# California Association of Criminalists NEWSLETTER



JANUARY 1986

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Abstracts, 66th Semi-Annual Seminar, October, 1986

Awards Committee Nomination Form

## MEETINGS

### AMERICAN ACADEMY OF FORENSIC SCIENCE

February 11 - 15, 1986

The annual meeting of the American Academy of Forensic Science will be held February 11 - 15, 1986, at the Hyatt Regency Hotel, New Orleans, Louisiana. Contact AAFS, 225 S. Academy Blvd., Colorado Springs, CO 80910, (303-596-6006)

### THE USES OF FORENSIC SCIENCE

April 4-5, 1986

The Forensic Science Unit of the University of Strathclyde is sponsoring a conference on the uses of forensic science. There will be four concurrent sessions: Transfer traces, Crime scenes, Investigation science, and the Trial process. For further information, contact Mr. P. F. Nelson, Continuing Education Center, University of Strathclyde, McCance Building, Richmond Street, Glasgow G1 1XQ, UK.

### NORTHWEST ASSOCIATION OF FORENSIC SCIENTISTS

April 29- May 2, 1986

The Spring NWAFS seminar will be held at the Inn of the Seventh Mountain, Bend, Oregon, Contact Mike Howard, Oregon State Police Crime Laboratory, 375 N.E. Franklin Street, Bend, OR 97701. 503-388-6150.

### ASSOCIATION OF FIREARMS AND TOOLMARK EXAMINERS

April 28-May 2, 1986

The 16th AFTE Seminar will be held at the Holiday Inn-Inner Harbor, Baltimore, MD. The Seminar will feature a tour of the Aberdeen Proving Grounds. Contact Joe Reitz, Baltimore City Police Department, 601 Fayette Street, Baltimore, MD 21202.

### CALIFORNIA ASSOCIATION OF CRIMINALISTS

May 14 - 17, 1986

The Spring, 1986, Seminar of the California Association of Criminalists will be held May 14 - 17, 1985, at the Hilton Hotel in Concord, California. The meeting is being hosted by the Contra Costa County Sheriff's Office Criminalistics Laboratory. Contact Kathryn Holmes, Contra Costa County Sheriff's Office, Criminalistics Laboratory, 1122 Escobar Street, Martinez CA, 94553, (415-372-2455)

### COMBINED MEETINGS

May 28-31, 1986

A combined meeting of several regional forensic science associations will be held at the Radisson Hotel, Lexington KY. The meeting will be preceeded by a 17 hour workshop on laboratory safety conducted by the Occupational Safety and Health Administration on May 27-28. Contact Harold Alfultis, Loraine County Crime Lab, 10005 Abbe Road, Elyria OH 44035 (216-365-4191x364)

### SOUTHERN ASSOCIATION OF FORENSIC SCIENTISTS

September 10-13, 1986

Auburn Conference Center, Auburn, Alabama. Contact Carlos Rabren, Alabama Department of Forensic Sciences, P. O. Box 231, Auburn, AL 36831. (205) 887-7001.

### CALIFORNIA ASSOCIATION OF CRIMINALISTS

October 8-11, 1986

Gene Autry Hotel, Palm Springs, California. For further information contact Faye Springer, CA Department of Justice, P. O. Box 3679, Riverside CA 92519 (714)781-4170.

### INTERNATIONAL ASSOCIATION OF FORENSIC SCIENCES

August 2 - 7, 1987

Vancouver, British Columbia, Canada. Contact International Association of Forensic Sciences, 801-750 Jervis Street, Vancouver, B.C., Canada V6E 2A9.

## SECTION and STUDY GROUP ACTIVITIES

The Study Group and Sectional Meetings are where the real work of the Association is accomplished: Exchange of information, help with problems, discussions of new techniques, reviews of existing methods, etc. All members are encouraged to participate in any study groups in which they have an interest, and to regularly attend regional section meetings. The individuals to contact regarding regional and study group activities are listed here along with recent and anticipated meetings. Study group moderators are encouraged to submit summaries of their group's activites for each newsletter.

### NORTHERN SECTION

Grady Goldman
Regional Director
Contra Costa Co SO
1122 Escobar St
Martinez CA 94553
(415) 372-2962

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**Northern Section Biology Study Group**

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Inst. of For. Sci.
2945 Webster St
Oakland CA 94609
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**Northern Section Firearms Study Group**

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Richard Schorr
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**Northern Section Trace Evidence Study Group**

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**Northern Section Drug Study Group**

Lance Gima
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Calif. DOJ-San Rafael
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## SOUTHERN SECTION

Eston Schwecke
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### Southern Section Biology Study Group

Barbara Johnson
Los Angeles Co SO
2020 W Beverly Blvd
Los Angeles CA 90057
(213) 974-4611

Margaret Kuo
Orange Co Sheriff
-Coroner
P.O. Box 449
Santa Ana CA 92702
(714) 834-3073

Carol Rhodes
Cal Lab of For. Sci.
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Tustin CA 92680
(714) 669-9461

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Forensic Science
Services
2501 Cherry Suite 370
Signal Hill CA 92702
(213) 424-2220

