board of Criminalistics (ABC) General Knowledge Examination will be offered in conjunction with this meeting at 9:00am on October 14, 1993. For further information, please contact: Karolyn Leclaire, MA DSP Crime Laboratory, 1010 Commonwealth Avenue, Boston, MA 02215, (617) 566-4500 ext. 241.

Northwest Association

October 19-22, 1993

The Fall 1993 Meeting of the NWAFS will be held at the Owyhee Plaza Hotel in Boise, Idaho. For further information, please contact: Donna Shepherdson, Bureau of Forensic Services, 2220 Old Penitentiary Road, Boise, Idaho 83712, (208) 334-2231.

California Association of Criminalists

October 20-23, 1993

The 82nd Semi-Annual Meeting of the CAC will be held at the Bahia Resort Hotel on Mission Bay in San Diego, California. For further information, please contact: Randy Robinson or Marty Fink, San Diego Co Sheriff, 3520 Kurtz Street, San Diego, CA 92110, (619) 692-5630.

Canadian Society & Northwest Association of Forensic Scientists

October 31-November 5, 1994

The CSFS and NWAFS will hold a joint meeting at the Waterfront Hotel in Vancouver, British Columbia. Workshops and original presentations will run from October 31 through November 5, 1994. For further information, please contact: Jeffrey Caughlin, RCMP Forensic Laboratory, 5201 Heather Street, Vancouver, BC V5Z 3L7, (604) 264-3507.

The CACNews
Summer 1993

CONTENTS

American Board of Criminalistics

On February 17, 1993, 64 forensic scientists evidencing a pioneering spirit sat for the first offering of the American Board of Criminalistics Examination in General Criminalistics. The exam was given at the 45th Annual Meeting of the American Academy of Forensic Sciences in Boston. One laboratory in the Northeast was represented by 65% of the staff (11 of 17), including the director. The laboratory director used the examination as a training opportunity to broaden his staff's forensic expertise. He involved staff members in preparing others for the exam by having them give mini-lectures from readings in the study guide. By the time this letter is published additional sittings will have taken place. The second offering is planned for the Spring meeting of the Southern Association of Forensic Scientists in Savannah, Georgia. Approximately 50 forensic scientists are expected for this sitting. Plans are being made to offer the examination for forensic laboratory systems in the near future. The third offering will take place at the Northeastern Association of Forensic Scientists meeting during October.

The process of exam development has been ongoing for three years. As a first step the five regional associations lending support to the certification effort established peer groups in five specialty areas. The five regional associations are the California Association of Criminalists, the Mid-Atlantic Association of Forensic Scientists, the Midwestern Association of Forensic Scientists, the Northeastern Association of Forensic Scientists, and the Southern Association of Forensic Scientists. The AAFS Criminalistics Section joined the process in February 1992. The five specialty areas chosen initially were drugs, serology, hairs and fibers, paints and polymers, and fire debris. The first task of the peer groups was to develop job descriptions for each area. These job descriptions were compiled and then sent to each of the peer groups for rating. Those that received high ratings were then used as the basis for developing sub-categories known collectively as KSAs, an acronym derived from knowledge, skill, and abilities. The KSAs from each of the regions were also compiled and sent back to the regions for rating. Those receiving high ratings were retained as the basis for developing questions.

In addition to giving the general examination at several sites in 1993, the ABC Board, the Examination Committee, and Peer Group Chairs from the five active regional associations have been active in the specialty exam development process. This work is being supported in part by a grant from the National Institute of Justice. It is expected that the first offerings of specialty examinations will take place at the AAFS meeting in San Antonio in February of 1994. To this end the Educational Testing Service (ETS) conducted a training meeting dealing with test development and question writing in Forsyth, Georgia in March.

Anyone wanting more information should write to:

Gloria Napolitano, Registrar
American Board of Criminalistics
P.O. Box 209
Greenlawn, NY 11740-0209

Peter R. DeForest, Chair
ABC Examination Committee

Forensic Scientist Certification Depends on You

—Thanks for the Help

The American Board of Criminalistics thanks everyone who has helped to develop the Certification Program. Many of you have helped move the program forward. You are the source of ideas that will help the program evolve to meet the needs of the profession.

Recently the ABC issued Certificates of Appreciation to a number of persons who have made special contributions and I would like to let everyone know the effort they made and their impact.

It takes a special person to volunteer their time to work on a project like Certification. It requires a vision of what you want our profession to be like five, or ten years in the future. It requires a risk-taker. There are no short-term rewards, and little appreciation. These individuals have had to work on this project despite many frustrating circumstances. Communications are difficult over long distances. Volunteer deadlines are hard to meet. The persons listed were able to work through these problems demonstrating commitment and professionalism. The Board and I recognize the work they have done, and thank them for their contribution to Forensic Science.

I asked the Examinations Committee to identify individuals who had significantly contributed to the development of the General Knowledge and Specialty Examinations. The criteria I specified were that the individual must:

1) Display a professional approach to developing certification requirements and examination questions; understanding that adjustments are made in a program as it evolves and are flexible about the change; 2) provide substantial value to the KSA and examination development process; 3) consistently meet deadlines; and 4) exhibited expertise in her/his specialty area.

The persons listed below clearly exceeded these expectations.

Matthew Abbott - MAAFS
Forensic Biology
Edwina Ard - SAFS
Drug Identification
Susan Ballou - MAAFS
Forensic Biology
Tina Banks - MAFS
(Computer Support)
Peter Barnett - CAC
Hair/Fibers
Dan Bergman - MAFS
Forensic Biology
Lisa Black - MAFS
Forensic Biology
Cheryl Cherry - MAFS
Paints & Polymers
Barbara Crim-Swanson-MAFS
Biochemistry Subgroup
Larry Flynn - SAFS
Drug Identification
Daniel Gregonis - CAC
Forensic Biology
George Herrin - SAFS
Molecular Biology Subgroup
Ira Jeffcoat - SAFS
Molecular Biology Subgroup
Jeff Kercheval - MAAFS
Drug Identification
Jan Lacey - MAFS
Forensic Biology
Ron Linhart - CAC
Forensic Biology
Albert Lyter - MAAFS
Paints & Polymers
Jeani Murphy - MAFS
(Computer Support)
Jim O'Conner - MAFS
Drug Identification
Annette Peer - CAC
Forensic Biology
Larry Peterson - SAFS
Hair/Fibers
Nick Petraco - NEAFS
Hair/Fibers
Connie Pickens - SAFS
Biochemistry Subgroup
Laurie Rawlinson - CAC
Forensic Biology
Ed Rhodes - CAC
Fire Debris
Reena Roy - MAFS
Forensic Biology
Scott Ryland - SAFS
Paints and Polymers
Lisa Schiermeier - MAAFS
Forensic Biology
Elaine Scott - SAFS
Biochemistry Subgroup
Gary Sims - CAC
Forensic Biology
Nancy Skraba - SAFS
Biochemistry Subgroup
Carl Sobieralski - MAFS
Forensic Biology
Robert Spalding - MAAFS
Forensic Biology
Theresa Spear - CAC
Forensic Biology
David Stockwell - CAC
Forensic Biology
Harvey Van Hoven - NEAFS
Fire Debris
Barbara Wheeler - SAFS
Hair/Fibers
Pat Wojtkiewicz - SAFS
Hair/Fibers
Amy Wong - MAAFS
Forensic Biology

Without their willingness to share their expertise, to volunteer time, and to meet difficult deadlines, the ABC would have made little progress. Their efforts have demonstrated our profession's commitment to growth, to learning and to excellence. Their input enabled us to complete the General Knowledge Examination and offer it at the Boston AAFS Meeting this February. They have made significant strides developing questions for the Specialty Examinations. Their effort helped persuade the National Institute of Justice to fund a grant for the completion of the Specialty Examinations. With the help of the Educational Testing Service the examinations will be offered in February, 1994.

I hope they will continue to stay involved in the Certification effort and our profession's evolution. I want to encourage others to participate in Certification's development. I, and all ABC Board of Directors, and Examinations Committee Members are willing to listen to your concerns and to consider your ideas. Please write to our office at P.O. Box 209, Greenlawn, NY 11740-0209, or call one of us to discuss your ideas or become involved in the process.

Richard E. Tontarski, Jr.
President, ABC

Exam Schedule

American Board of Criminalistics (General Knowledge)

The American Board of Criminalistics (ABC) is pleased to announce the offering of the Forensic General Knowledge Examination (GKE) leading to Diplomate status and a Certificate of Professional Competency in Criminalistics at the following regional meetings:

Midwestern Association of Forensic Scientists (MAFS) in Madison, Wisconsin on October 12, 1993 (afternoon). Contact: Mike Haas (715) 845-8626

Northeastern Association of Forensic Scientists (NEAFS) in Springfield, Massachusetts on October 14, 1993 (9:00 a.m. - 12:00 p.m.). Contact: Marie Samples (212) 447-2618

The ABC Forensic General Knowledge Examination is tentatively scheduled to be offered at the following meetings if a sufficient number of applicants apply to take the examination at each site:

- **Southwestern Association of Forensic Scientists (SWAFS)** in Flagstaff, Arizona: October, 1993. (subject to SWAFS Board of Directors and membership approval). Contact: Ronald Singer (817) 923-4999
- **American Academy of Forensic Sciences (AAFS)** in San Antonio, Texas: February, 1994. Contact: Carlos Rabren (205) 887-7001
- **Mid-Atlantic Association of Forensic Scientists (MAAFS)** in Virginia Beach, Virginia: May 1994. Contact: Isabel Conley (410) 641-2961
- **California Association of Criminalists (CAC)** in Oakland, California: May, 1994. Contact Steve Renteria (213) 226-4978

An application packet to apply to take the GKE may be requested by writing to: ABC, P.O. Box 209, Greenlawn, NY 11740-0209 (FAX: 516-261-2120). All potential applicants should be aware that a completed application must be received by ABC at least 90 days prior to the date of the exam. for which a candidate wishes to sit.

Its Role in Certification

The General Knowledge Exam

Following is a background on how the American Board of Criminalistics (ABC) General Knowledge Examination (GKE) fits into the certification process, how it was developed, and how it is graded.

Examination Philosophy

The General Knowledge Examination (GKE) is the first segment of a comprehensive certification program leading to "Fellow" (for examiners specializing in drug identification, forensic biology (including DNA), fire debris analysis, or trce evidence) or "Diplomate" (for those not seeking Fellow, i.e. supervisors not working in a specialty, or where Specialty Exams are not planned immediately, i.e. explosives, soil, GSR, etc.).

The ABC Board's goal for the examination was to develop a process that answers the question, "Does this person have sufficient knowledge to be able to competently perform the work typically encountered by forensic scientists?" With the assistance of professional testing agencies, every effort was made to develop an examination to answer that question.

The Board of Directors is following a certification approach used by many other professions that is based on four (4) concepts. 1) No single examination is a total measure of an individual's ability to do the work. Exams measure knowledge and reasoning.; 2) A general understanding of a field is needed before specializing.; 3) Knowledge measured on an examination only reflects the understanding at that point in time. Continuing professional education is needed.; and 4) Practical exercises (proficiency tests) help measure one's ability to apply the knowledge. The legal, medical and accounting professions all follow a similar exam and education approach.

The ABC process leading to "Fellow" has all of these components–a measure of general knowledge, a specialty exam, a proficiency requirement, and a continuing education component. The process leading to "Diplomate" calls for successful completion of the GKE and continuing education. Both awards have a work experience and a Bachelor degree (in a natural science) prerequisite.

There is an increasing trend toward specialization in forensic science. ABC's design supports that trend with the philosophy that forensic scientists first should have an adequate understanding of all aspects of forensic science. This broader information base provides a solid foundation for examiners to develop specialized knowledge and skills. This is analogous to the approach taken with all science (i.e. BS before PhD or physician before surgeon). This extensive cognitive base facilitates thorough evidence analysis because the examiner is aware of what other tests might be done, and their limitations or requirements. Using this broader knowledge, forensic scientists are better able to maximize evidentiary value and to avoid compromising/contaminating samples.

The ABC believes that completing each phase of the certification process should be an achievement. Examinations should not be a "rubber stamp." Tests that anyone can pass are a disservice to the forensic profession and the clients and communities we serve. We look forward to sharing and to celebrating your accomplishments as you seek and attain certification.

Examination History

The GKE is a modification of the examination the California Association of Criminalists (CAC) began offering in May 1989. In 1991, the ABC purchased the rights to the examination questions and began creating a test to fit nationwide needs.

California-specific questions (i.e. laws, CAC Code of Conduct, etc.) were removed. The exam was evaluated by the Educational Testing Service (ETS), arguably the premier test development organization in the United States. Some questions were added and others were modified to fit their standards.

To date, about 200 persons have successfully completed the exam. Their years of experience have ranged from just over 2 years to almost 20 years. Approximately 86% of the persons sitting for the ABC examination have successfully completed the test. The percentage of passing grades for the CAC test was about 80%.

Examination Development

The process used to design the exam was recommended by experienced test development companies and has been followed in the design of numerous professional examinations. It is an inclusive approach that gives members of the forensic community the opportunity for direct involvement and on-going representation. The process has three (3) major steps –develop a position description; describe knowledge, skills and abilities (KSA's) required for the position; and draft questions to measure the knowledge identified. The California Association of Criminalists began this approach with the GKE and it was continued by the ABC. The ABC accomplishes these steps through a regional system of Peer Groups consisting of forensic examiners. The process is continuing as we develop the Specialty Examinations.

