



NEW LETTER California Association of Criminalists NEW LETTER

JUNE 1979

PRESIDENT'S MESSAGE

The Seminar in San Diego was a tremendous success. Attendance at the meetings and at the banquet were record breaking (approximately 150 at the meeting and 110 paid at the banquet). And for once there was no question of a quorum at the business meeting. Was the attendance due to interest in the program, in CAC, or in San Diego? Whatever, Brandon and his staff did a truly superlative job in organizing and handling the seminar. Thanks and accolades to the San Diego Sheriff's Crime Lab.

Thanks also to Wayne Burgess for participating in "The Great Russian Hoax." I brought Wayne into the conspiracy several months ago after I saw Gregor Alexandrovitch Malnekof alias Jack Laskin at a Peace Officer's Meeting. I thought the CAC would enjoy his talk, but it was Wayne's efforts that made it happen.

The Association honored me by re-electing me to the Presidency. I'm not sure if it's because I did something right or if you're giving me another chance. Whatever, I appreciate the opportunity to see some very important matters through.

One is, of course, Certification. The work of the various peer groups and the National Board should reach fruition this year. Then, a product and a methodology will be presented to you instead of a nebulous concept. Then it is time to make a decision: Do you want certification?

The second is just as important but, for the present, is confined to the CAC. Our Code of Ethics implementation Procedure is undergoing review and reshaping. I was glad to be able to keep Jan on the Board, as she started this project two years ago. At each meeting, we find a little more that was overlooked or should be added. This project will be finished!

I think the Journal situation will also be resolved during the next year. This issue of our Newsletter is greatly expanded and contains real articles. It's about time the CAC recognized that we have a great deal of information that becomes worthless to the field because we do not share. Put your ideas down on paper and send them to George or a member of the Editorial Staff.

Again, I wish to thank all of you for the show of confidence you have given me. I will try to live up to your expectations.

JOURNAL UPDATE

By now, everyone should have received JFSS vol. 18/1-2 (1978); it is distinguished by a new green cover. Vol. 18/3-4 was printed in June and should reach members by the end of the summer. Vol. 19/1 is to be printed in July or August and 19/2 in September or October.

Three CAC papers are in press in JFSS.

CONTENTS

President's Message.....	1
Editor's Note.....	1
Study Group Activities.....	2
Upcoming Meetings.....	2
Employment Exchange.....	2
Metal Detectors - Notes on their principle, purchase, and use. T.D. JOHNSON...	3
Extraction and Comparison of Hair Dyes. J.M. WHITE.....	10
Copper Based Incendiary. D. ATKINSON and J. DEHAAN.....	11
An Unusual Mushroom. M. F. KALCHIK.....	13
Drug Chemistry Peer Group Meeting. C. HIDER.....	17
Serology Peer Group Meeting. G. SENSABAUGH.....	22

EDITOR'S NOTE

Continuing with the effort to improve the CAC Newsletter, this issue includes several contributed articles. Three are represented by permission from the DOJ Tieline; John DeHaan made the appropriate arrangements. If this effort is to continue, we need contributed material for the September issue. Many of the papers presented at the San Diego seminar are worthy of publication in the Newsletter, and authors are urged to submit their material. For all submissions, send clean copy, single spaced on white paper, to George Sensabaugh, U.C. Berkeley or Steve Shaffer, Fresno County Sheriff's Department.

You will note this issue of the Newsletter contains two sizes of copy. The reduced copy that has appeared in preceding issues allows a substantial savings in printing and postage costs but requires that everything be retyped. With the inclusion of technical articles, retyping is not immediately practical; accordingly they have been printed at standard size. In addition, some people have requested that the technical articles be printed in a fashion to allow them to be torn out integrally for filing convenience. The end result may not be completely pleasing esthetically but it is practical.

Please let us know your comments.