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The study group has had several meetings since last June: The July meeting was hosted by Ron Linhart and Rubin Flores who gave a presentation on the interpretation of blood spatter and bloodstain patterns. The September meeting, held in conjunction with the Regional dinner meeting in San Diego, was devoted to the subject of quality assurance. A sub-committee, under the leadership of Dan Gregonis, was appointed to formalize some of the ideas discussed at that meeting and to work in conjunction with a similar committee to be formed by the Northern section study group. The October meeting, held at the seminar in conjunction with the northern thern section, included further discussion on the subject of quality assurance. For further information contact Gregonis (714-383-7344) or Gary Sims, the Northern section study group moderator. The final meeting of the year is planned for December 12. At that meeting George Sensabaugh will review the papers presented at the International Hemogenetics meeting last summer.

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### Southern Section Firearms Study Group

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### Southern Section Trace Evidence Study Group

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Harley M. Sagara
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### Southern Section Drug Study Group

Carole Sidebotham
Orange Co. S. O.
550 N. Flower Street
Santa Ana CA 92702
(714) 834-3073

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The Drug Study Group met on December 12, 1985. Darrell Clardy summarized the groups activites during the past five years: Methods of analysis, quality control and assurance, sampling, street drug forms, clandestine laboratories and synthetic routes, instrumentation, disposal of toxic chemicals, laboratory safety, MPTP and Parkinson's disease, chronic toxicity of reagents and compounds worked with on a regular basis, and articles presented at American Academy of Forensic Sciences and International Association of Forensic Sciences meetings.

The new chairman of the study group is Carole Sidebotham. Some of the ideas

that were discussed for future activities of the study group inlcude sunthesizing drugs on weekends, outside speakers, obtaining a current listing of generic drugs and company contacts, identificaion of designer drugs, and stayiong abreast of current legislation.

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## PAUL KIRK AWARD TO LAURIE DeHAAN

Laurie DeHaan was presented with the Association's Paul Kirk Award at the Fall Seminar in Los Angeles. This award, which carries with it an honorarium donated by the American Academy of Forensic Sciences, is given annually to the criminalist who has been working less than five years and who has made substantial contributions to the field.

Laurie is a serologist with the Serological Research Institute (SERI) in Emeryville. She is a graduate of the Forensic Science Program at Sacramento State College, and did an internship at the Department of Justice Laboratory in Sacramento. Her research interests include the use of the quantititation of P30 in semen and the analysis of genetic markers in blood of Big Horn sheep. She is involved in casework examinations and assists in the instruction of students attending courses at SERI. She is an active member of the Association as a participant in the Serology Study Group and a member of the nominating committee.

Laurie is an outstanding young scientist who has contributed significantly to the profession.

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## JOB OPENINGS

( Job openings are obtained from a variety of sources. Given publication deadlines and delay in receiving announcements from other parts of the country, some of the openings announced here may be filled by the time this Newsletter is received. Job announcements will normally be run only one time. Members actively seeking employment are encouraged to contact the editorial secretary for information about openings which become available between newsletters.)

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**FORENSIC CHEMIST**
The Bureau of Alcohol, Tobacco and Firearms San Francisco Laboratory Center has openings for 2 forensic chemists positions. To qualify, you must be place on the Office of Personnel Management (OPM) chemist roster. Contact the nearest OPM office for information. Contact James A. Cherolis or Elliott B. Byall, Bureau of ATF, Building 233, naval Station, Treasure Island CA 94130 415-556-7040, for further information.

**FORENSIC SCIENTIST III**
Responsibilities include analysis of biological samples for ethanol, maintenance of Intoxilyzer 5000 breath testing instruments throughout the State, and testifying in court as an expert witness. Contact Jim Hutchinson, Division of Forensic Science, 275 West Front Street, Missoula MT 59802 406-728-4970.

**PART-TIME LABORATORY AID**

**The Bureau of Alcohol, Tobacco and Fire**arms San Francisco Laboratory Center has an opening for a lab aid. The applicant must be enrolled in school and demonstrate financial need as certified by the University Financial Aid Office. Contact James A. Cherolis, Bureau of ATF, Building 233, naval Station, Treasure Island CA 94130 415-556-7040, for further information.

**JOB WANTED**

**TOXICOLOGIST-Forensic or Clinical**
Individual with one year experience in toxicology and with experience on the following: GC, AA, HPLC, EMIT,UV-VIS Spectrophotometry, GC-MS. B.S. in Forensic Science.

Christopher Boden
P.O. Box 970
Richmond KY 40475
606-624-1789

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## CAC RESPONDS TO JUDICIAL CRITICISM

The following letter was written by then-President John Murdock in response to the majority opinion of the Third District Court of Appeals in the case of People v. REILLY. Among other issues raised in that appeal was the validity of the serological examinations conducted in that case by Jan Bashinski, Criminalist and Director of the Oakland Police Department Criminalistics Laboratory. In their decision, the Court held that the serological examinations conducted by Bashinski had not been established as acceptable according to the principles set forth in the so-called Kelly-Frye test for the admissibility of scientific evidence.