Regional Peer Groups identify appropriate KSA's using surveys, and other mechanisms, to get additional examiner input. The Peer Groups then develop questions which measure the knowledge identified.

The Peer Chairs take the Group's output and, with a member of the Examinations Committee designated by region of the country and forensic specialty, finalize the KSA's and examination questions. Each question must have an authoritative reference associated with it, designating where the correct answer can be found. This reference list becomes the basis for the Study Guide and suggested reading list. Final questions are critiqued by the test development company.

The examination is piloted to evaluate how well the test and individual questions perform, and questions are modified as needed. This refinement is an evolutionary process and will continue as the exam is administered. Additional questions are added and poorly performing questions are eliminated (both from the grading and future examinations). Not all questions included in the exam are used for scoring. Some questions are being evaluated for use in future exams, as part of the exam validation and development process.

Exam Content and Grading

The GKE consists of about 200 questions. All questions are drawn from the Study Guide references, including a few questions from current journal articles, and the ABC Code of Professional Conduct. All answers are discernable from the readings. Candidates must understand the general concepts sufficiently to be able to reason through questions and to apply the knowledge. Good preparation is needed to successfully complete the examination. Experience in more than one discipline is helpful, but certainly not essential to pass the examination.

The exam is currently graded by the Educational Testing Service (ETS). They provide a breakdown of question performance, as well as other indicators of test reliability. The passing score is about 80%.

For an examination application package, please write to: Registrar, American Board of Criminalistics, P.O. Box 209, Greenlawn, NY 11740-0209.

ABC Board
April 14, 1993

ABSTRACTS

Mid-Atlantic Assoc. of Forensic Scientists

1992 Meeting

QUESTIONED DOCUMENTS SECTION

ANALYSIS OF BALL POINT PEN INKS BY DIFFUSE REFLECTANCE-INFRARED SPECTROMETRY

Rena A. Merrill and Edward G. Bartick, FBI Academy, Forensic Science Research and Training Center, Quantico, VA 22135

The primary method for the analysis of inks is think layer chromatography (TLC) which only permits comparison of dye components. Studies have been done on the utility of diffuse reflectance (DR) with Fourier transform infrared (FT-IR) spectrometry using a direct deposit sampling technique for the analysis of ball point pen inks. Use of this technique allows for the screening of a composite ink as a whole including dye components, resins, and other additives. A total of 184 ink samples were analyzed by this technique, and searchable spectral libraries were created of both whole and extracted inks. Results indicate the additional information provided by the DR analysis combined with the complimentary information from the TLC analysis provides enhanced value to the forensic examination of inks.

IDENTIFICATION OF INDENTED TYPEWRITTEN ENTRIES WITH CHARACTERS PRESENT ON A LIFT-OFF CORRECTION RIBBON

Steven M. Grantham, FBI Laboratory, Washington, DC 20535

During the course of a bank fraud investigation, a Smith-Corona printwheel typewriter and a Brother dot matrix thermal printer were seized. Unfortunately, the suspect had removed the carbon film ribbons from both machines, but he neglected to remove the lift-off correction ribbon from the printwheel typewriter. The class characteristics of the questioned and known typewriting were consistent, and spectral images were observed on the platen of the printwheel machine which corresponded to portions of the text on the questioned checks. This interesting, yet circumstantial evidence was overshadowed by the discovery of indentations beneath the typewritten text on certain areas of the checks. Comparison of the paper fibers in the area of the indentations with the posterior surfaces of characters plucked from the paper and preserved on the correction ribbon formed the basis for an identification.

A SIMULATION OF A CRIME VERIFIES IMPRESSION BELONGS TO FOOTWEAR

Robert B. Hallett, Virginia Division of Forensic Science, 9797 Braddock Road #200, Fairfax, VA 22032

An impression found on the inside panel of a automobile trunk lid belonging to a suspect was found to correspond with a victim's right Tretorn shoe in both design and size. A practical reenactment of the crime aided in determining and verifying this correspondence. The impression was not located until two years after the murder had occurred and was compared to the victim's footwear ten years after the crime due to oversight.

EYESIGHT AND VISUAL DYSFUNCTION

Jeanette E. Bunch and Kirsten S. Jackson, Virginia Division of Forensic Science

There is little information currently available on vision and how it effects handwriting. An overview of the eye, visual problems, and the relationship to handwriting will be discussed. Actual case studies are detailed.

THE PRETENDER

David P. Grimes, Virginia Division of Forensic Science, 9797 Braddock Road #200, Fairfax, VA 22032

Raymond Norris LeCraw, age 43, owner/operator of Immediate Care Family Medical Centers, located in McLean, Virginia and Crystal Park Arcade, Arlington, Virginia, was arrested by the Arlington Police on charges of prescription fraud and practicing medicine without a license. He provided a variety of medical services for patients, including general physical and gynecological examinations, minor surgery, and writing prescriptions forging names of qualified and licensed physicians who were employed by him. LeCraw furnished 6 1/2 hours of disguised writing and upon an order to appear before a judge to force him to furnish his normal writing he entered a plea of guilty to two felony counts of prescription fraud and six misdemeanor charges of practicing medicine without a license. He is to be sentenced on March 6, 1992.

FRAUD AT THE CARD SHOW

Thomas E. Dewan, FBI Laboratory, Washington, DC 20535

With the arrival of the sports memorabilia collectors phenomenon has come the business of autographs for pay. No longer can the Little Leaguer innocently expect his patience waiting in line at an old-timers game to be cheaply rewarded by an autograph of an ex-major leaguer scrawled across his program. That signature will probably cost him at least as much as the price of admission to the event, more if written on a card or photograph. The Internal Revenue Service will attest that autographing has become a big and lucrative business, and with it has come the inevitable: deception and fraud. This paper takes a look at a major federal fraud investigation involving the literal wholesale forgery of autographs of Ted Williams, Joe DiMaggio, Mickey Mantle and others that has resulted in enormous financial losses to unwary fans and other purchasers.

continued on Page 14

Northern

On March 4, 1993, Kristina Benson of SERI hosted a dinner meeting at Spenger's Restaurant in Berkeley. The evening's guest speaker was Alexander Jason. His topic was "Forensic Animation for Criminal and Civil Trials". He discussed the various aspects of using computer animation for crime reconstruction. Over 50 attendees viewed the animation he developed for the Mitchell trial in Marin County.

On April 22, 1993, Susan Swarner and Nivan Gill of the Contra Costa County Criminalistics Lab. hosted a dinner meeting at The Greenery Restaurant in Walnut Creek. The evening's guest speaker was Ray Wisneiwski of the Contra Costa Sheriff's Dept. His topic was "Evidence Associated with Occult Crimes". He discussed the various items one may encounter at occult scenes. He also discussed the beliefs and practices of the occult followers. A very useful booklet was given to the attendees. Twelve CAC members and two Sacramento State students attended .

SEROLOGY STUDY GROUP

Chairs: Pam Sartori, Oakland PD; Nancy Marte, Santa Clara Co.

The Serology Study Group met on March 4, 1993 at the DOJ-DNA Lab. in Berkeley prior to the dinner meeting. Nicola Fildes and Sean Walsh gave presentations on the Polymarker Kit, TWGDAM Validation and a new product kit that quantitates human DNA using a chemiluminescent method. The Quantitation Method Kit will be available sometime this summer.

The Serology Study Group met on April 22 at the Oakland PD prior to the dinner meeting. Terry Spear, Senior Criminalist from the Santa Clara Co Crime Lab, gave a lecture on saliva as part of the "Back-to-Basics" series in serology. Topics included components of saliva, how to identify saliva, preparation of standards and samples, and how to characterize saliva. Nancy Marte gave a short presentation on the Amylase Diffusion test and the Pantrak Amylase test. This lecture was video taped for the Training and Resources Library.

FIREARMS STUDY GROUP

Chair: Lansing Lee, Oakland PD

The Firearms Study Group met on March 13, at the George Gordon Center in Martinez. Ray Wisniewski, Contra Costa Sheriff's, discussed the various alterations that might be done to S&W revolvers by "gunsmiths" to "improve" trigger action. Ed Peterson, Santa Clara Co, discussed the role he played in authenticating a S&W .33 American revolver as having been used at Custer's battle at the Little Big Horn. A short video tape about "Bulletproof", an automated bullet comparison instrument, was shown.

Southern

On February 25th, Carol Hunter of Cal. Lab. hosted a dinner for 47 at Angelo's and Vinci's in Fullerton. Bernard Bergman, of Mediamation in Studio City, spoke on crime scene reconstruction using video animation.

On April 22nd, John Simms of the San Diego PD, hosted a dinner meeting/ study group meeting for 42 at the Raintree Bar and Grill in Carlsbad. Deputy DA George Woody Clark discussed the David Lucas serial killer case (longest Kelly-Frye hearing in California).

SEROLOGY STUDY GROUP

Chairs: David Hong, LA Co Sheriff; Don Jones, San Bernardino Co.SO

The Serology Study Group met on February 25th at the Orange Co. Crime Lab prior to the dinner meeting. In the "Back-to-Basics" serology series, Jeff Thompson, Huntington Beach PD, gave a presentation on ABO (H). The AAFS seminar papers were reviewed.

The Serology Study Group met on April 22nd at the Raintree Bar and Grill in Carlsbad in conjunction with the dinner meeting. The guest speaker was Deputy DA George Woody Clark, who reviewed the Kelly-Frye hearing from the David Lucas serial killer case. After the meeting, DNA samples were exchanged.

TRACE STUDY GROUP

Chairs: Lynne Herold, LA Co Sheriff; Jeff Thompson, Huntington Beach PD and Wayne Moorehead, OCSD

DRUG STUDY GROUP

Chairs: Elizabeth Thompson, John Davis, Orange Co Sheriff-Coroner

A combined meeting of the Trace Study Group and Drug Study Group met on February 25, 1933 at the Orange County Crime Lab prior to the dinner meeting. A "Back-to-Basics" FTIR workshop was presented by Wayne Moorehead, OCSD, and Tom Abercrombie, DOJ-Riverside.

BLOODALCOHOL

Chair: Dan Nathan, LA Co Sheriff

The Blood Alcohol Study Group met on April 22nd. at the Raintree Bar and Grill in Carlsbad in conjunction with the dinner meeting. Topics of discussion included: steeple effect on measured alcohol levels, topics for future meetings, plans for a blood alcohol study group meeting to be held in conjunction with the CAC Fall 1993 meeting, turbochrome questions and answers.

NEW STUDY GROUP - DNA

A DNA Study Group was formed. The first meeting was held on April 8, 1993, at the San Bernardino SO Lab. Erin Riley, LAPD and Rob Keister, OCSD, volunteered to be the DNA Study group co-chairs. Topics of discussion: Review of papers from the 2nd. International Symposium on the Forensic Aspects of DNA Analysis (FBI, March 29-April 2, 1993), discussion of future topics/committees, coordination of sample exchanges for training/validation.

INSIDE Information

New Kids on the Block

Los Angeles Police Department:
Collin and Jenny Yamauchi–Sabrine Sachine on May 8, 1993; Los Angeles Sheriff's Department: (winner of this quarter's baby boom award!) Heidi and Dennis Robbins–Kristin Ingrid on December 3, 1992, Christina and Leo Gonzales–Erica Danielle & Jennifer Christina & Anthony Joseph on January 13, 1993, Phil and Betty Teramoto–Darren Osamir, Elizabeth and Michael Devine–Austin Michael on May 7, 1993; Riverside DOJ: Phil and Laura Pelzel–Lindsay on December 8, 1992; Orange County Sheriff/Coroner: Laurie and Bill Crutchfield–Kelci Anne on June 2, 1993

MARRIAGES

Ventura County Sheriff's Department: John Houde and Donna Hingley–Honeymooned in Ireland and Paris

PROMOTIONS

San Diego County Sheriff's Department: Ronald Barry–from Supervising Criminalist to Crime Lab Manager, Randy Robinson–from Criminalist III to Supervising Criminalist, Marty Fink–from Criminalist II to Criminalist III

TRANSFERS

Dwight Reed–from Orange County Sheriff/Coroner to San Diego Coroners Office as Chief Toxicologist; Kathryn Marks–from San Bernardino Sheriff's Department to Norfolk Virginia as a Forensic Chemist.; Bill Matty–from Riverside DOJ to San Bernardino SO Crime Lab

RETIREMENTS

Mary Graves has retired from the Orange County Sheriff's/Corner's Office after 22+ years. Concluding her career as a Supervising Criminalist. However, as many dedicated people realize, it is hard to give up all that excitement cold turkey. She is continuing to work in the lab one day per week.

ACTIVITIES

Ventura County reported that their laboratory organized a ten mile bicycle trip. Quite a few people participated, no injuries were reported. It was also reported that their Bureau of Identification will be civilianized as of July 1.

With the failure of Measure U in San Bernardino County, all of the laboratory personnel are anxiously awaiting news of the state budget figures and are anticipating layoffs. While LAPD anxiously awaits the arrival of the first "new" mayor in twenty years. Who knows what the change will bring, Mr. Riordan has promised big things for law enforcement in LA, however, he is also in big proponent of privatization.