OUR INFORMED AUTHORS

Edward Keys in *The Michigan Murders* (Reader's Digest Press, 1979) comments "The basic procedural test for blood is to place the sample into an amphetamine solution -- the Benzedrine test, it's called."

STUDY GROUP ACTIVITIES

Northern Biology Group

The April meeting was hosted by Mike Grubb who outlined the principles and practice of immunoglobulin marker (Gm and Inv) typing. There was also discussion of certification and of participatory studies on hair, semen, and vaginal fluids. The next meeting was in early June, by Ed Blake, and dealt with outlining an experimental protocol for testing accuracy in the microscopic examination of hair; about 25 people volunteered to participate in a blind trial study, the results of which will be presented at the Fall CAC seminar. There was also discussion of questions for a certification examination; about 100 questions were donated for review.

Northern Firearms Group

The April meeting was hosted by Chuck Morton who talked on Forensic Photography; Chuck also provided a tour of his new laboratory. The June meeting had been scheduled to have a guest speaker, Dave Cumberland; it has been postponed until July 27.

Southern Serology Group

The April meeting was hosted by Orange County and was devoted to certification issues. The June meeting, again held at Orange County, addressed problems with discrepancies between bloodstain and fresh whole blood typing. Keith Inman presented a case situation and led a discussion on a paper on discrepancies in post mortem blood given at the Academy meeting by Campbell, Luke, and Cowan. In addition, Jim White distributed the updated and revised Forensic Serology Bibliography.

Southern Drug Group

The group met in April to discuss methods for PCP detection and identification. It was decided to pursue this further by attempting a multi-laboratory study of identification procedures. Hiram Evans (Ventura) provided a selective bibliography on PCP which may be obtained by writing him or Duane Mauzey, DOJ Santa Barbara.

UPCOMING WORKSHOPS AND MEETINGS

1. Advanced Soils and Mineralogy Microscopy, 6-10 August, 1978.

It will be taught by Dr. Walter C. McCrone of the McCrone Research Institute and will be held at MRI in Chicago, Illinois.

The workshop is open to students who have successfully completed the Basic Forensic Microscopy course or its equivalent. Tuition is \$65 plus expenses.

For further information, applications, and to reserve space, please contact Ira T. Silvergleit at the Foundation (301) 770-2723 as soon as possible.

2. International Congress on Forensic Hemogenetics, 23-27 September, 1977.

The Congress is meeting in London; sessions include paternity testing, analysis of bloodstains and other body fluids, population genetics, and new methods.

3. CAC Semi-Annual Seminar, 18-20 October, 1978.

Forensic Science Associates and Oakland Police Department are co-hosting the 54th Semi-Annual Seminar. Announcements and the call for papers will be forthcoming shortly.

4. Medico-Legal Investigation of Death, 1-3 May, 1980.

The Michigan Medical-Legal Research and Educational Association, Inc., in conjunction with the Wayne County Medical Examiner's Office and Wayne State University, School of Medicine, announces the 5th Annual Symposium in MEDICOLEGAL INVESTIGATION OF DEATH at the Plaza Hotel in the Renaissance Center, Detroit, Michigan.

The fee for the seminar is \$150 for physicians attending the 2-1/2 day session. (Physicians in training will qualify for a 33% discount upon receipt of certification from their Chief of Service.) Non-physicians' fee is \$100 for the 2 day session. A copy of MEDICOLEGAL INVESTIGATION OF DEATH, a text edited by Werner U. Spitz, M.D. and Russell C. Fisher, M.D., is included in the fee. As attendance is limited, the deadline for registration will be April 1, 1980. Checks can be made payable to the Michigan Medical-Legal Assn., Inc. and mailed to the Medical Examiner's Office, 400 E. Lafayette, Detroit, Michigan 48226. More information can be had by contacting the office by mail or by calling (313) 224-5648.