Relying primarily on the case of People v. Kelly [17Cal.3d 24], the court held that the trial court in REILLY failed to hold a hearing to evaluate three aspects of the scientific evidence which was presented: First, no attempt was made to place opposing views of the scientific community before the court; Second, the only witness presented (Bashinski) could not fairly and impartialy assess the views of the scientific community since she was "a law enforcement officer. . .not employed in a academic or other research setting that reinforces objectivity. . .and, as a employee of the Oakland Police Department . . .[cannot] be considered a detached and neutral observer"; And, finally, Bashinki's credentials were suspect since she was "a technician and law enforcement officer not a scientist. . .[and her] graduate training and professional experience is in the field of criminalistics, not in any of the specific areas of genetics, biochemistry, serology or hemotology[sic] that are the most relevant to the scientific evaluation of the reliability of electrophoretic blood typing."

Based on the trial court's failure to adequately explore the areas described, the appellate court revered the the verdict.

The text of President Murdock's letter was as follows:

April 10, 1985

Re: Reversal of the Lawrence Reilly Case as Reported in the Written Decision Filed on March 25, 1985

Dear Judge Klein:

On behalf of the Board of Directors of the California Association of Criminalists I would

(conintued page 6)

like to comment on the general acceptance of electrophoresis and on Jan Bashinski's presentation of testimony regarding it.

First, there is no fundamental disagreement within the relevant knowledgeable scientific community, the Forensic Science Community, about the use of electrophoresis to analyze genetic markers in physiological fluids such as blood. Our community has determined that electrophoresis, properly performed, is a reliable and acceptable technique. Both the California Association of Criminalists and the American Academy of Forensic Sciences have studied the technique and have issued reports in support of electrophoresis. In addition, the American Society of Crime Laboratory Directors has issued a statement supporting this technique. I have attached copies of all three of these documents for your review. We are also quite aware that Dr. Benjamin Grunbaum, after many years of supporting it, now routinely speaks out against it. The attached ad hoc committee reports address several of his concerns. His lone voice, however vigorous, does not, in our opinion, constitute fundamental disagreement within the knowledgeable scientific community.

Secondly, I take exception to and am at a total loss to explain the reasoning behind the characterization of Jan Bashinski, who as a police employee was not a detached and neutral observer and thus cannot be deemed able to fairly and impartially assess the position of the scientific community. To suggest that a Criminalist's employment status is directly related to their objectivity is offensive and is an insult to members of our association.

The California Association of Criminalists is the oldest and one of the largest Regional Forensic Science Societies in the United States. Our membership consists of Criminalists from private laboratories doing mainly defense work as well as Criminalists associated with Sheriff's and Police Departments, District Attorneys Offices, and various Federal and State Agencies. Since one of the basic responsibilities of our Criminalist/-Forensic Scientist members is to apply only proven and accepted techniques to the examination of evidentiary materials and to present the results in both written and oral form in a comprehensive and objective way, our code of ethics speaks directly to these issues. This code and the procedure for enforcement of the code (both attached) are the most comprehensive of any regional society. Ethics code sections I and II-A speak to the issue of scientific methodology and the application of proven methods; sections II-F and G and section III-G to the issue of impartiality.

Ms. Bashinski is a scientist and a member in good standing of the California Association of Criminalists. The Oakland Police Department Crime Laboratory is a highly respected facility which is recognized as having an especialy high level of expertise in Forensic Serology examination techniques including electrophoresis.

I write this letter both as a concerned Criminalist and as President of the California Association of Criminalists. The Board of Directors has authorized me to respectfully request that you consider these remarks to be an official protest to the majority reasoning as expressed the the 21 page majority opionion. We heartily endorse the reasoning expressed in the 5 page dissenting opinion written by Justice Allison Rouse.

/s/John E. Murdock

## GENERAL APPEAL TO CAC MEMBERS

The following editorial appeared in the July 12, 1985 issue of Crime Laboratory Digest, as you can see it is a plea for papers:

From the January, 1984, issue when the format of the Crime Laboratory Digest was changed, through the issue of July, 1985, 6 of the 12 technical articles have been written by the editorial staff or FBI personnel. Most of the articles written by individuals other than the editorial staff or FBI personnel have been directly solicited from our associates, colleagues and friends. This situation has arisen out of necessity rather than choice. If we are to continue to achieve a high standard of quality, we must have critical review and contribution of articles. It is recognized that the majority of the readers are practitioners rather than researchers in the forensic sciences. However, it is also recognized that they are imaginative, resourceful and inventive in their practice. Many times the work on a case, the development or modification of a technique, or the approach to the solution of a problem results in information which could be quite useful to other workers in a similar area, or may indicate the need for research and development in a particular field. This informaiton needs to be disseminated; and it can only come from you. This is your publication, please help us improve it.

The quality and revelance of the Digest has improved greatly. It is sent at no charge to crime laboratories and should therefore be available to most members. I encourage you to consider publishing in the Digest. For your general information, the publication policy and the instructions for submitting articles are printed below.