Several members of the San Bernardino Co. Crime Lab "rode the high" of the L.A. Kings venture into the Stanley Cup Finals. Representing their lab in cheering on the Kings at four of the games were Dawn Sorrenson and Cathy Wojcik.

The Riverside DOJ Crime lab is hosting a criminalist, Flor Sierra, from Bogata, Columbia. She will training in Serology at their laboratory for three months. This was done in cooperation with the ICITAP (International Criminal Investigative Training Assistance Program.)

In an attempt to make a comeback from their crushing defeats at the hands of the LAPD (and friends) softball team, the Orange County and Huntington Beach softball teams planned a clandestine "practice" game for June 5th. Unfortunately, it was rained out.

Year two of the Southern Region Criminalistics Softball Tournament will be here before you know it and the current champions, LAPD (and friends), are encouraging all laboratories to take part in this event. The winning team gets to house the coveted "BIG" trophy for the year of their victory, and to keep a smaller but more dignified trophy for their display case.

In the same "vein" (a serology joke) as the softball tournament, the Los Angeles County Crime Lab will accept any challenge for either 3 on 3 or 5 on 5 basketball. Contact Dave Hong to accept the challenge.

When News Happens...
Tell your Lab's "Insider",
or call Greg Matheson.

Training & Resources
(CAC Members Only)

SEROLOGY

Back to Basics Series:

TAPE 1: • Electrophoresis Basics — *Ron Linhart*
• Glycogenated Vaginal Epithelia —*Ed Jones*
• Erythrocyte Acid Phosphatase — *Berni Rickard*
• Phosphoglucomutase —*J. White / M. Hong*
• Haptoglobin — *David Hong*

TAPE 2: • Immunology — *David Stockwell*
TAPE 3: • Gm / Km —*Stockwell / Wraxall*
TAPE 4: • Peptidase A — *Colin Yamaguchi*
TAPE 5: • ABO —*Jeff Thompson*
TAPE 6: • Saliva —*Terry Spear* (incl DNA Kelly-Frye issue Howard Decision)

Also available:

Population Genetics & Statistics Course
Dr. Bruce Weir, Instructor
Eight two-hour tapes, PLUS the course notebook.
(from the three day course at SBSD)

Bloodspatter Lecture — Fall 1992 CAC Meeting
Gary Knowles, Instructor
2 Tapes

Microscopic Exam. of Sex Assault Evidence
Ed Jones, Instructor

DNA Workshop — Spring 1993 CAC Meeting
4 Tapes

GENERAL INTEREST

TAPE 1: • ABC News 9/23/91: "Lab Errors"
• CBS News 4/27/92: "Animation Reconstruction"
• Alex Jason / Jim Mitchell: "Trial Animation"
TAPE 2: • 48 Hours 9/25/91: "Clues"

TRACE EVIDENCE

Basic Microscopy Lecture
Ed Rhodes, Instructor, (Two tapes)

Tire Impressions as Evidence
Lawren Nause, RCMP, Instructor
Five two-hour tapes PLUS the course notebook
(from the three day course at SBSD)

Evaluation of Lamp Filament Evidence
Lowell Bradford, Instructor, (One tape)

Please address requests to:
Carol L. Hunter, T&R Chairperson
Cal Lab of Forensic Science
17842 Irvine Blvd. Suite 224, Tustin, CA 92680

ABSTRACTS
Southwest Association of Forensic Scientists
from the Spring 1992 meeting

Identification of Jimson weed: *Datura stramonium*
Gary Koverman, Colorado Bureau of Investigation

Although jimson weed is not controlled, instances of abuse followed by a request for laboratory examination are periodically brought to the attention of in any crime laboratories. A discussion of the morphology, history, toxicology, laboratory identification, and quantitation of the principal active ingredients, scopolamine and hyoscyamine, will be presented. Some of the problems associated with the control of jimson weed will be addressed.

Comparison of the Agreement in Alcohol Concentrations of Dual Breath Specimens with Specimen Durations
Max Courtney, Janet Benton, and Steven R. Kleypas, Forensic Consultant Services

Breath test operators manually recorded the number of asterisks indicated on the display of the Intoxilyzer Alcohol Analyzer Texas Model 5000 during actual subject breath tests in 552 cases. Analysis of the data shows significant correlation between the agreement in alcohol concentrations with the agreement in specimen durations (as indicated by the asterisks displayed).

Quantitation of Nicotinamide in Illicit Drug Samples by Direct Ultraviolet Spectroscopy
Brian Blickensderfer, Texas Department of Public Safety

A discussion of the reliability of a U.V. quantitation of nicotinamide in unextracted samples containing cocaine, amphetamine, or methamphetamine.

Gunshot Residue Testing of Blood Stained Garments
Ed Hueske, Arizona DPS Northern Regional Crime Lab

It has been reported in literature that Haemo-Sol solution maybe used to remove blood stains from garments bearing gunshot residue without altering these residues. It has been further reported that blood stained garments that have been subjected to gunshot residue testing without positive result may then be subjected to Haemo-Sol. This paper examines these findings.

The Reconstruction of a Double Homicide Near Ashfork, Arizona
Ed Hueske, Arizona DPS Northern Regional Crime Lab

In March of 1992 a man and his wife, owners of a truck stop near Ashfork, Arizona, were murdered by gun fire by one of their employees and a fake robbery was reported. This paper details the reconstruction of the crime using bullet trajectories and blood spatter.

Separating Testosterone and Epitestosterone GC/FTIR Analysis
Nick Dawson, Arkansas State Crime Lab

Testosterone and epitestosterone are epimers but have differing anabolic and androgenic properties, and while testosterone is a controlled substance, epitestosterone is not, so a reliable technique is necessary to be able to identify each substance. GC/MSD data show very similar mass spectra but GC/FTIR spectra are different enough to facilitate easy recognition.

An improved Method for Activated Charcoal Strip A/E
James Crippin, Colorado Bureau of Investigation

This paper will cover the various ways to use activated charcoal strips in accelerant absorption/elution techniques. The improved method that will be discussed involves the soldering of alligator clips to the underside of the can lid and hanging the strip from that.

Around the world in Flames: Flammable Liquid Filled Auto Compass Globes
James Crippin, Colorado Bureau of Investigation

This paper will cover the discovery of flammable liquids in common auto globe compasses. The analysis and identification of the flammable liquids along with the steps taken to correct this problem will be discussed.

Lead Free? or Clean Fire?
Gary M. Lawrence, Arkansas State Crime Laboratory

A look at the newly developed organic based primer mixture being used by some ammunition manufacturers. An examination into the residues left by this ammunition on target clothing and hand swabs, and the potential problems today's analyst faces.

Factors Affecting Pyrolysis GC Reproducibility
Manual Valadez, Jr., Texas Department of Public Safety

Various factors that affect the reproducibility of polymer pyrolysis will be discussed, with special emphasis on paint samples.

Pyrolysis GC Determination of Paint Sampler.
Manuel Valadez, Jr., Texas Department of Public Safety

GC conditions were optimized and the reproducibility of pyrolysis GC was determined. Paint class determination will be discussed. Results of attempts to differentiate the same type of paint produced by different manufacturers will be presented, along with FTIR comparison of the some paint samples.

Med Voice
Herb Graham, General Computing Systems, Inc.

Speech recognition and voice annotation allow a user to speak to the

computer and display a requested image or form. The user can then attach a voice message to a field(s) on the form.

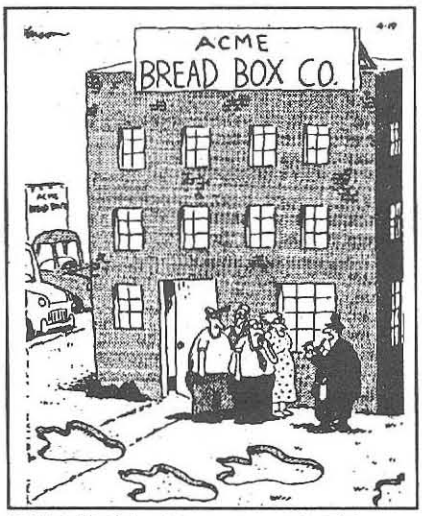
Forensic Validation Studies on the APOB Amplified Fragment Length Polymorphism

Joey Verret, Analytical Genetic Testing Center, Inc.

The PCR amplification of the 31 hypervariable region of the Apolipoprotein B (APOB) locus produces a series of VNTR alleles referred to as an Amplified Fragment Length Polymorphism (AFLP) (Boerwinkle et al., 1989). A total Of 682 individuals from four populations (white, Black, Mexican and Amerindians) were tested for APOB, identifying 26 alleles and yielding DP,s of 91.0%, 97.4%, 90.8% and 87.5%, respectively. All four populations were in Hardy-Weinberg equilibrium.

Testing of non-probative or adjudicated evidence indicated that APOB types could be determined from all victim knowns. If results were obtained from the epithelial call fraction, it matched the reported victim. In two simulated sexual assault cases the appropriate types for male and female donors were obtained.

Testing of non-human DNA indicates that non-human does not pose a significant threat as a complicating factor in the amplification of forensic evidence.



"OK, OK! Calm down, everyone!...This monster— would you say he was bigger or smaller than your building?...You can talk it over."

Review

Criminalist / Author Ken Goddard's "Digger"

Forensic scientists are usually not known as authors of gripping thriller stories and they are rarely the subject of an article in Smithsonian magazine either. However, this time we have an exception.

Sometime since the last issue of this newsletter I read a copy of my competition from the NWAFS. The North Western newsletter is edited by Roger Ely (who happens to be a DEA chemist too) and he had an article about Kenneth Goddard who is the Director of the US Fish & Wildlife Service Forensics Laboratory in Ashland, Oregon. He is also an author. Roger's article was sufficiently intriguing to make me go to the bookstore and buy the latest novel by Goddard.

The March 1992 issue of Smithsonian has a good story on the USFWS laboratory and Ken Goddard. In it there is a quote I like: "When he arrived in Washington, D.C., Goddard discovered that the USFWS had not yet asked Congress for funds to pay for the Forensics lab. For eight long years, the joke at headquarters was, 'Ken Goddard's briefcase was the forensics lab.' He vented his frustration by writing Balefire and The Alchemist, a pair of crime thrillers notable not only for their vivid scientific methodology but also for an alarmingly high body count among law-enforcement officers."

Amen, AMEN!

Kenneth Goddard has a new novel out called Digger which is the only one of the three available at my favorite bookstore. So I bought this book and started reading it. I was quite surprised to find that the events in this book supposedly occurred in Fairfax County; the county I live in. In fact, as I continued to read the book the action moved to the very street I live on! Now that got my attention. That really got my attention!

After I finished the third novel I tried to get the first two; they are not currently sold as new books (but may be available in used book stores.) Thanks to Mary Koles, I was able to borrow and read the first two novels.

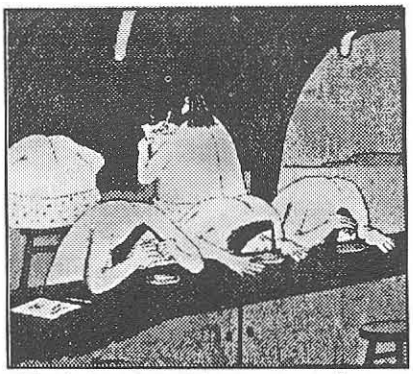
I recommend his novels if you would like to read some good stories that are part modern thriller, part police, part spy, part terrorist; and part forensic science too. The three novels are:

Balefire (1983, ISBN 0-553-24029-3) published in both hardcover and paperback by Bantam Books Inc. of New York, NY;

The Alchemist (1985 ISBN 0-553-25598-3) published in both hardcover and paperback again by Bantam Books;

Digger (1991 ISBN 0-553-28982-9) apparently only published in paperback by Bantam Falcon Books of New York, NY.

Dr. Edward Sykes Franzosa
MAAFS Newsletter Editor



Early trace evidence examiners.

First Person

Beyond a Reasonable DOUBT

If you're at all involved in law enforcement then you know how unlikely it is that you would ever serve on a jury, let alone a criminal one. In his own words, Ventura Sheriff's Senior Criminalist Ed Jones tells what it was like to serve on just such a panel in Ventura a few years back . . .

The large assembly room was packed. Even though it had been a particularly busy time for me at work, I had always wanted to serve on a jury, and when the call came I was ready. Several years earlier I had almost gotten to sit on a jury in Orange County, but was never chosen. Myself and a group of others were given a brief orientation and then sent upstairs to a courtroom. It was a civil trial involving a dispute over cement. It was going to involve a lot of expert testimony, but was expected to take up to two months to try. This was no for me, nor was it for about ninety-five percent of the others in the panel who asked to be excused due to the anticipated length of the trial. As soon as I got back to the jury assembly room it was onward to another panel, and another courtroom. This time it was a burglary trial. The time estimate was a much more reasonable two to three days. The judge began his well worn introductory remarks by asking if we knew any of the three attorneys in the case; one prosecutor and two defense. I knew them all. "Could you still be impartial and fair?", the judge intoned. I replied that I could. In fact, I was the only one of fifty or so prospective jurors who spoke up at all during this phase.

Next came the reciting of the list of witnesses. "Yes", I knew the Bureau of Identification deputy . . . and "yes" I knew the toxicologist . . . so far I was six-for-six if you counted the judge, whom I'd testified in front of only two weeks previous. Any second now I expected to be removed or excused by the attorneys. It never happened.