5. Conference on Forensic Science, 30 September - 4 October, 1978.

Jointly sponsored by the National District Attorneys Association, the American Academy of Forensic Sciences, and the Forensic Sciences Foundation, this conference will provide state of the art reviews and workshops in several Forensic Science specialty areas including Criminalistics. The meeting will be held at Snowmass, Colorado. For information contact National Institute Director, National District Attorneys Association, 666 Lake Shore Drive, Suite 1432, Chicago, Illinois 60611, (312) 944-4610.

EMPLOYMENT EXCHANGE

1. Position Wanted - H. J. Fobus

Dr. Kobus is currently director of the Forensic Science Laboratory, Salisbury, Rhodesia, and is looking to relocate. He is an analytic chemist with a specialty in emission spectroscopy. As lab director, he supervises 15 workers. For further information, write him at 17 Oxford Avenue, Highlands, Salisbury, Rhodesia.

2. Position Open - Florida Dept. of Law Enforcement

The Florida Dept. of Law Enforcement anticipates having openings for Crime Laboratory Analysts in the areas of Chemistry, Serology, Documents, Microanalysis, Latent Prints and Crime Scene Analysis. There are immediate openings in the first five areas. Journeyman and/or entry level applicants are acceptable with salary commensurate with training and experience.

For further information concerning these positions, please contact: Mr. Jack Duncan, Forensic Research and Training Section, Florida Department of Law Enforcement, Post Office Box 1489, Tallahassee, Florida 32302, (904) 487-2500.

3. Position Open - Calif. Dept. of Sheriff-Coroner

The Orange County, Calif. Dept. of Sheriff-Coroner has openings for the following positions:

Criminalist. This position may be suitable for either Journeyman or entry-level candidates, with salary commensurate with experience and training. Candidates must possess at least a B.S. in a natural, biological or forensic science.

Toxicologist. Minimum educational qualifications are similar to those given above for the criminalist position. In addition, at least two years experience in forensic toxicology are required.

For more information, please contact J. L. Ragle, Director, Dept. of the Sheriff-Coroner, Forensic Science Services, P.O. Box 449, Santa Ana, Calif. 92702, (714) 834-3073.

4. Position Open - University of Alabama

Forensic Science/Criminalistics - Assistant/Associate Professor. Tenure track position to start Fall, 1979. Ph.D. in Forensic Science, Criminalistics, or Analytical Chemistry with Crime Lab experience required. Will be responsible for undergraduate and graduate courses in criminalistics. Opportunity to participate in the development of an inter-disciplinary program (law/science/medicine) in Forensic Science. Possibility of shared appointment with Alabama Dept. of Forensic Sciences. Wide variety of lab facilities for research projects. Send detailed vita to: Dr. Charles Lindquist, Chairman, Dept. of Criminal Justice, University of Alabama in Birmingham, University Station, Birmingham, Alabama 35294.

NOTES ON THEIR OPERATING PRINCIPLES,
THINGS TO CONSIDER WHEN BUYING ONE AND THEIR USE AT A CRIME SCENE
by Torrey D. Johnson, Riverside laboratory

Recently, I purchased a metal detector with the idea of making it available for use in field investigations involving the Riverside Lab. I am also interested in it's hobby applications such as 'coin shooting' or relic hunting. I have made some observations, regarding this and other metal detectors, which may be useful to people considering the use or purchase of a detector for crime scene work.

In everything we do in criminalistics, we are haunted by "trade off rules". You just don't get something for nothing. If we are in a hurry and run the IR on fast scan, we lose some accuracy in wavenumber calibration and some peak definition. If you stop the aperture down on your camera, the focus is less critical and the depth of field increases. However, you have to increase exposure time to compensate, increasing problems with vibration or film color variations. Or if you go to faster film, the resulting photo has more grain. And so on in almost everything we do.

And so it is with metal detectors. The current market offers a myriad of new features and extravagant claims and this is to be a brief discussion of new features and what you trade off to get them.

Basic theory of operation:

Depending on how you divide them, there are two or three basic types of hand held metal detectors currently being manufactured.