--John Murdock, member-Publications Committee - Editorial Board

### PUBLICATION POLICY

The Crime Laboratory Digest is published quarterly by the FBI Laboratory in cooperation with the American Society of Crime Laboratory Directors (ASCLD). It is intended to serve as a rapid means of communication between crime laboratories, permitting information of interest and value to be dissseminated among crime laboratory scientists.

Inclusion of an article in the Crime Laboratory Digest in no way represents an endorsement or recommendatin of any part of that article by the Federal Government, the Department of Justice or the FBI. Contributing authors assume total responsibility for the contents and accuracy of their submission. Questions or requests concerning an article should be directed to the contributing agency.

All submissions are subject to editorial review in accordance with the editorial policy established by the FBI Laboratory and ASCLD. The editorial staff of the Crime Laboratory Digest reserves the right to edit all articles for style, grammar and punctuation. Comments and letters to the editor are encouraged and will be published when appropriate and as space permits. These should be forwarded to: Crime Laboratory Digest - Editor FSRTC, FBI Academy Quantico, Virginia 22135

### INSTRUCTIONS FOR SUBMITTING ARTICLES

In order to facilitate rapid publication, submissions should conform to the following:

1. Manuscripts should be typed, double-spaced, on 8 1/2 X 11 paper. Submit three copies of the manuscript (one of which must be the original with glossy photographs).

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2. Tables should be as simple as possible. Each table should be typed on a spearate sheet of paper and should include a heading.

3. Graphs and diagrams should be submitted as sharp photographs on white glossy paper.

4. References in the body of the paper should refer to the author's (authors') names(s) and the date of publication. For example: According to Doe and Smith (1972). . .has been discussed in the literature (Doe and Smith 1972; Weinburger et al 1984; Jones 1981)

5. References at the end of the paper should appear in alphabetical order. Journal references should include the author's (authors') names(s), date of publication, title of the article, journal, volume number, and the beginning and ending pages of the article. Please follow the format below. Davis, H.E. and Jones, B.A. (1978). Seasonal variations in plasma hormones, Biol. Reprod. 88:271-273.

List articles or chapters within a book as follows: deHaseth, J.A. (1982). Fourier transform infrared spectrometry. In: Fourier, Hadamard and Hilbert Transformations in Chemistry, (Marshall, A.G., ed,) Plenum Press, New York, pp. 387-420.

6. Technical papers should be written in an Introduction, Materials and Methods, and Results and Discussion format.

7. When reference is made to a particular product, state the manufacturer's headquarters. For example: Isotactic PS (Dow Chemical, Midland, MI)...

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## ALLEGATION OF ETHICS VIOLATION

Charges of unethical conduct against a CAC member arose out of certain matters that came to the Ethics Committee's attention during its investigation of another ethics matter. The Committee was asked to look into these charges, to be described below, by the Board of Directors.

The member ws alleged to have violated the following two sections of the CAC ethics code.

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

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

The Committee's investigation revealed that a detective requested that the criminalist test a number of blood stained objects in an effort to associate the defendant with the crime scene. The Criminalist carried out tests in the ABO, PGM, EAP, Es-D, GLO and other systems with the ABO testing being carried out by means of the Lattes method and the absorption-elution technique. In the written report the criminalist summarizes the various results for each item tested with the ABO findings described as "indicative of type___ for those stains that gave a clear cut response by one (but not both) techniques and a definitive statement as to

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ABO type when the techniques produced complimentary results.

At the trial the prosecutor produced and offered two charts prepared by the Detective and cursorily reviewed by the Criminalist. Those charts summarized the Criminalist's serological test results but made no distinction as to the certainty of the various findings. The format of the charts could easily be misinterpreted to the benefit of one side to the extent that all results listed appeared to be definitive statements as to type. The first chart also contained a clear error as to the Criminalist's ABO results on one item. In the Criminalists lab report this stain is described as either indicative of type B with H activity or type B and type O (i.e.- a mixed stain). The first possibility would exclude the defendant (who was type O) and the victim (type A) as being associated with this stain while the latter possiblity (a mixed stain) would not. The chart showed the stain in question to be type O.

This particular error was apparently recognized by the Criminalist when the chart was examined more closely with the prosecutor just prior to taking the witness stand since it was largely (but not wholly) rectified on direct examination.

Facts Supporting the Allegations

Both the Committee and the accused agree that the chart prepared by the Detective and presented at the trial overstated a number of the Criminalist's actual findings and clearly misstated the findings on one particular bloodstain. Further, these over and misstatements presented a stronger association between the defendant and the crime scene than the Criminalists actual lab results would allow.

When these issues (i.e.- the erroneous reporting of an ABO grouping on the chart and the lack of distinction as to certainty of some of the test results) were raised in cross-examination, the Criminalist conceded that he did not point out any of the discrepencies in the chart to the Detective and that he did not tell the Detective to correct the chart because - "I figured the defense would do that. -- you have the right to bring it out". These answers strongly suggest that by the time of the trial the Criminalist had recognized the discrepancies in the prosecution's chart, failed to accept the personal responsibility for correcting it and deferred that duty to the defense. Such events and actions support the charges in sections IIIG and IIIH of the code.