Now it was time to answer voir dire from each attorney. Several of the prospective jurors were excluded and quickly replaced by other candidates. "Name?, occupation? . . . Marital status? . . . Any friends or relatives in law

"He must be innocent because his fingerprints

enforcement? . . . Have you ever been the victim of a crime?"

Finally, my name was called and I went through the process. It seemed much easier than testifying. I was relaxed. All three attorneys had their time at bat, and still I was not excused. Several more people were thanked and asked to leave the jury box as the process of replacement continued. "I'll be gone next", I whispered to a fellow sitting next to me. Wrong. All three attorneys were just informing the judge that the jury was acceptable as it was now constituted.

At the defense table sat two men each charged with section *459 P.C.*— burglary of a residence. One of them was also charged with being under the influence of a narcotic drug. The prosecutor's case looked air-tight. Four eyewitnesses had identified both suspects. The men had been taken into custody within ten minutes of the crime. A fingerprint of one defendants had been found inside the house, and if that wasn't enough, both men had confessed.

Photo by Tom Culbertson

The attorney for the man charged with the drug offense did not put up a credible defense, but the job by the other attorney was nothing short of masterful. He was able to bring out the fact that each of the witnesses had seen only the profile of his client, and never the full face. The witnesses had also lost sight of the suspects for a couple of minutes while they had been chasing them.

Of course the confessions were contested and a reasonable doubt introduced as to the meaning of the confession. The second suspect, while refusing to give a urine sample was quoted as saying, "You got me on the burglary." The defense attorney pointed out that the suspect had been advised that he was under arrest for burglary by the sheriff's deputy before this statement was uttered. He argued that this "confession" was just a statement of fact by the defendant, that he acknowledged his arrest.

In summing up his arguments, the able barrister painted a picture of a poor transient sleeping in a building and being awakened by the burglary victim wielding a shotgun, then being arrested by sheriff's deputies. The story was told with passion, and seemed quite believable.

The expert testimony on fingerprints and toxicology was uncontested and uneventful.

In the jury room, there was some confusion brought about by testimony by one witness that he had asked a bystander where the fleeing suspect had gone. The witness' testimony had been stricken on the grounds that the bystander's answer was hearsay. This argument had successfully broken the continuation of the chain of events leading up to the capture of the suspects at the point of one victim's shotgun. The burglary victim had never been asked if the man was out of breath or sweating.

We voted on the first defendant's guilt and convicted him of burglary and being under the influence of a narcotic drug. The fingerprint and toxicology evidence made this decision easy for everyone on the jury. Since it was close to lunch, we decided to try a quick poll on the second suspect, to see what we were looking at for the afternoon. "Not guilty", the foreman started off with the first vote. When it was my turn, I voted guilty. The voting stopped right there and we adjourned for lunch.

That afternoon we deliberated for four hours before reaching a decision. "He must be innocent because his fingerprints were not found inside the house . . .", one woman insisted. Now, I've processed several hundred burglarized homes for fingerprints, and it's not unusual to fail to find any prints. I took the opportunity to point this out to the group. "He looks like my husband . . .", another juror commented. She proved to be our last holdout. The voting proceeded from 9-3 guilty, to 10-2, then 11-1 and finally 12-0 guilty.

I must mention a few things that would have made our decision easier. Linking the second suspect with a car which had been left behind at the scene of the crime would have clinched it for me. It would also have been nice to know that socks had been used to avoid leaving fingerprints, as we found out later. But probably the most informative information of all would have been the physical condition of the second man as he was captured. Was he sweating and all out of breath? Or did he appear as a poor transient, just awakened from a peaceful nap?

—Ed Jones

were not found inside the house . . ."

GENERAL SCIENTIFIC SESSION

EVALUATION OF VARIOUS ADHESIVES FOR COLLECTION OF GUNSHOT RESIDUE (GSR) FOR SEM/EDS ANALYSIS

Douglas DeGaetano, Virginia Division of Forensic Science and Max M. Houck, Link Analytical, Inc.

Four types of adhesives were evaluated for their suitability in GSR collection and analysis by scanning electron microscopy/energy dispersive spectroscopy. Each tape was tested on its efficiency of collection, charging under an electron beam of varying voltage, whether is produced artifactual peaks in spectra and the suitability of the surface for imaging GSR particles. The statistical efficiency, as well as photomicrographs of the various types, are presented.

MODIFICATION AND ADAPTATION OF THE RANDOM PRIMER LABELING TECHNIQUE

Richard A. Guerrieri, Roche Biomedical Laboratories; David A. Pomposini, Susan B. Stanitski and Miriam S. Vanty, Virginia Division of Forensic Science, 401-A Colley Avenue, Norfolk, VA 23507

Random primer labeling of DNA probes with P-32 has become a routine method utilized by forensic laboratories for detecting the resulting allele fragments of restriction fragment length polymorphisms (RFLP). While this is an overall effective technique, laboratories performing large scale hybridizations on a regular basis can incur significant expenditures of time and resources. The objective of this study was to investigate improving the existing random primer reaction to accommodate the high volume demands of our laboratory. the results of this study reveals a simple, efficient, and cost effective technique of labeling DNA probes for routine use in the forensic laboratory.

STANOZOLOL AND PSILOCYBIN DERIVATIZATION FOR GC AND GC/MS

Charles E. Fishel, Jr., Virginia Division of Forensic Science

Recent advances in capillary column chromatography have lessened the need for chemical derivatization of solid dosage drugs due to the capillary's increased inertness, resolution, and sensitivity as compared to packed columns. However, derivatization should not be viewed as an outdated technique. Derivatization of two specific drugs-stanozolol and psilocybin-will be discussed which may be adapted easily into the chemist's scheme of analysis. Formation of TFA-TMS stanozolol yields a derivative with enhanced chromatographic response. Psilocybin may be silylated to form a derivative with sufficient thermal stability to endure high temperature gas chromatographic analysis.

A PRECISION STUDY ON THE FBI DNA IMAGE ANALYSIS SYSTEM

Barbara Llewellyn, Virginia Division of Forensic Science; Virginia Fristoe, Virginia Commonwealth University and Richard A. Guerrieri, Roche Biomedical Laboratories

Computer assisted image analysis systems have become a critical component in forensic DNA analysis for estimating allele fragment lengths. A precision study was conducted on the FBI Image Analysis System and results are presented.

DNA was isolated from six different sets of biologically related individuals (mother/child pairs), digested with the restriction endonuclease HAE III, separated electrophoretically, Southern Blotted and hybridized to probes at four genetic loci routinely utilized in forensic analyses (D187, D2S44, D4S139 and D10S28). All samples were analyzed repetitively over triplicate electrophoretic gels, permitting both intra-gel and inter-gel comparisons.

The maximum percent difference for intra-gel comparisons ranged from 0 - 4.17, with an average of 56.2% of the readings in the 0.0 - 0.5 range for the four probes. The maximum percent difference for inter-gel comparisons ranged from 0.0 - 5.12 with an average of 56.2% of the readings in the 0.0 - 1.0 range for the four probes.

Based on the findings that most of the percent differences for the intra-gel comparisons were confined to the 0.0 - 0.5 range and the percent differences for the inter-gel comparisons were confined to the 0.0 - 1.0 range, the FBI Image Analysis system can be considered a precision system for the autoradiogram analysis.

DRUGS REPORTED IN DRIVING UNDER THE INFLUENCE OF DRUGS: CASES SUBMITTED IN 1990 AND 1991

Randall Edwards, Virginia Division of Forensic Science

Legislation passed in 1988 allowed officers to obtain blood samples from those who are thought to be driving while impaired. These blood samples are then submitted to the Division of Forensic Science for alcohol and drug tests. Interesting trends can be seen in the drugs and drug/alcohol combinations that were found in cases reported in a two year period after the DUID law became operative.

A FUNNY THING HAPPENED ON THE WAY TO THE URINALYSIS

Carl M. Selavka, National Medical Services, 2300 Stratford Avenue, Willow Grove, PA 19090; Charles V. Watson and Andrea B. Weir, Tripler Army Medical Center

The knowing and willful ingestion of a controlled substance by a soldier is a violation of the Uniform Code of Military Justice. Given the severe penalty associated with this offense, military personnel who have positive urinalysis findings often claim drug exposure or ingestion scenarios which do not involve knowing and willful use of drugs.

The excuses relayed by lawyers and commanders to the laboratory for evaluation can range from fully supported, likely scenarios, to incredible collections of circumstances which, if true, would lead to the rewriting of

many toxicology and social science texts.

We have amassed sufficient consultation data in the past three fiscal years to develop categories, document trends, and in some cases accurately guess the literature source(s) used by the soldier before offering the excuse. This presentation will detail the common categories of stories by drug and provide case studies of some of the more unusual scenarios.

CASE STUDY: DNA ANALYSIS ON FORENSIC CASEWORK (SEXUAL ASSAULT)

David A. Pomposini, Virginia Division of Forensic Science

This sexual assault case involved three brothers. One claimed consent, one claimed he did not have sex with the victim and the other brother claimed he never had sex.

Evidence submitted to the laboratory for DNA analysis included blood samples from the victim and the three brothers, as well as stains from the victim's underpants, and an underpants stain from one of the brothers.

Conventional serological testing from the victim's underpants stain showed PGM subtype 2+1+1-, the victim was PGM type 2+1-, but all the three brothers were PGM subtype 1+.

Differential lysis was performed on the stains submitted. Discussion of these results to the polymorphic loci tested will be presented. In addition, the genetic profiles of the three brothers and their relationship to each other will also be discussed.

CASE STUDY: DNA ANALYSIS IN FORENSIC CASEWORK (RAPE AND HOMICIDE)

Miriam S. Vanty, Virginia Division of Forensic Science, 401-A Colley Ave., Norfolk, VA 23507

The victim was abducted from one city and raped then murdered in another city. The victim was found in the suspect's bedroom about 7 hours after she was abducted. Two suspects were arrested and charged with capital murder. Evidence submitted for DNA analysis included blood samples from the victim, the victim's husband, and the suspects, as well as vaginal swabs from the victim and additionally pubic area swabs and underpants from the suspects. The purpose of submitted the pubic area swabs and underpants from the suspects was to try to detect any of the victim's genetic material.

Differential lysis was performed on the vaginal swabs, pubic area swabs and underpants stains. The DNA profiles detected at the various polymorphic loci tested will be discussed.

CASE STUDY: DNA ANALYSIS ON FORENSIC CASEWORK (INMATE RAPE)

David A. Pomposini, Virginia Division of Forensic Science

This case involved a rape and sodomy of an inmate. Evidence submitted for DNA analysis included blood samples from the victim and suspect, as well as the victim's towel (victim used to wipe himself) and the victim's underpants.

Conventual serological tests revealed the presence of spermatozoa on these items; however, typing results revealed no foreign types.

Differential lysis was performed on the towel and underpants stains. DNA profiles obtained from both the sperm and non-sperm fractions and the polymorphic loci tested will be discussed.

CASE STUDY: DNA ANALYSIS ON FORENSIC CASEWORK (RAPE)

George Li, Virginia Division of Forensic Science

Blood samples from the victim, victim's boyfriend and suspect, along with contraceptive sponge (sperm positive) and vaginal swabs were submitted for DNA analysis.

Differential lysis of the contraceptive sponge and vaginal swabs revealed a ladder-like DNA pattern. This ladder-like DNA pattern was found only in the non-sperm fraction for all polymorphic probes tested. This consistent ladder-like DNA pattern will be discussed. The sperm fractions revealed DNA profiles consistent with a mixture of the boyfriend's DNA profile and another individual(s) DNA profile. The suspect was eliminated as a donor of this mixture pattern.

THE ANALYSIS OF LSD IN BLOOD BY NEGATIVE CHEMICAL IONIZATION GAS CHROMATOGRAPHY/MASS SPECTROMETRY

Lawrence A. Fuller, Chemistry Dept., State University of New York College at Oswego and Robert Steiner, Virginia Division of Forensic Science

The analysis of LSD by gas chromatography/mass spectrometry has become more routine by the introduction of the fused silica capillary column. However, the detection of such small amounts that would typically be found in the blood of an individual LSD user would be undetectable using conventional electron impact mass spectrometry.

This project involved the preparation of a LSD derivative using trifluoroacetylimidazole (TFAI) and then subjecting the derivative to analysis by negative chemical ionization mass spectrometry. the results of this investigation will be presented along with data from blood samples tentatively identified as containing LSD.

"JUNK SCIENCE" AND CERTIFICATION: WHERE IS THE EDUCATIONAL REQUIREMENT?

Charles r. Midkiff, Dept of Justice, Law and Society, The American University

Controversy over "Junk Science in the Courtroom" highlights "uncredible" forensic testimony by "experts" of dubious credentials. Although we can blame the courts' lack of meaningful guidelines for acceptance of scientific testimony or zealous attorneys attempting to win a case, forensic scientists' record of self-regulation is inadequate. Forensic organizations accept and retain individuals whose qualifications are principally payment of fees. These same organizations often lack will or ability to act against quacks and frauds who continue to ply their trade. Certification offers the opportunity to ensure the courts and the public that our testimony is not "junk science". Verifica-

continued on page 16

tion of claimed education must be an integral part of the certification process. To certify a forensic expert without proof that he/she legitimately meets both aspects of qualification, relevant education as well as applicable experience, may constitute a fraud on the justice system.