The first is the Beat Frequency Oscillator type or BFO. This very common type of detector operates by beating two frequencies together, one from a fixed oscillator, the other from a variable oscillator.

When the signals from two oscillators with frequencies f_1 & f_2 are 'mixed' the resultant output contains the two original frequencies as well as the sum and differences of the frequencies, $|f_1 - f_2|$ & $|f_1 + f_2|$. If the oscillators are tuned so that $f_1 = f_2$, the resultant frequencies are f_1 and $2f_1$. The $|f_1 - f_2|$ component is zero. The oscillators are said to be null. If one oscillator frequency shifts slightly so that f_1 & f_2 are close but not equal, the $|f_1 - f_2|$ component has low frequency which could easily be in the audible range of frequencies, around 20 cps to 20,000 cps.

Thus the output of an oscillator at a frequency of 150,435 Hz in the radio frequency range, can be mixed with a second signal with a frequency of 149,975 Hz and will result in a frequency of 460 Hz being present in the output. If the frequency of the second oscillator is changed to 148,850, the $|f_1 - f_2|$ component jumps to 1585 Hz. If the output signal were being amplified and applied to a speaker the change would be to a higher pitch - not in loudness.

This principle is used in a BFO detector in the following way. Two oscillators with frequencies out of audio range (usually around 100 to 300 kHz) are mixed and the resultant is amplified and applied to a speaker. The variable oscillator circuit's frequency is determined by a tuned circuit which incorporates the search coil. The oscillators are tuned (usually by a tuning control on the detector) so that $|f_1 - f_2|$ is a low frequency - just into audio range. Now when the search

coil is moved into the proximity of a metal object, an electromagnetic coupling takes place causing the frequency of the variable oscillator to change. This causes a resultant change in $|f_1 - f_2|$. Thus detection of a metal target is indicated by a change in the frequency or pitch of the tone in the speaker.

It may occur to you that the tone will go up in pitch if the variable oscillator frequency changes in a direction that causes $|f_1 - f_2|$ to get larger. On the other hand, if $|f_1 - f_2|$ gets smaller, it may go out of audio range (toward the null position). It turns out that non-magnetic materials - such as gold, lead, silver, etc., will cause a frequency shift one direction while magnetic materials such as iron or minerals with some magnetic character will shift the frequency the opposite direction. Thus depending on which 'side' of null the oscillators are set, a metal (non-magnetic object) may shift the beat frequency to a higher audio frequency while a mineral (magnetic object) may shift the beat frequency into the null area resulting in a loss of tone. Many manufacturers have utilized this phenomena by equipping their metal detectors with metal/mineral settings.

These are basically just labels on the oscillator tuning control so the operator knows which side of the null he is on and can predict how a metal or mineral will affect the beat frequency.

It should be noted that this type of detector may give an increased audio frequency when set on non-magnetic even though the loop is passed close to a large magnetic object (such as a gun). This is due to the large frequency shift caused by the large object which moves $f_1 - f_2$ through the null area (where $|f_1 - f_2|$ = a sub audio range frequency) and into the audio range on the other side of the null.

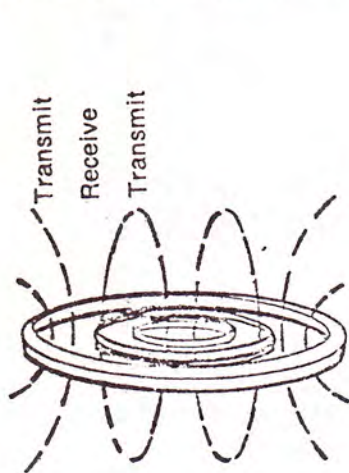
This type of detector can generally be obtained at a lower cost than the other types and is the easiest to use. The simplicity of the BFO system results in reliability and ruggedness. It is, however, affected by minerals in the ground which can give false positives and may make such a detector hard to use in some areas. The BFO detectors will range in price from the very cheapest of detectors in the 20 dollar range to several hundred dollar models with very stable fixed oscillators and good faraday shielding of the search coil to reduce the effects of the ground and other non-metallic objects.