Facts in Contravention of the Allegation

The Criminalist's role in the preparation of the chart appears to have been only peripheral in that it was prepared by the Detective who was acting on his own initiative. The blood types listed on the chart had been excerpted from the Criminalist's laboratory report and this report did make a distinction between stains that were indicative of a certain type and those that were identified as to type. As previously pointed out, the chart did not specifically preface the ABO results with the terms "identified as" or "indicative of type___". The Detective prepared the chart approximately 10 to 11 months after the evidence had been examined and according to the Criminalist, when he first saw it he did not compare the entries with his report. Rather it was merely inspected for general form. A more careful inspection of the actual content of the chart was not made until just prior to his taking the witness stand at which time he asked to review it by the prosecutor.

According to the Criminalist, pretrial preparation in the form of conferences with prosecutors or mock trials with laboratory staff members were not routine or encouraged at his agency. In addition, no training or instruction was given as to courtroom demeanor and responsibilities.

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As for the Criminalist's preparation and experience to handle sophisticated analyses and major casework, he related that he began serology casework with no previous experience in the subject and that he was instructed by an individual with 8 months experience and after 15 months in the section became the senior person. He still lacked any training from outside sources and by his own assessment of himself should still have been working as a trainee by the time he worked on the case in issue.

The Criminalist described a work environment where both caseload demands and unwritten policy do not allow for the criminalist to challenge the detectives' methods of evidence submission and case preparation. This case represented the first major trial for the Criminalist in serology; the defense was a skilled and thorough cross-examiner who had a nationally recognized criminalist serving as an aide-to-counsel and a serologist was also known to be on the jury. The Criminalist conceded his responses in this trial were poorly chosen, that he missed several opportunities to repudiate and correct the chart and that the responses he did give would indicate a bias for the prosecution. Naivete and ill-preparedness were the motivating forces for his answers and not a premeditated plan of deception and support for his employer or the prosecution.

As for his own work product, the Committee noted that the Criminalist's responses on direct and cross-examination were fair and accurate.

Summary

The Criminalist's responses under cross-examination regarding the blood type chart in this case are not removed by any matters or evidence that was brought to the attention of the Committee. The information that was developed by the Committee and summarized in the foregoing contravention section technically does not contravene the evidence supporting the charges but rather stands to mitigate it. It does deserve mentioning that the Criminalist's responses to the Committee's inquiries were made with complete candor and in a totally non-belligerent manner.

The Board of Directors feels that a Criminalist's employing Agency shares in the responsibility for preparing him for the rigors of the courtroom which include report-writing, trial preparation and testimony. Indeed, this joint responsibility extends to all facets of the forensic science endeavor.

Pursuant to the authority granted to the Board, described in Section III A-2c of the Ethics Code Enforcement Procedure, this matter was Procedurally Terminated because it was felt that it had been dealt with in a constructive manner and as such, caused it not to require the application of additional procedures of the Enforcement Procedures.

It is important to note that the Board has not and will not make any determination regarding whether or not the conduct described above amounts to a violation of the CAC ethics code. There shall be no rights of appeal or of reconsideration by any person whomsoever from this decision.

This summary has been prepared for the general information and education of all members in the hope that it will aid our professional growth.

## SUPREME COURT ISSUES BROWN DECISION

The decision of the California Supreme Court in the case of the People vs. Albert Greenwood BROWN has been handed down. (Crim 22501) This is the case in which an Amicus Curiae brief was filed on the behalf of the Defendant by Benjamin Grunbaum. (For a discussion of that Amicus Brief see CAC Newsletter, December 1984, pp. 15-25) In that Brief, Grunbaum contended that the genetic typing of enzymes in dried bloodstains is unreliable and is not scientifically acceptable. In the Court's decision a number of issues are addressed, the only one of which concerns forensic scientists is the acceptability of the blood typing evidence.

For those not familiar with the facts of the case: Brown was accused of the sexual assault and murder of a 15 year girl in Riverside. Among the evidence presented at trial was the analysis of certain stains recovered on items from the crime scene. This analysis, conducted by California DOJ Criminalists Rod Andrus and Faye Springer, established that certain of the stains found on items at the scene were semen and that, based on determination of the ABO, PGM and Peptidase-A types of these stains, they originated from an individual from a group representing 1.2% of the Black population. Testing of appropriate samples from the defendant revealed that he was a member of that group.[1]

The essence of the Defendant's argument was that the trial court failed to establish, pursuant to the standards set forth in the so-called Kelly-Frye rule, the acceptability of the techniques utilized in the examination of the biological evidence : "The technique must be sufficiently established to have gained general acceptance in the particular field to which it belongs." (Quoting People vs. Kelly, 17Cal.3d. 24, 30; Typed opinion, p. 18) The Supreme Court agreed with this position.

In their opinion, the Court reviewed cases decided in other jurisdictions and some of the technical literature and decided that, since they could not determine that a consensus exists, and that since the highly complex nature of the subject prevented the court from adequately reviewing the material itself, a hearing must be held at the trial court level where the requirements of the Kelly-Frye doctrine can be shown to have been met before such evidence can be admitted.