HUMPTY DUMPTY'S DAY IN COURT

Walter F. Rowe, Department of Forensic Sciences, The George Washington University, Washington, DC 20052

This paper will discuss current defense arguments against the application of the drug mixture rule in determining sentences in cases involving the possession and/or distribution of blotter acid. It will examine critically the testimony of a defense expert for one of the defendants in the case of United States of America v Glendon Forbes, Jeffrey Penkala and Christian Martensen (Northern District of California, CR 91-0087-VRW). This expert presented a bizarre, idiosyncratic definition of the term mixture, which the judge relied upon in handing down a significantly more lenient sentence than that requested by the prosecution. Transcripts of this expert's testimony are being circulated among defense attorneys and may be the basis for other challenges of prosection sentencing recommendations. This presentation will conclude by examining the broader implications of pseudoscientific testimony in courts of law.

FORENSIC APPLICATION OF CAPILLARY ELECTROPHORESIS

Bruce R. McCord, Kelly A. Hargadon and Janet M. Jung, FBI Academy, FSRTC, Quantico, VA 22135

Capillary electrophoresis is a recently developed analytical technique with a number of potential applications in forensic analysis. Capillary electrophoresis instrumentation operates by applying high voltage to a thin, 50 micron ID fused silica capillary filled with a conductive buffer solution. Separation occurs due to differences in charge to mass ratios as the solvated ions move under the influence of the electric field. The result is a high resolution separation. Applications of this new technique will be discussed as well as operational details. Particular attention will be focused on the areas of explosive, drug, and DNA analysis.

CRIME SCENE DOCUMENTATION USING THE ROLLEIMETRIC MR2 MULTIPLE PHOTOGRAPHIC SYSTEM

Douglas A. Goodin and William J. Stokes, FBI Laboratory, Washington, DC 20535

Any law enforcement officer involved in the processing of a crime scene may be required to create a sketch of that scene. Information that should appear in the sketch is often omitted due to various reasons, such as, the limited amount of time that can be invested in the processing of the scene. Invariably, the officer will fail to record some item on the sketch that later becomes an important issue during court proceedings.

By using the Rolleimetric MR2 Multi-Photo system, the officer can record a crime scene with minimal time invested while collecting and infinite amount of information about that scene. After the officer has collected the baseline data at the crime scene, this data can be processed in the laboratory rendering a precision drawing that accurately represents the crime scene.

THE EVIDENTIARY VALUE OF FINGERNAIL RIDGE PATTERNS AS A MEANS OF PERSONAL IDENTIFICATION

Ann D. Jones, Virginia Division of Forensic Science

Human fingernails and toenails bear longitudinal striations which are formed by the extrusion of the nail substance over irregularly distributed parallel ridges of the nail bed of fingers and toes. Because these striations are formed from the dermal papillae of the nail bed, not unlike the dermal papillae forming the minutiae of fingerprint patterns, it seems reasonable to conclude that the ridge pattern of each nail surface would be unique unto itself and to the person from which it originated. Although many researchers, including the author, have in the past conducted examinations of the fingernail striation patterns to support the theory, courts have been somewhat reluctant under the Frye test to accept such evidence as a means of personal identification. Current research demonstrating the uniqueness of the fingernail striation patterns as well as the first criminal case in Virginia involving the identification of the defendant will be presented.

A STUDY IN FACSIMILE COPIES

Adriana Gale Black, Virginia Commonwealth University, Richmond, VA

This comparative study presents the observations obtained from facsimile copies produced by Canon and Murata machines. Various types of questioned document evidence have been examined, including simulated and traced signatures, typewriting and rubber stamp impressions. The copies from these machines, as well as multi-generational copies, were compared.

DIGITAL IMAGE PROCESSING OF LATENT PRINTS

Charles M. Pruitt, Virginia Division of Forensic Science

Digital Image Processing is primarily used for latent print enhancement in the forensic science field, although applications exist for all forensic disciplines where human vision is the principle examination procedure.

The image processing system enables the latent print examiner to take latent prints of marginal quality or of no value for comparison and through image processing enhance the latent print to a degree of being of value for comparison and in many cases effect an identification.

Image processing technology has been accepted by the courts based on the fact that enhancing an image, not restoring it does not in any way alter the characteristics or their relationship to one another, as it is on the unique relationship of characteristics that the sci-

ence of fingerprints is based.

BAND SHIFTS IN FORENSIC DNA ANALYSIS

Harold A. Deadman, FBI Laboratory, Washington, DC 20535

A band shift exists when DNA profiles obtained from two samples from the same source contain DNA bands in visually different positions. DNA band position depends on DNA fragment mobility during agarose gel electrophoresis. DNA band position and DNA fragment size, which is determined from band position, are the key components in whether or not a match exists in a forensic DNA comparison. There are many factors that affect DNA fragment mobility in agarose gel electrophoresis and to accurately interpret DNA profile results, it is important that one is knowledgeable about these factors.

The FBI Laboratory has been involved in casework for approximately three years and has spent over two years developing and testing its RFLP procedures. Agarose gel electrophoresis in general and the system used by the FBI, in particular, has also been studied in many other laboratories. Two types of situations have been particularly useful in assessing the occurrence, cause and extent of band shifts which occur using FBI RFLP procedures. The FBI Laboratory has often received degraded blood samples and it is necessary to request an additional sample that is more suitable for comparison purposes. The comparison of the DNA profiles from these two known samples, where the quality of the DNA is considerably different, has demonstrated that DNA fragments from the poorer quality samples have greater mobility. This has also been seen repeatedly in casework situations where female fraction DNA is compared with victim DNA in sexual assault cases. Here again DNA fragments in the poorer quality sample will run faster. No counter example of this behavior has been seen by the FBI Laboratory.

Band shifts can also occur because of differences in the amount of DNA being compared. This type of shift, however, becomes important only when there are large differences in the quantities of DNA (and probably RNA) being compared and the smaller of the two samples contains several micrograms of nucleic acid (an amount much larger than that used in casework samples in the FBI Laboratory).

Because the presence of degradation and concentration differences can easily be identified, these two factors should not cause a problem for the experience forensic scientist. In most cases, extensive shifting due to either condition will result in inconclusive findings.

The above mentioned types of band shifts will be discussed in detail in this presentation. Other factors that affect DNA fragment mobility during agarose gel electrophoresis will also be discussed.

VARIOUS APPROACHES TO ANALYSIS OF DISPARATE CONCENTRATION LEVELS OF IONS USING CAPILLARY ION ANALYSIS

Waters Chromatography Division, Millipore Corporation

Capillary Ion Analysis (CIA) is a form of capillary electrophoresis in which the conditions are optimized for the rapid analysis of low molecular weight anions and cations. The extremely high efficiencies and unique selectivities inherent to this technique have solved a number of difficult separations that can be completed in under five minutes. Previous methods using ion chromatography generally required fifteen to thirty minutes and would require gradient elution for the simultaneous analysis of inorganic ions and organic ions.

Other advantages of the technique include: (1) only microliters of sample are required for multiple injections since each analysis injects nanoliters per run; (2) this technique is more matrix independent than HPLC or ion chromatographic methods plus dilution and filtration are typically the only steps required for sample preparation; (3) this technique is very amenable to samples containing different levels of anions and cations. Concentrations of up to 10,000 ppm of the major ionic component in the presence of sub-ppm impurities have been injected directly into the capillary without overloading the separation.

Detection of ions using CIA is comparable to that using ion chromatography and is accomplished through the use of indirect photometric detection. Applications pertinent to the Forensic Science community would include the analysis of: explosives, soil samples, gunpowder residues, foods, plastic additives, and water samples.

Cigarette Identification Project Needs Funds

The Cigarette Butt identification Aid has been issued for thirteen years. During this time between 386 and 55 copies were distributed annually.

The Cigarette Butt Identification Aid is very labor intensive. It must be updated annually. Cigarettes are dropped from the market, their construction altered and new ones introduced. In the past, this has amounted to about one third of the Cigarette Butt Identification Aid annually. Current owners of the 1992 Cigarette Butt identification Aid should realize that by 1995 it will be completely outdated and worthless.

In the past, this project was funded by the U.S. Forest Service, who developed funding problems. Recently, the State of Oregon attempted to sell it on the open market at a break even price. As the price went up, the sales went down. The 1992 Cigarette Butt Identification Aid covering 416 cigarettes did not sell enough to break even on the costs.

Because the price per Cigarette Identification Aid must be raised still higher to break even on costs with a dwindling base of buyers, there are no current plans for future editions.

Operating expenses last year were $6,500. If you are aware of any funding source for the Cigarette Butt Identification Aid, please contact me. My phone number is 503-945-7406.

Sincerely,

Bob Bourhill

Bob Bourhill
Oregon Department of Forestry
2600 State Street
Salem, OR 97310

Original Research

Microorganisms in Seized Cocaine Samples

Abstract:

Forty of 118 seized packages of cocaine hydrochloride, approx. one kilogram each, were sampled aseptically; cultures were prepared in spread or pour plates from concentrated solutions or on membranes after filtration of dilute solutions. Antimicrobial activity against selected known microbes was measured. Cocaine HCl inhibited gram positive and negative bacteria and a yeast; inhibition varied with cocaine HCl concentration. Relatively few organisms were recovered from cocaine HCl, indicating few microbes in the samples, killing of microbes by cocaine HCl solution, or both. Most isolates were species of *Bacillus* or *Staphylococcus epidermidis*. The results implicate cocaine as a source for infective agents, and suggest that the concentration of cocaine HCl influences microbial survival and selects for sporeformers.

Infection with environmental microbes usually considered as non-pathogens is reported with increasing frequency in cocaine abusers [*2, 3, 7, 9, 12, 15, 16*]. We sought to survey the microbial flora in cocaine samples as potential sources of infectious agents. A recent drug raid by police provided an opportunity to examine a large quantity of bulk cocaine for microbiological load. A search of the relevant literature revealed a paucity of information relative to the flora which could be considered to have come from the country of origin. Previous reports had been limited to the examination of street-dosage forms of cocaine and heroin [*6, 10, 11, 14*], the contamination of which might arguably have come from the end user of the drug or any of the myriad of intermediary handlers involved with its distribution [*8, 13*].

MATERIALS and METHODS

Cocaine. One-hundred eighteen packages of cocaine were originally seized, and one-hundred eight of the packages each contained approximately one kilogram (net wt.) of substance. Forty of these were selected arbitrarily and used for this study. Each package was wrapped in a similar manner: grey duct tape over several layers of plastic bags. Each package contained a solid block of off-white, flaky, dry compressed powder. There was no appreciable difference in color or texture from package to package. Each package was given an identifying number, and the net weight of its contents recorded. The mean weight was found to be 1131 grams, median 1133 grams, with a SD of 38.0.

Cocaine as the hydrochloride was presumptively identified in each package by its reaction with aqueous cobalt thiocyanate. Eleven packages were selected for confirmation of the presumptive test by means of a random number table. A composite sample was prepared by grinding approximately one gram from each in a mortar. Cocaine was identified by gas chromatography / mass spectrometry (GC/MS), and the hydrochloride form by infrared spectrophotometry. Quantitation was carried out by gas chromatography, and found to be 78% calculated as the hydrochloride. Organic contaminants included a significant amount of fatty acid methylesters. Trace element analysis was carried out using energy dispersive X-ray fluorescence (EDXRF). Elements identified included (in descending order of amount): Cl, Na, Fe, Zn, Cu, Au, Hg, Co, V, Pd, Ni, and Ca. The pH of a 50% w/v solution was determined to be 2.4.

Outside packaging. A sterile swab moistened with sterile water was used to swab a 2 cm square area of the outside package. The swab was then used to streak plates of eosin methylene blue, Saboraud-dextrose, Mueller-Hinton agars, and incubated at 22 and 30 degrees C.

Aseptic sampling. A three centimeter square area on the surface of each of the forty selected packages was prepared for sampling by cleaning with 70% ethanol. A number 3 brass cork-borer was passed through the packaging material to a depth of 3 to 5 centimeters and withdrawn. The resulting plug of material was extruded into a sterile tube. The layers of packaging were left behind in the borer and discarded. In one case the packaging plug was placed in thioglycollate broth and incubated. The borer was rinsed with methanol and flamed between each operation. The plug of cocaine ranged in weight from 0.5 to 0.8 grams. All subsequent examinations were made on the plug of cocaine.

Preliminary survey. A sample of 0.10 grams of cocaine from each of five packages was dissolved in 0.10 ml each of sterile phosphate-buffered saline (PBS). Then 0.02 ml of each of those solutions was spread in triplicate on four different agar media: sheep blood, Saboraud-dextrose, MacConkey and eosin-methylene blue. In addition, 0.02ml of each sample was transferred to a 10 ml tube of thioglycollate broth. Each culture was incubated at 22, 30, and 37 degrees Celsius.

Bacteriostatic assay. Pure cultures of *Escherichia coli*, *Pseudomonas aeruginosa*, *Streptococcus faecalis*, *Staphylococcus aureus*, *Saccharomyces cerevisiae*, and *Bacillus subtilis* were

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each spread as a lawn on six groups of Mueller-Hinton agar plates. (See Figure 1.) Serial dilutions of cocaine in sterile water were prepared to give a ratio of cocaine to water as: 1:1, 1:2, 1:4, 1:6, 1:8, and 1:10. A 0.010 ml aliquot of each dilution was applied to a corresponding area of the indicator plate. Following innoculation, the plates were incubated at 30 degrees C.