The second group of detectors is known as the Transmitter/Receiver (TR) Type. This group includes the Induction Balance (IB)² detectors, the very low frequency (VLF) and ground canceling detectors which will be mentioned later.

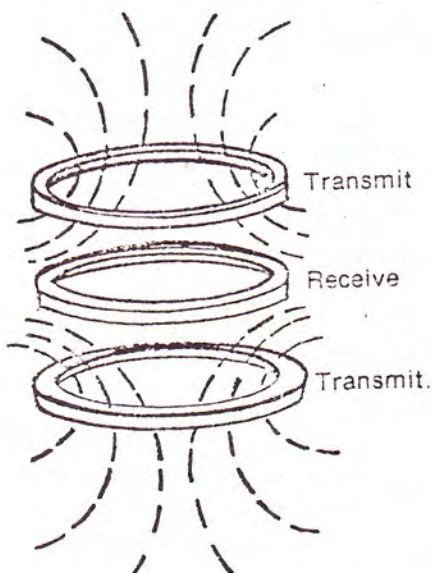
Very basically, the TR detectors have two sets of coils. One set transmits a signal, usually around 100 KHz[†], the other receives it. The coils or antennas - which is what they really are - are arranged in a way that, in the absence of any metal in the electromagnetic field, no signal is detected by the receivers. If the field passes around a metal object, however, it is deformed or warped and this results in a signal at the receive coil.

The original TR detectors had the transmitter mounted at one end of a short pole and the receiver at the other end. These detectors are still used but are limited to looking for large objects at great depths.

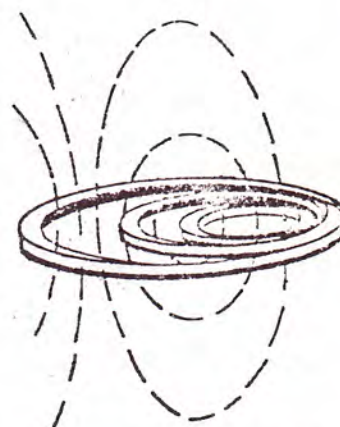
The induction balance (IB) detectors use a similar system except both the transmit and receive coils are both mounted together in the search head. There may be a receive coil sandwiched between two transmit coils (coaxial coils) or a large transmit coil and a small transmit coil with an intermediate sized receive coil mounted concentrically in the same plane. The latter arrangement can be modified into other configurations such as being equally spaced but having their centers at different locations.



Coplanar coils.



Coaxial coils.



Modified coplanar coils.

In these detectors the two transmit coils are balanced so there is a null at the receive coil giving no signal reception. When a metal object deforms the electromagnetic field around the transmit coils, a signal is then induced into the receive coils. This is amplified and applied to a speaker or meter.

The IB detectors also may have a metal/mineral setting. Here the frequency does not shift. However, the residual coupling between the transmit and receive coils is affected with one type of material increasing the coupling and the other reducing it.

The IB or TR detector is more sensitive than the BFO and will give greater depth of detection. As with the BFO, it is affected by mineralization in the ground. Once balanced at a certain distance above soil with mineralization in it, any change in this distance or in the character of the mineralization will give a false 'metal' signal. This can be debilitating in areas of heavy to moderate mineralization.

A relatively new variety of TR detector is now becoming very common. This type operates in the frequency range from 3000 Hz to 30 KHz.¹ This region of the radio frequency spectrum is known as very low frequency or VLF.

The use of very low frequencies makes these detectors less sensitive to the ground mineralization and increases the depth of penetration and the sensitivity of these detectors to all metals. This increase in sensitivity will be discussed later in the light of trade off rules.