The court stated, "Where the issue [of acceptance of the technique] remains open, the party offering the evidence has the burden of proving in the trial court that a consensus of scientific opinion has been achieved." (Typed opinion, P. 24) The court concludes its review of the legal and technical literature by refusing to decide the issue on the basis of its own review, and states:

> "It is not clear from our unaided review of these authorities that impartial science has developed a consensus on the crucial issue: whether for the typing categories (ABO, PGM, Peptidase-A) and body fluids (semen, blood, vaginal secretion) at issue here, current methodology, employed by qualified technicians, can discriminate reliably between testable and untestable samples and between accurate and inaccurate results. [Emphasis in original]
>
> "We do not suggest that such a consensus is lacking. We simply conclude that the answer must abide an adequate future trial record made with the help of live witnesses qualified in the applicable scientific disciplines. We

(continued page 12)

> therefore do not foreclose future attempts to admit staintyping evidence based on a foundation such as we have described.(P28-29)

In addressing the question of the foundation necessary to establish the acceptability of the techniques, the Court was mostly concerned with the qualifications of the witnesses:

> Kelly further defined who is a "qualified expert" on the issue of scientific acceptance. The witness must have academic and professional credentials which equip him to understand both the scientific principles involved and any differences of view on their reliability. He must also be "impartial," that is, not so personally invested in establishing the technique's acceptance that he might not be objective about disagreements within the relevant scientific community. (ibid, P. 18-19)

In reviewing the evidence presented by the prosecution concerning the techniques used, the court stated:

> The prosecution did present testimony by Springer and Andrus that the tests they had used were accepted and reliable. However, the People do not seriously contend that this showing was sufficient. Indeed, it fell short under several of the criteria discussed in Kelly and Shirley. [citations omitted] Springer and Andrus were competent and well-credentialed forensic technicians, but their identification with law enforcement, their career interest in acceptance of the tests, and their lack of formal training and background in the applicable scientific disciplines made them unqualified to state the view of the relevant scientific community of impartial scientists. (Ibid, P. 24-25)

The court found that, although the evidence was improperly admitted, the error was harmless in light of other, overwhelming evidence of the defendant's guilt. This decision does, however, place a much greater burden on the expert witness to establish the validity of the technique. It is interesting to consider the question of who will be qualified to speak to the reliability or unreliability of a technique in which he has no "career interest." Perhaps after Diogenes finds the truthful man he can continue looking and find an "impartial scientist" who has no "career interest in acceptance of the tests" is which he is an expert.

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[1]This is a factual error in t court's opinion: Actually, the Peptidase-A analysis of the stain evidence was ambiguous. The 1.2% population figure refers to the combination of markers found in the blood of the defendant not in the stains from the scene.

# ISOLATION OF CAPSAICINOIDS BY SOLVENT EXTRACTION

John Thornton[1], D.Crim.,
Beth Hendrickson[1], B.S.,
and Grady Goldman[2], B.S.

[1]Professor of forensic science and research assistant, respectively, Dept. of Biomedical and Environmental Health Sciences, University of California, Berkeley, Ca., USA 94720.

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## Introduction

A number of jurisdictions, including California*, have chosen to frame their statutes concerning "tear gas" devices in a *general* manner, specifying that the code covers all aerosol devices containing an offensive material. It is not necessary that the offensive material be a true gas, nor is it necessary that the material be a true lacrymator.

A broad definition of this type includes those devices containing *oleoresin of capsicum*. An oleoresin is a water-insoluble extract of a plant; alcohol extracts are typical. Capsicum is the chili pepper plant, *Capsicum annum L.*, from which is also derived Cayenne pepper and paprika.

The identification of the contents of capsicum-containing devices has been described in the forensic literature by Sreenivasan and Boese [1], and by Gag and Merck [2]. Both articles involve infrared spectroscopy, and the article by Gag and Merck addresses gas chromatographic analysis also. In the view of the present authors, existing approaches to the identification of oleoresin suffer greatly from the complex mixtures of capsaicinoids commonly encountered. The direct identification of the oleoresin by infrared spectroscopy is viewed by the present authors as being particularly undesirable, since the infrared spectrum is a composite of many extracted materials and not the singular expression of the material or materials responsible for the pharmacological activity; by the same token, one would not attempt to identify hashish or opium by

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*California Penal Code Section 12401: "Tear Gas" as used in this Chapter shall apply to and include all liquid, gaseous, or solid substances intended to produce temporary physical discomfort or permanent injury through being vaporized or otherwise dispersed in air. . .

infrared spectroscopy of an alcoholic extract of these plants. Apart from the active principles of *Capsicum*, the red color of the oleoresin may be due to as many as 20 carotenoids, including capsanthin, capsorubin, lutein, cryptoxanthin, α- and β-carotenes, and flavone glycosides [3]. It is clear that the infrared spectrum of the raw oleoresin could not be expected to be that of the principal pungent agent, capsicum.