Collection by filtration. Samples from thirty-six packages ranging in weight from 0.10 to 0.60 grams (mean: 0.29, median: 0.29, SD: 0.11) were each dissolved quickly in 99 ml of sterile water and vacuum filtered through a 0.22 µm Millipore filter. Each filter membrane was then rinsed with an additional 25 ml of water and incubated on chocolate agar at 30 degrees C.

Broth inoculation. Samples from twenty packages each weighing 0.10 grams each were dissolved in 0.5 ml of PBS. Samples from fifteen other packages weighing 0.10 grams each were dissolved in 0.5 ml of tryptic-soy broth (TSB). These samples were each added to 10 ml tubes of thioglycollate broth and incubated at 30 degrees C.

RESULTS

Tentative identification of organisms recoverd from the cultures was carried out by classic microbiological methods. These included observing pigment production, fermentation of various sugars, oxidase and coagulase reactions, Gram stain reaction, colony morphology, and microscopic appearance.

The culture of the outside packaging recovered mixed flora including various fungal and bacterial species which were not further characterized. The preliminary survey samples all resulted in no growth, irrespective of the incubation temperature. Where cocaine was added directly to the culture media, no growth was observed. Where a small amount (0.050 grams) of cocaine was dissolved in 10 ml of water and then mixed with agar, *Bacillus sp.*, *Staphylococcus sp.*, and an unidentified fungi was recovered. It was felt that the fungus was due to air contamination. No anaerobes were observed in the thioglycollate broth cultures.

The serial dilutions of cocaine in water resulted in a proportional inhibition of microbial growth. Each of the indicator organisms showed a zone of inhibition which increased in diameter as the concentration of cocaine increased. The *Saccharomyces cerevisiae* culture was the most sensitive, showing a range of inhibition from 4 mm in diameter for the 1:10 dilution up to 18 mm in diameter for the 1:1 dilution. The least sensitive organism was *Staphylococcus aureus*, which displayed no inhibition for the 1:10, 1:8, 1:6, and 1:4 dilutions. A 4 mm zone of inhibition was noted at the 1:2 dilution and a 6 mm diameter zone for the 1:1.

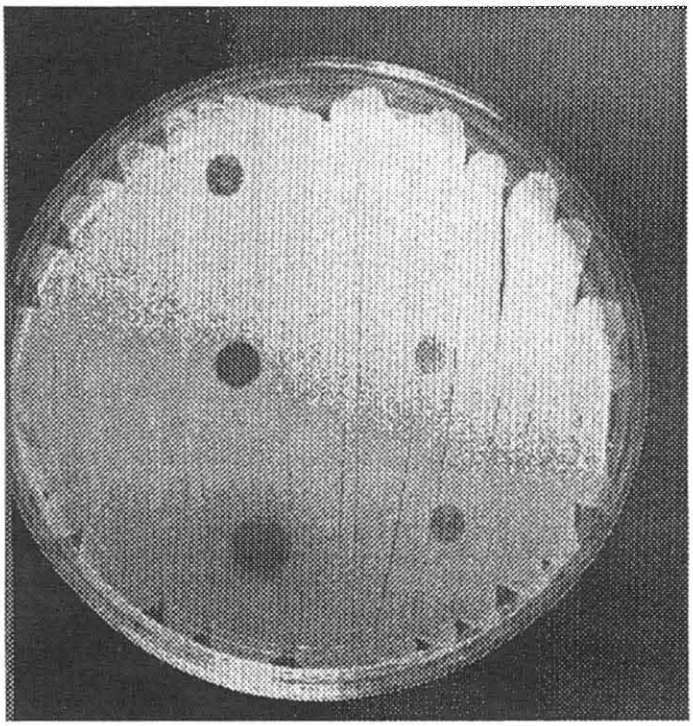

Figure 1.
Example of sensitivity test for bacteriostatic activity. This plate had been spread with a lawn of *E. coli*, then drops of cocaine HCl applied in decreasing concentration. The area of inhibited growth on the lower left represents the higest concentration, while the upper right represents the lowest (no inhibition). This photo is reproduced at approximately 80% actual size.

The most productive assay was by far the vacuum filtration. In all, seventy-four isolates were recovered, including forty-nine gram positive spore-forming rods, all tentatively identified as genus *Bacillus*, and representing at least four different species. One gram negative, oxidase positive, pigment producing rod was recovered, probably

Flavobacterium sp. or *Xanthomonas sp.* Fourteen gram positive, glucose fermenting cocci, probably *Staphylococci sp.*, one of which was coagulase positive *S. aureus* was identified. The other *Staph.* were probably *S. epidermidis.* Four gram positive, glucose non-fermenting cocci were recovered, probably *Micrococcus sp.* Six others failed to grow on subculturing after deep freezing and were thus unavailable for further testing.

DISCUSSION

At the outset of our investigation, it appeared that cocaine was at least bacteriostatic, in that nearly all of our cultures failed to grow out any viable organisms. Previous work by Kalyanpur [*4*] suggests this effect may be due a disruption in several metabolic pathways in the cell, including the inhibition of citrate and/or malate synthesis. In fact, there is some evidence to suggest that certain ophthalmic preparations manufactured in Poland use cocaine as a preservative [*1*]. Upon reducing the concentration of cocaine, the bacteriostatic effect diminishes to the point where viable organisms, especially sporeformers like *Bacillus*, may then be recovered [*5*]. Other factors which might adversely affect microbial survival not further examined in this project might include water activity of cocaine HCl, oligodynamic effects of metal ions present in the mixture, and pH effects.

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1993 Distinguished Member:

—John Murdock

John Murdock was awarded the Distinguished Member award for 1993 at the Spring Seminar Banquet on May 21st. The Awards Committee selected John as a prime example of what this award is intended for: "Recognition of outstanding service to the Association and the profession." John joined the CAC in 1968 and has actively supported it on many fronts, including: Chair, Northern Firearms Study Group 1976-9; Ethics Committee Member 1976-9; chair 1978-9; Chair, Ad Hoc Ethics Procedure Revision Committee 1979-80; President, CAC 1984-1985; Chair, Ad Hoc Committee on Forensic Serology (Bower case) 1985; CAC Rep. to DOJ BFS Serology Symposium '87; Endowment Committee member 1991; chair '92-

In addition to his commitment to the Association, John has contributed to the profession through other means, including 9 CAC presentations and Newsletter articles, 13 AFTE publications and 2 IAFS presentations.

Everyone who knows John is impressed with his technical knowledge in criminalistics and with firearms in particular. John's nominators (Jim White, Sandy Wiersema and Ed Rhodes) unanimously voiced their belief that John's major quality is his thoroughness in all of his endeavors. These qualities in themselves support our selection of John as this year's Distinguished Member. Still, our committee was most impressed with John's work in the area of ethics. The CAC has the most effective ethics guidelines and procedures of any professional organization, in large part due to John's thoroughness on the Ad Hoc Ethics Procedures Revision Committee. John has continued to stress the need for strong ethics in our profession, including two publications devoted to ethics. It is not surprising the ethics was the topic he selected for his acceptance speech at the Spring Banquet. We would like to express our thanks to John for his participation in the Association, his efforts in expanding the ideals of professionalism, and for the extra effort involved in commuting cross-country to be with us for the banquet. Best wishes, John, in your new position with ATF!

Dave Stockwell
Awards Committee

Most Outstanding

Kristina Benson's Most Outstanding Presentation at the '93 Spring Seminar

There were a lot of excellent papers given at the 81st Semi-Annual Seminar held in Berkeley this past May. Many of the papers were original and relevant to forensics while others had excellent visual aids to enhance the presentation. However, by the panel of three judges evaluating various criteria during the presentation, a unanimous decision was reached for the Most Outstanding Presentation. That honor goes to Kristina Benson for her paper titled "The Effects of Aerosol Inhalers on Pre-Existing, Pre-Determined Blood Alcohol Concentrations Using the Intoxilyzer 5000". The panel of judges felt that her originality along with the quality of work done on the project was outstanding. Her slides that went with her talk truly enhanced the quality of the presentation. Congratulations to Kristina and thanks to all of the presenters at the Spring Seminar.

Marty Fink
Awards Committee

The Effects of Aerosol Inhalers on Pre-Existing, Pre-Determined Blood Alcohol Concentrations Using the Intoxilyzer 5000.

Kristina L. Benson, Forensic Laboratory Services. Present address: SERI 3053 Research Dr., Richmond, CA 94806

ABSTRACT

The objective of this research was to determine if aerosal inhalers compromise breath alcohol analysis. Subjects with a blood alcohol concentration (BAC) between 0.08% weight per volume and 0.12% weight per volume (w/v) used an aerosal, metered dosage inhaler; Alupent. Each volunteer then submitted to several breath tests using the Intoxilyzer 5000 breath analysis instrument. Immediately after the use of the inhaler and for the next 30 minutes, subsequent breath samples were given and the BAC recorded for each individual. The use of the Alupent, inhalers did not cause the BAC of the breath samples to rise in any of the subjects tested.

INTRODUCTION

Alcohol abuse is not a new phenomenon. It is estimated that one in three American families has been negatively effected by the use of alcohol by one or more family members. One of the most serious effects of alcohol consumption is the tendency for one to drink in excess and then attempt to operate a motor vehicle. The drinking driver is also not new, but it is one of an ongoing concern. The means of forensic testing of the drinking driver for alcohol concentration serves as a basis for this project.

It has been suggested that the results of breath testing for alcohol could be compromised by using asthma inhalers just prior to giving a breath sample. The focus of this project is to determine if asthma inhalers affect a pre-existing, pre-determined blood alcohol concentration (BAC). Breath samples will be used as a means of obtaining the data.

Of significant importance is that breath samples are relied upon so often by law enforcement agencies to determine whether or not a person is legally intoxicated. According to Saferstein (1982), "Breath tests to determine the alcohol concentration present in a person's blood are by far the most frequently utilized tests in driving under the influence of alcohol cases." Because such tests are done thousands of times per month, it is essential that the results of breath analysis are accurate and cannot be altered. This research will show that the use of metered dose inhalers does not significantly change a person's BAC. This result can be helpful when defending the use of breath testing as a reliable method of analysis and not one that would be compromised by the use of an asthma inhaler.

Alcohol is most commonly ingested orally where it passes from the mouth, down the esophagus, through the stomach and into the small intestine. Gastric absorption can take place rapidly if high concentrations of ethanol are consumed and the ingestion of the ethanol takes place on an empty stomach. High concentrations of ethanol can be achieved by ingesting strong drinks such as distilled spirits, which are 40-50% ethanol by volume. As a comparison, a dilute beverage such as beer is only 3-5% ethanol by volume. Gastric absorption is not the only process in which ethanol can be absorbed into the body. Goldstein (1983) points out that the passage of the stomach contents into the duodenum is also important, "...because absorption of alcohol from the small intestine is even faster than from the stomach." This shows that the addition of food into the system affects the rate of absorption. The peak concentration or the maximum degree of intoxication will be greatly reduced when the stomach and/or small intestine is full of food. Goldstein (1983) continues by saying, "...taking food with drink sharply reduces the total amount of ethanol that reaches the brain." The reason for the differences in absorption as a result of food is due to the small intestine. Because of its surface, it has the capacity to absorb a great deal when empty. If food is present, the small intestine will be absorbing nutrients from the food and thus the alcohol will pass through the gastrointestinal tract without being absorbed. Saferstein (1982) describes this information graphically in figure 1 by plotting the blood ethanol in terms of milligrams per milliliter versus hours. Also note, from figure 1, experts in the field are able to extrapolate the data to determine at what level an individual's blood alcohol concentration may have been at a given time.

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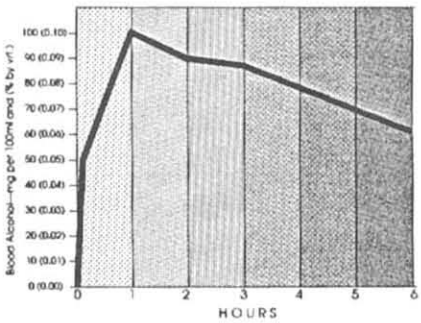

Figure 1. Blood Alcohol Concentrations after ingestion of 2 ounces of pure alcohol mixed with 8 ounces of water (from Saferstein, 1982).

Saferstein (1982) explains that, "During absorption, alcohol enters the blood stream by way of the portal vein and the blood carries the alcohol to the heart and then to all parts of the body." Ethanol is a very water soluble substance. Therefore, it rapidly diffuses throughout the aqueous parts of the body with little resistance. Because alcohol diffuses throughout the tissues rapidly, it can attain equilibrium within all parts of the body very quickly. Not even the blood-brain barrier can offer a strong challenge for the diffusion of ethanol. This is the main point of interest when studying the impairment, due to alcohol, of drivers. The amount of ethanol that has reached the brain is of the utmost importance because the relative amount of impairment is proportional to the amount of ethanol that has been ingested. If it were possible to directly determine the amount of ethanol in a living person's brain, we would do so. Of course, this is not possible, so we choose blood analysis as a means of predicting the level of ethanol in the brain. According to Walls (1985), "The venous blood alcohol represents something close to what the brain is experiencing."