*Capsicum* was discovered during the second voyage of Columbus and rapidly became an economically important plant. The need to establish the quality of these plant products by objective means promoted some interest in the chemistry of *Capsicum*, and in 1876 Thresh isolated a crystalline material which he called *capsaicin* [4]. Until the mid-1950's the pungency of capsicum was attributed to the single compound capsaicin. This assumption was proven false by Nelson [5], and it is now known that numerous analogs exist of both natural capsaicin (8-Methyl-N-vanillyl-6-nonenamide) and synthethic capsaicin (Vanillyl-*n*-nonamide). In 1958, Kosuge *et al.* isolated dihydrocapsaicin from the oleoresin [6], and in 1971 the five principal capsaicinoids represented in the oleoresin were isolated by Masada *et al.* using gas chromatography and mass spectrometry [7]. The 5 principal capsaicinoids occuring in the oleoresin, and 5 synthetic analogs are depicted in Figure 1. Syntheses of these materials have been described by Nelson [8], by Rangoonwala and Seitz [9], by Spath and Darling [10], and by Crombie, Dandegaonker, and Simpson [11]. It is unlikely that the synthetic capsaicinoids will be encountered as the *principal* capsaicinoids in the aerosol devices commonly marketed, although it is not impossible that the natural capsaicin will on occasion be *adulturated* with synthetic materials.

Todd *et al.* [12] have described a thin-layer chromatographic approach to the identification of each of the 5 principal natural and 5 principal synthetic cannabinoids. There are several aspects to the work of Todd and his co-workers, and three different TLC systems were described. The present writers are in accord with Todd that the Analtech polyamide plate TLC method is the preferred method of capsaicinoid analysis.

The identification of capsaicin, as the principal pungent agent responsible for the pharmacological activity of *Capsicum* would seem to be essential for forensic purposes. Although the identification of capsaicin may be facilitated by reversed phase partition thin-layer chromatography, its isolation from carotenoids, fatty acids, and a host of other lipophilic substances is not. It is the view of the present authors that an attempt to directly conduct thin-layer chromatographic analysis on the oleoresin asks too much of any TLC approach, and that a preliminary cleanup procedure is indicated.

Solvent extraction and isolation of capsaicinoids.

The present authors favor an initial cleanup of the oleoresin by solvent extraction; this relieves the burden of the

identification step to discriminate among many structurally related congeners of capsaicin, natural coloring materials of the carotenoid type, and other ballast materials which may be co-extracted with the organic solvent.

The extraction method proposed here was adopted after considerable experimentation; it bears some distant and probably no longer recognizable relationship to the extraction method proposed by the Joint Committee of the Pharmaceutical Society and for the Society for Analytical Chemistry [13]. As is obvious from the flow chart of the extraction as depicted in Figure 2, it is somewhat tedious. However, the time spent here on the cleanup of the oleoresin will probably be recovered later during the identification phase of the analysis.

The steps of the extraction have been numbered in order that it may be more easily followed:

1) To 1.Ø ml of the test oleoresin of capsicum is added 8 ml of 97% ethanol, 8 ml of water, 1 g of NaCl, and 3 ml of Ø.1N NaOH.

2) This mixture is shaken for 2 minutes and extracted three times with 6Ø-8Øo petroleum ether. A volume of 5 ml is used in each of the three extracts.

3) The petroleum ether extracts are discarded.

4) The aqueous phase is filtered through Whatman #1 filter paper and washed with 5 ml of 6Ø% ethanol.

5) The ethanol is then evaporated over a steam bath, with the aqueous fraction being reduced in volume to approximately 5 ml.

6) Water is added to the filtrate to bring the volume of 25 ml, and the pH of the solution is adjusted to 7.5 with Ø.1N HCl.

7) The filtrate is then extracted six times with diethyl ether; a volume of 1Ø ml of ether is used in each extraction.

8) The aqueous fraction is discarded.

9) The ether fraction is washed with 5 ml of water and the water discarded.

1Ø) Ten ml of methanol is added.

11) The extract is evaporated down on a steam bath to a volume of approximately 1-2 ml.

12) The volume is brought up to 5Ø ml with absolute methanol.

13) Ø.Ø5 g of activated charcoal are added and shaken for 1

minute.

14) The methanol solution is then filtered through Whatman #1 filter paper.

15) The first 5 ml of the filtrate is discarded.

16) The remainder of the filtrate is evaporated on a hotplate to a volume of approximately 3 ml. This forms the test solution for further identification of capsaicin. The solution is still likely to be faint yellow.

Thin-layer chromatography of capsaicinoids

The principal thrust of the present work is the preliminary extraction of capsaicinoids, not the subsequent analysis; it is the position of the present authors that once the cleanup procedure has been accomplished, then the subsequent identification is facilitated and may proceed by any one of several methods. Thin-layer or gas chromatographic identification of capsaicinoids may proceed with the final extract described above. The methods proposed by Todd *et al.* have been found to be entirely suitable for purposes of forensic characterization.

Acknowledgement

The contributions of Ronald Miller and Carol Harralson are gratefully acknowledged.

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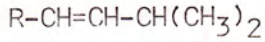
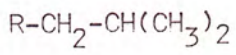
Naturally-occurring capsaicinoids

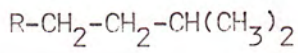
Capsaicin



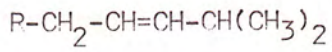
Nordihydrocapsaicin



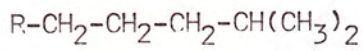
Dihydrocapsaicin



Homocapsaicin

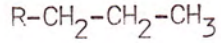


Homodihydrocapsaicin

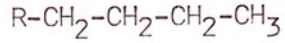


Synthetic capsaicinoids

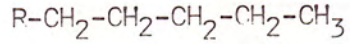
Vanillyl octanamide



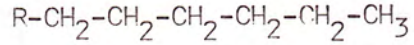
Vanillyl pelargonamide



Vanillyl capramide



Vanillyl undecanamide



Vanillyl undecenamide

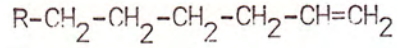
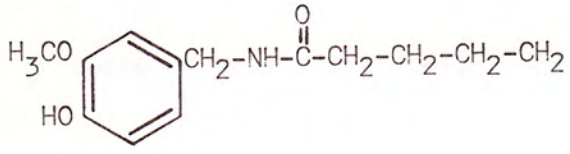


Figure 1. Naturally-occurring and synthetic capsaicinoids [12]. R is



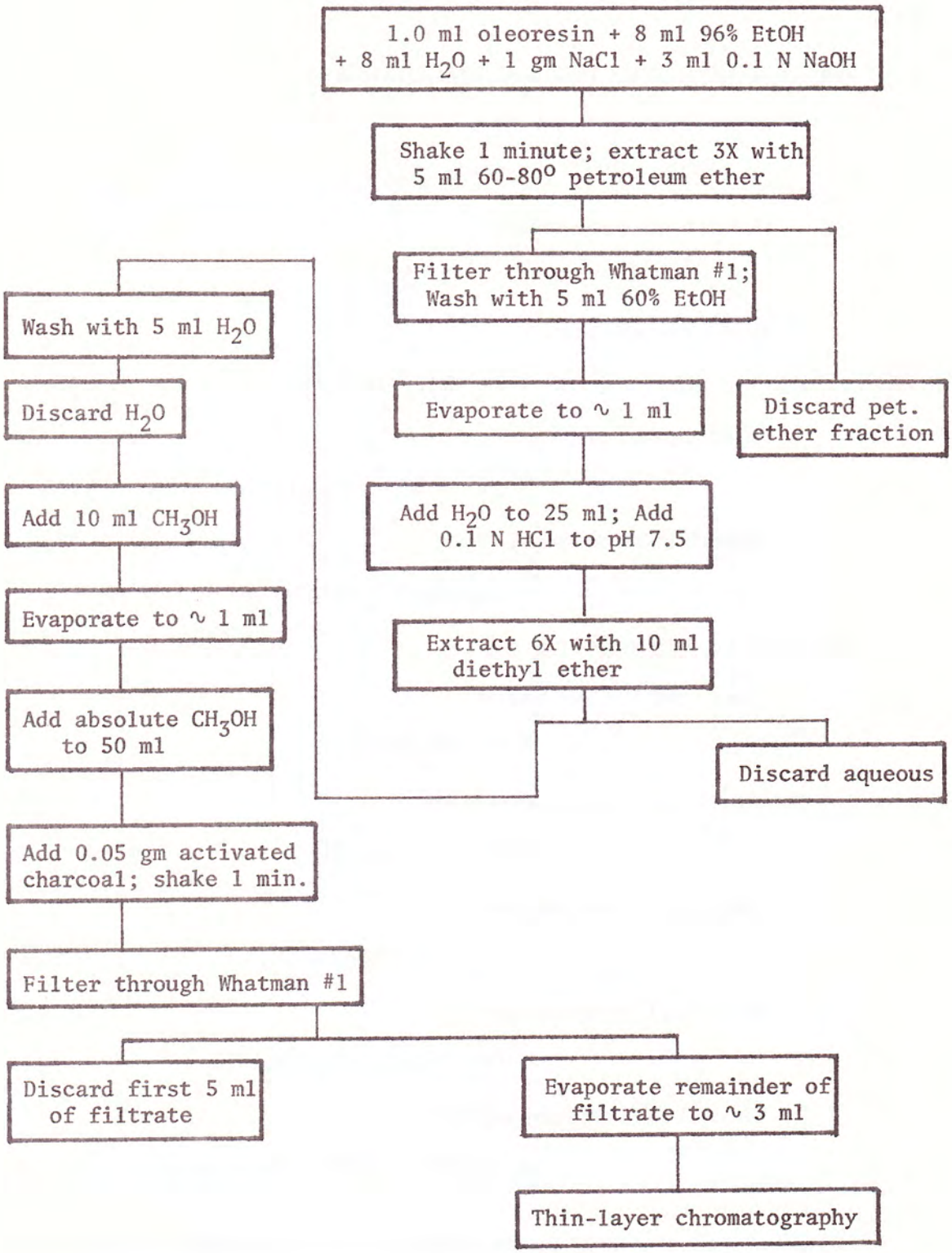



Figure 2. Flow chart for the solvent extraction "cleanup" procedure.