Unlike many other drugs, alcohol does not accumulate in the adipose tissue, but rather is found in all tissues of the body. The concentration of ethanol in the tissue is directly proportional to the water content of that particular tissue.

The rate of distribution of ethanol into different tissues varies according to their blood supply which determines the quantity and concentration of the alcohol that reaches the tissue and the contact time the alcohol has with the various segments of the gastrointestinal tract. The brain, which is a very vascular structure, will have a slightly higher ethanol concentration than will venous blood because it is not losing ethanol to nearby structures in the same fashion as the venous blood supply. Ethanol will diffuse slowly into the tissues that have a smaller blood supply, such as muscle. Once the blood alcohol peak has been passed, the blood alcohol level then changes almost entirely through relatively slow metabolism in the liver. Alcohol dehydrogenase in the liver converts the alcohol first to acetaldehyde then to carbon dioxide and water. This process can decrease a person's BAC by 0.01% weight of ethanol divided by 100cc of blood or percent weight per volume (w/v) per hour. According to Saferstein (1982), "Approximately 90% of the ingested alcohol is removed in this manner but the remaining is excreted unchanged wherever water is removed from the body (i.e. through breath, urine, perspiration and saliva)."

Excretion of ethanol via breath and/or urine is the basis by which breath or urine testing is done. As a general rule, higher doses of alcohol will be excreted in greater quantities than lower doses. For the purposes of this research, excretion through alveolar air will be discussed exclusively.

The use of breath testing has several advantages over other methods of determining blood alcohol concentrations such as urine and saliva testing. The main advantage being that it yields immediate, reliable results. Bouchardat and Sandras are quoted by Walls (1985) as having dated breath testing, "...as far back as 1847 when the detection of drinking wine was reported." The quantitative measurement of breath alcohol as a means of obtaining a BAC goes back approximately 50 years according to Walls (1985). This technology is one that has been studied extensively.

The current method is based on the theory that alcohol from the blood circulating through the lungs diffuses into the breath in the alveoli. Walls (1985) explains that, "Under the right conditions, an equilibrium is reached, so that the alcohol content of breath expired from the lungs accurately reflects the BAC at the moment of expiration." According to a paper given by Parsons and Dallosta at the Proceedings of the International Symposium on Driving Under the Influence of Alcohol and/or Drugs (1986), "In 91% of the examined cases, the breath alcohol analysis was less than or equal to the corresponding blood alcohol concentration."

There exists a 2100:1 ratio of equilibrium between the alcohol contents of breath and blood. The relationship between blood in the interalveolar septa and air in the alveoli follows Henry's Law. Saferstein (1982) defines Henry's Law in terms of alcohol as follows: "When an aqueous solution of a somewhat volatile chemical compound (alcohol) is brought into equilibrium with air at normal atmospheric pressure, there exists a fixed ratio between the concentration of the compound in air and its concentration in water and this ratio is constant if the temperature remains constant." Goldstein (1983) further explains the 2100:1 ratio: "There is the same amount of ethanol in 1 ml of blood as in 2.1 liters of alveolar air." This ratio is rather large due to ethanol's high water solubility. According to Emerson (1980), since the ratio was originally proposed by Liljestrand and Linde in 1930, it has been studied extensively and there have been many suggestions and studies published which both agree and disagree with the 2100:1 ratio. The United States Department of Transportation has studied the 2100:1 ratio extensively and has recommended that all breath analysis machines currently being used by law enforcement agencies, use this ratio as the basis for reporting BACs via breath samples. Because this research was done following the same procedures as those used in law enforcement, all results will use the 2100:1 ratio as their basis.

Discrepancies in the ratio range widely from different temperatures of the alcohol to different breath testing devices. Taking into consideration all the possible methods for determining the 2100:1 ratio, the following may be categorized as possible causes for the

differences in results: differences in body temperature, breathing patterns, temperature and humidity of inspired air, as well as physiological facts such as differences in lung capacity, affecting the individuals being tested. Basically, each research team obtains slightly different results because human subjects will not be affected exactly the same way each time. In order to alleviate these problems, law enforcement agencies have set clear guidelines for calculating the BAC results from breath samples using the 2100:1 ratio. A breath sample is only valid in law enforcement for BAC consideration if, and only if, it is composed of alveolar or deep lung air. All breath testing devices used by law enforcement agencies will work correctly only if deep lung air is expired into the machine. This breath sample standard was followed in this project.

Metered dosage inhalers are used by the majority of the one in twenty adults that suffer from asthma. There are several types of inhalers prescribed to asthmatics, based on the individual needs of the patient. For the purposes of this project, the focus will be on a beta 2-adrenergic inhaler.

MATERIALS AND METHODS

Study Group. The entire procedure was supervised by Sandra A. Rakestraw, a licensed alcohol supervisor. Ms. Rakestraw has received extensive training in Intoxilyzer 5000 operation and is in charge of training all San Luis Obispo County law enforcement officers in proper Intoxilyzer 5000 operation procedures. I am a licensed forensic alcohol analyst.

The volunteers that participated in this project were between the ages of 21 and 45. The group consisted of three males and two females, two of which were asthmatics, that were healthy and without a medical condition, including heart disease, which would impair their participation. All volunteers, regardless of gender, were evaluated identically as there are negligible differences in lung function between the two sexes.

Each volunteer was required to attend a discussion in which the entire research project was explained to them and all questions about the project were answered. All volunteers were kept under supervision throughout the experimental procedure and appropriate safety procautions were taken.

An ambulance was supplied by San Luis Ambulance Service Inc. and remained on the site throughout the experimentation. Two paramedics staffed the ambulance and were present in the laboratory during the entire procedure to guard against any medical emergencies that may have occurred.

Dr. Norman E. Tullis reviewed the protocol and gave written approval for the project. Dr. Tullis has been in general practice in Arroyo Grande, California since 1981. Some of his areas of interest include internal medicine and pulmonology. He is currently the Medical Director of the Arroyo Grande Care Center. Dr. Tullis submitted guidelines which were strictly adhered to during the procedure. One such guideline was that all subjects should use the same type of inhaler. In order to facilitate this, Dr. Tullis supplied the Alupent inhalers for use in this project. During this experiment, each subject was given one for their own use. All of the inhalers were collected upon completion of the project.

Disposable, sterile mouthpieces for the Intoxilyzer 5000 were used by each subject. The mouthpieces were the only direct interaction between subject and instrument. Upon completion of this project, all of the volunteers were returned to their residence. None of the subjects were permitted to drive themselves home.

Choice of Inhaler and its Pharmacology. The specific beta 2-adrenergic inhaler used for this project was Alupent, a brand name for metaproterenol. The American Medical Association (1989) defines this inhaler as "...a sympathomimetic bronchodilator that acts selectively to dilate the airways in the lungs while having little stimulant effect on the heart." Each inhaler delivered through a mouth piece, 0.65 mg of metaproterenol sulfate. All parts of the administration device are issued as a closed system that requires no assembly.

Chemically, Alupent is defined in the 1992 Physician's Desk Reference as, "...a 1-(3,5 dihydroxyphenyl)-2-isopropylaminoethanol sulfate, a white crystalline, racemic mixture of two optically active isomers." The chemical formula is depicted in Fig. 2.

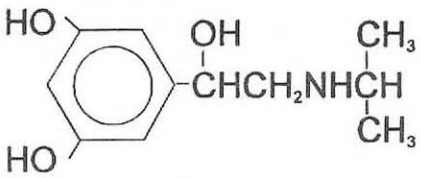

Figure 2. Alupent Chemical Formula (from Bailey, 1991)

This drug is a beta-2-adrenergic stimulator. Beta-2 receptors are found in the lungs, blood vessels and other tissues. Metaproterenol sulfate, the active ingredient in Alupent, stimulates the release of the neurotransmitter chemicals epinephrine and norepinephrin in the sympathetic nervous system. These neurotransmitters bind to the Beta-2 receptors to dilate the airways by relaxing the muscles of the bronchioles (small airways in the lungs), thereby increasing air flow to the lungs. Herein lies the argument in question: If the available surface area of one's lungs is artificially increased by bronchodilators, then more blood is reaching the lungs. Knowing that blood carries alcohol, and more blood is circulating through the lungs, a person being given a breath test for alcohol under these conditions will give an artificially heightened BAC.

The following side effects were possible side effects with the use of Alupent: nervousness in 6.8% of patients tested and headache, dizziness and palpitations in 1 to 4% of patients tested by Boehringer Ingelheim Pharmaceutics, Inc.; tachycardia occurred in less than 1% of patients. All side effects were taken into consideration on an individual basis before the experimentation took place and the paramedics on scene were made aware of the symptoms. Each volunteer was told about the possible side effects and were monitored individually for any symptoms. None of the volunteers reported experiencing any side effects.

Instrumentation. All measurements were made on the CMI/MPH

Intoxilyzer Breath Alcohol Analyzer. This type of intoxilyzer was approved for use in law enforcement by the United States Department of Transportation in 1972 and is widely accepted by the judicial system today.

According to the 1988 edition of the operator's manual, the principle of the Intoxilyzer 5000 is based on infrared absorption. Ethyl alcohol absorbs infrared energy at a specific wavelength. The more alcohol present in the breath sample, the greater the absorption of infrared energy and therefore the higher the blood alcohol concentration will be reported. The machine is more easily understood diagrammatically from Fig. 3.

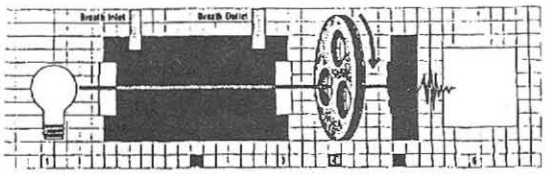

Figure 3. Intoxilyzer 5000 Model (from Operator's Manual, 1988).

A quartz lamp (1) generates infrared energy which travels through a single sample chamber (2) containing the subjects breath. Upon leaving the sample chamber, a lens (3) focuses the energy onto the chopper modulator (4) containing three optical filters that allow only specific infrared energy wavelengths to pass through. The three wavelengths-one for alcohol, one for acetone, and one for reference-are focused onto a highly sensitive photo detector (5) which converts the results into electrical impulses. An electronic processor (6) interprets the impulses and the percent Blood Alcohol Concentration is displayed (Fig.3).

Before any measurements of blood alcohol were taken, the instrument analyzed a reference sample of known alcohol content at a known temperature. This procedure ensured that the instrument was both functioning correctly mechanically and measuring and reporting blood alcohol concentrations accurately.

Specific Design of Experiment. Section 1219.3 of Title 17 of the State of California Department of Health publication on Forensic Alcohol Analysis (1976), defines a breath sample: ***"...a breath sample shall be expired breath which is essentially alveolar in composition."*** The quantity of the breath sample shall be established by direct volumetric measurement. Title 17 (1976) also states that, "The breath sample shall be collected only after the subject has been under continuous observation for at least fifteen minutes prior to collection of the breath sample, during which time the subject must not have ingested alcoholic beverages, or other fluids, regurgitated, vomited, eaten, or smoked." For the purposes of this project, the fifteen minute observation period was not upheld so that the "worse case scenario" of interference could be tested. The original concern was that the inhaler would change the 2100:1 blood to breath ratio. To answer that question, it was important to know that the inhaler did not cause a change in BAC at time= 0 minutes as well as time= 15 minutes. The results of this data may be important in future Title 17 requirements that set guidelines for the observation period.

During the testing process of this project, strict guidelines were followed so as to facilitate the best possible results and to fulfill all project obligations. The data was collected by using near simultaneous breath samples from five subjects. Each subject reached an alcohol equilibrium throughout their body compartments wherein the 2100:1 ratio was established. The latter was confirmed after each subject reported having an empty stomach. Knowledge of peak alcohol level verses time following drinking episodes was also used to confirm that equilibrium had been reached. An empty stomach allows alcohol to be absorbed more rapidly which is likely to yield an earlier blood alcohol peak (see figure 1.). Food in the stomach would interfere with the rate of ethanol absorption.

Before any ethanol was consumed, each individual verified that they had neither ingested alcohol for twelve hours nor eaten for six hours prior to the beginning of this experiment. Each subject served as his/her own control and the results were evaluated as intra-individual differences. This was achieved by having four subjects give a breath sample after drinking distilled spirits, but before using the Alupent inhaler. This served as the individual's baseline value and the value with which subsequent BAC values were compared. The BAC of each of the four individuals fell within a window of 0.08% w/v to 0.10% w/v. I was able to predetermine the amount of ethanol that needed to be consumed by each of these individuals by taking into account each volunteer's weight and gender. Widmark's formula from Andreasson (1985) was used to calculate the amount of ethanol that needed to be drunk:

$$\text{Ounces of alcohol required to achieve desired BAC} = \left(\text{Weight of volunteer in lbs.}\right)\left(\text{Desired BAC in \% w/v}\right)\left(\text{ALcohol coefficient based on gender}\right)$$

After each volunteer reached a level within the desired window, testing began. Each volunteer inhaled a single dose of Alupent. According to the Alupent directions and Dr. Tullis, a single dose consisted of two to three metered dose inhalations. Immediately following the inhalations, the subject gave a breath sample and continued to do so at timed intervals. Each individual's BAC was recorded at timed intervals until 35 minutes had elapsed.

RESULTS

Table 1 illustrates the results that were collected.

SUBJECT	TIME (min)[3]	BAC (%w/v)[2]
1	W/O Inhaler	0.091
	0	0.079
	7	0.080
	13	0.071
	19	0.072
	25	0.071
2	W/O Inhaler	0.094
	0	0.104
	7	0.097
	18	0.089
	24	0.085
	31	0.081
3	W/O Inhaler	0.103
	0	0.081
	6	0.081
	12	0.085
	18	0.084
	24	0.084
4	W/O Inhaler	0.097
	0	0.068
	11	0.066
	17	0.061
	23	0.060
5	W/O Inhaler	0.000
	2	0.000

Table 1. Changes in BAC[2] Before and After Use of the Alupent[1]

[1] Alupent is a metaproterenol sulfate metered dosage inhaler.
[2] BAC(%w/v) is Blood Alcohol Concentration reported as % weight/volume.
[3] Times are given as minutes after use of inhaler.

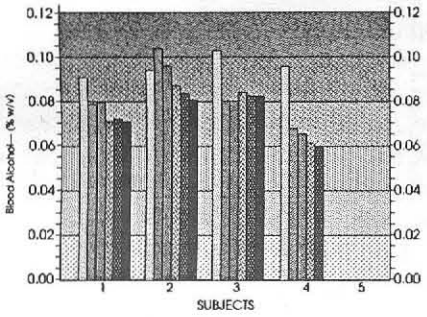

Figure 4. Graphical Conclusions Based on Five Subjects

Before beginning the experimental portion of this project, I researched the argument of artificially increased lung capacity due to bronchodilators (previously outlined in this report). I hypothesized that the argument was invalid, based on Walls (1985) who reported that alcohol will equilibrate throughout the body compartments. The theory that the surface area of the lungs is increased is a misnomer. The function of bronchodilator is not to increase the size of tissues but rather, to relax the muscles of the lungs. Therefore, the lungs are merely being returned to their original size and the inhaler will not cause an actual increase in the size of the tissues. It was my opinion that the BAC would not be effected by the use of aerosol inhalers, such as Alupent.

The four drinking volunteers reached their peak BAC quickly and each of their BAC's fell within the target window of 0.08% to 0.10%. One male and one female were actual asthmatics and had Alupent prescribed to them by their doctors (See figure 4, Subjects 2 and 4). The remaining volunteers were not asthmatics. However, it is important to note that the results did not show any significant differences between asthmatics and nonasthmatics. Because there were no differences between asthmatics and nonasthmatics, it suggests that both asthmatics and nonasthmatics may be used simultaneously for testing the effects of ingesting ethanol in conjunction with using bronchodilators.

Two breath samples were given by an individual who only used the inhaler, but did not ingest any alcohol (See figure 4, Subject 5). Both breath samples given by this volunteer were recorded as 0.000% w/v. This step was done to insure that the inhalers themselves were not contributing any false BAC results.

There were three important results that came out of this research. First, the inhaler did NOT cause a rise in the pre-existing BAC of any of the volunteers.

Secondly, two of the readings decreased by as much as 0.02% w/v., see Table 1, Subjects 1 and 3. There are several theoretical explanations for this result such as physiological differences in each volunteer and the error margin of the Intoxilyzer 5000. The error margin of the Intoxilyzer 5000 as reported by CMI (1988) is defined for law enforcement purposes as + 0.005 or 5%, whichever is greatest. Further study on this apparent decrease in BAC is warranted . Use of a larger study group would be helpful to determine if in fact 0.02% w/v is a true decrease, rather than a random result that would be eliminated with repetitive testing.

Finally, it can be seen from Table 1, that there was no residual or delayed effect caused by the inhaler. No volunteer experienced any significant changes in BAC results at both time = 0 as well as over a 30 minute time period.

The data from Subject 2, see Table 1., suggests that the inhaler caused an increase in BAC immediately following the use of the inhaler as well as seven minutes after the inhalation. This interpretation is incorrect. Subject 2 had difficulties blowing a complete air sample after the use of the inhaler. The difficulty was not physiological but rather, due to the mouthpiece of the Intoxilyzer slipping from their mouth. The latter being the result of not being familiar with the machine. As subsequent samples were given by this subject, the difficulty previously experienced disappeared and was no longer a problem.

DISCUSSION

Gomm, Weston and Osselton (1989) performed an experiment through the Home Office of Forensic Science Service in England that correlates well with this study. They tested the affect of respiratory aerosol inhalers and nasal sprays on breath alcohol testing devices used in Great Britain. In their experiment, they tested twenty aerosol inhalers and five nasal sprays to determine if the active ingredients in these agents interfered with the breath alcohol measuring devices. They reported, "No interference attributable to the contents of any of the aerosol inhalers or nasal sprays tested...."

Both Gomm et al and my study suggest that aerosol inhalers alone or after they have been inhaled into the body, do not cause elevated BAC levels. Although my study group was small, I feel this work yielded meaningful results regarding the question of bronchodilator interference with the accuracy of BAC values. Further study on this important legal topic with a larger study group is clearly warranted.

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Reprint

The Forensic Sciences Foundation, Inc.
Criminalistics Volume 2,
"Methods of Analysis"
Edited by Brunelle, R.L., Thornton, J.I., et al.
June 1980

Detection of Rh Antigens in Dried Blood

Laboratories: Texas Department of Public Safety; Royal Canadian Mounted Police

Reference: Martin, P.D, *J. Forensic Sci. Soc.*, Vol. 17, 1977, pp. 139-142.

This is an absorption-elution method in which Rhesus antigens C, C^w, c, D, E and e can be detected from bloodstained cotton threads.

Reagents and Apparatus

Antisera:

Anti-C, anti-c, anti-D, anti-E anti-e and anti-C^w can be obtained from Travenol (Hyland) Laboratories, Norfolk and Biotest-Folex, Ltd. Birmingham.

Antisera should be tested against a panel of red cells and bloodstains of the following phenotypes: CcDEE, ccDEe, Ccddee, CCddEe, C^{w}cDee and C^{w}CDee. For optimum reaction, it is often necessary to dilute antisera prior to use, the extent of which varies with different batches of antisera.

Prepare bloodstains on clean cotton sheeting. Store in the dark, at room temperature.

(Because incomplete antisera is used, indicator red cells must be enzyme-treated to obtain agglutination.)

Papainization of indicator red cells.

Papainize R_1R_2 (CcDEe) indicator red cells by the following method: Prepare a 1% solution of papain in saline as a stock solution and store at -20°C. Dilute the stock solution by 1/10 in M/15 phosphate buffer (7.09 g Na_2HPO_4, 2.27 g KH_2PO_4 and distilled water to 1 liter, pH 7.3).

To one volume of washed, packed red cells add 2 volumes of phosphate buffered papain and incubate at 37degC for 10 minutes. Wash the cells 3 times and make up to 1% in saline. Papain may be obtained from Sigma Chemical Co., as Papain Crude powder, Type II.

	C	c	D	E	e
1					
2					
3					
4					

Figure 1.

Method:

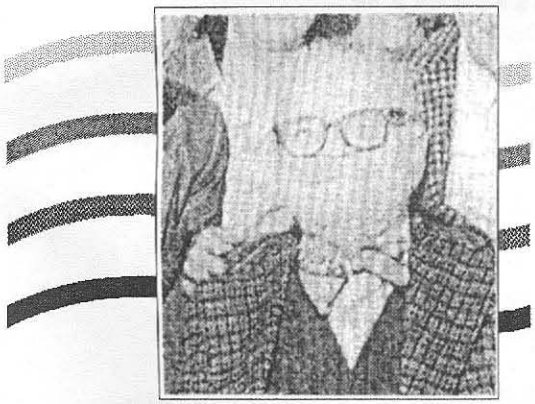
(1) Take 5 x 1cm pieces of bloodstained thread.
(2) glue threads to polycarbonate sheet using cellulose acetate adhesive as shown in Figure 1.
(3) Add suitably diluted anti-C, anti-c, anti-D, anti-E and anti-e. Add 2 drops (approx. 0.04ml) of antisera to each thread.
(4) Leave in sealed humidity chamber overnight at 37°C. Use plastic sandwich boxes containing moistened filter papers to form a tight seal to prevent water loss during the long incubation.
(5) Wash in saline at 4°C for 20 to 30 minutes by placing in a 4-liter tank of saline which is in a refrigerator. Change saline daily.
(6) Cut the threads from sheets and transfer to small tubes.
(7) Add 1 drop (approx. 0.02ml) of 1.5% albumin in saline (30% albumin diluted 1 in 20) to each tube.
(8) Elute at 60°C in a waterbath for 30 to 40 minutes.
(9) Remove the tubes from the waterbath and add 1 drop of papainized R_1R_2 (CcDEe) cells to each tube. (It is not necessary to remove the threads from the tubes.)
(10) Cover the tubes and leave at 37°C for 1 to 2 hours.
(11) Centrifuge tubes for approx. 1 minute.
(12) Carefully remove the button of cells from the bottom of the tube and transfer to a microscope slide.
(13) Read all results microscopically.

Note: Known bloodstain and unstained substrate controls should be run.

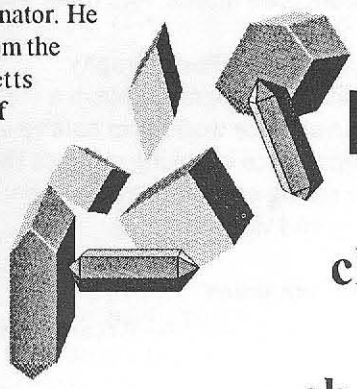
Results and interpretation.

Agglutination indicates the presence of an antigen. Report only the factors identified. It has been found in experimental work using this method that C, C^w, c, D, E, and e could be detected in bloodstains up to six months old. Only c and D could be reliably determined from stains that were one year old.

Charles C. Fulton, Pioneer in Microcrystals, Remembered



It is with great regret that I report that passing of Charles Clarke Fulton, author of ***Modern Microcrystal Tests for Drugs*** and pioneer in the development of non-aqueous microcystal test reagents. Mr. Fulton was born on January 22, 1900 in Fairfield, Iowa, the son of Charles J. Fulton, an Iowa State Senator. He graduated from the Massachusetts Institute of Technology in 1922 with course work concentrated in chemistry and philosophy.



His career in the forensic sciences began in 1924 with a position as chemist for the US Department of the Treasury's Bureau of Prohibition in Omaha, Nebraska, publishing "Some New and Improved Tests for Morphine and Related Alkaloids" in the *Journal of Laboratory and Clinical Medicine* in 1928. He served with the Treasury Department's Alcohol Tax Unit and Bureau of Industrial Alcohol, in Minneapolis, St. Paul, and Chicago, publishing over 25 articles on both color and microcrystal tests for drugs in clinical chemistry and pharmacy journals, there being in effect no forensic science literature as such. At the time of his first 'retirement' in 1948, he had published articles on the identification of morphine, atropine, cocaine, procaine, heroin, pseudomorphine, opium alkaloids specifically, cinchona alkaloids, Dilaudid, and alkaloids generally.

He joined the Division of Narcotic Drugs within the newly formed United Nations Secretariat in 1948. His work on both problems of international drug controls and the identification of new synthetic drugs, such as methadone and Demerol, continued for ten years, during which he authored a number of articles for UN publications such as the *U. N. Bulletin on Narcotics.*

He returned to Federal service with the US Food and Drug Administration in 1958, publishing tests for colchicine in the *Journal of the Association of Official Agricultural Chemists* and contributing 10 sections to the *Encyclopedia of Microscopy*, including those on chemical microcrystal identifications, forms of microcrystals, origin of opium, purpose of chemical microscopy, reagents for microcrystal identifications, sympathomimetics and central stimulants, microcrystal tests for differentiating O^3-monoacetylmorphine, O^6-monoacetylmorphine, diacetylmorphine, morphine, and codeine.

Microcrystal tests ARE chemical methods of identifying chemical substances.

He later served under Dr. Milton Helpern, Chief Medical Examiner of the City of New York, publishing in *International Microfilm Journal of Legal Medicine* and was with the New Jersey State Medical Examiner's Office at the time he completed ***Modern Microcrystal Tests for Drugs***, contributed to *Acta Pharmaceutica Jugoslavica* and authored the chapter on Microcrystal Tests in ***Handbook of Analytical Toxicology***.

Mr. Fulton retired again in 1970, allowing him additional time to pursue eclectic interests including raising exotic animals, perfumery, mushroom hunting and butterfly collecting. He continued to publish, authoring "Chemical Microcrystal Identifications" in the ***Encyclopedia of Microscopy & Microtechnique***, and penning articles on Maya architecture, arithmetic, and astronomy . Following the passing of his second wife in 1978, he returned to Minneapolis to live with his son and daughter-in-law, Eugene and Mary Ellen Fulton, in whose home he resided at the time of his death on November 4, 1992.

Mr. Fulton was strongly convinced that while the physical instrument of a microscope was used to reduce the quantity of substances needed to effect an identification, microcrystal tests were and ARE **chemical** methods of identifying **chemical substances**. Analysis by instrumental methods which identify chemical substances based on their **physical** properties have their place, but for those not content to be, as E. G. C. Clarke put it in the forward to ***Modern Microcrystal Tests***, "a machine minder", microcrystal tests present a rapid, inexpensive, time-tested method of identification with a solid place in the armory of the criminalist.

—Hiram K. Evans
San Bernardino Co. Sheriff's Lab

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