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While both mineralization and metal targets can "warp" the field of a TR detectors search coil so a signal is received, a secondary effect is present. In the case of ferrous minerals (non-conductive) the return signal is in phase or only slightly out of phase with the transmitted signal. However, with ferrous and non-ferrous conductive materials the return signal is not similarly in phase.

Detectors now are made which eliminate most if not all of the in phase signal (from ground mineralization) and see only the out of phase signals which are due to metal targets.⁴ These are termed 'Ground canceling', compensation or exclusion, synchronous phase discrimination, etc., each manufacture having his own name for this type of circuitry.

Most of the detectors using the phase shift detection usually operate in the VLF frequency range. Thus a TR metal detector may operate in VLF range with or without phase shift detection.

This is where the 'trade off rules' are especially obvious (now that I have a VLF/Ground Canceling detector and understand what the literature was saying all the time). The VLF gives almost unbelievable depth penetration relative to other detectors and the phase shift allows the ground mineralization to be ignored. This is great but what do you trade off or loose? It turns out that the lower the frequency the greater the sensitivity to conductive ferrous objects - it actually gets too sensitive. This may not seem like a problem until you try to find a bullet or cartridge casing near a house where a clumsy carpenter dropped 50,000 small nails. The detector I have will detect a small nail 6 to 8 inches down, even in mineralized soil. The end result is it becomes almost useless in yards or other places where nails or small pieces of iron wire abound.

This objection can be overcome to some degree (at a considerable increase in cost, however) by getting a detector which has the phase shift detection capability but also can be switched to standard T/R mode with "discrimination".⁴

A discriminator detector has circuitry which enables the operator to adjust the sensitivity to exclude detection of certain types of objects, such as pull tops and aluminum foil, or deeply buried nails. This naturally results in overall sensitivity loss (trade off!) but does make the detector useful to some degree in areas where it would be useless without it.

Accessories. Most metal detector companies are now making various sized search coils for all types of detectors. Very large search heads - give exceptional depth of detection on larger objects such as buried guns or metal boxes but have low sensitivity to very small objects such as a .22 caliber bullet. Other smaller search coils can pin point very small particles but depth of detection is low. Some detectors come with two sizes of search heads; some have two built into one search head and the operator merely switches to the one he wants.

Before a discussion of a metal detector purchase is undertaken, we should briefly consider how it is most likely to be used.

Many applications for a metal detector on a crime scene can be envisioned. Application such as looking for a gun in mud or brush, looking for bullets or cartridge casings on the ground, searching for a knife or chain, or searching an area of a struggle to find any objects such as keys, coins or watches. Other possibilities would be searching for metal objects thrown into shallow muddy water or looking for bullets lodged in trees or telephone poles.

The criminalist must also be aware that there are some situations where a metal detector is useless. Examples would be looking for a particular metal object in an auto wrecking yard or scrap metal yard (or a place which once was a wrecking or scrap yard). Also excluded would be searches in many buildings. This is because of nails, metal reinforcing, pipes, electrical wiring and various other metal construction materials.

Now a few notes on a metal detector purchase. There is no metal detector which is best in all situations but each type has it's advantages. The BFO detector is good under a wide range of conditions and it's basic operation is simple. Various accessories are available to make it fairly versatile. It is, however, affected by mineralization in the soil which will cause a loss of depth of detection and will give "false" signals. Weaker signals may be difficult to recognize - especially to inexperienced operators.

The T-R detector is easy to operate and weak signals are easy to distinguish. They commonly are available with a discriminator circuit to help eliminate trash. The T-R detector is greatly effected by the minerals in the soil. When rough ground is encountered, small depressions and holes will give a signal.

The VLF/ground exclusion detector will give the greatest depth of detection - even over mineralized ground. They may be trickier to tune but once tuned, they are very easy to use. Their main disadvantage is their sensitivity to ferrous metal trash. Some VLF detectors may experience interference from high tension power lines.

There are also some combination detectors. Several companies have detectors which have both the ground exclusion mode and a standard TR mode with discriminator. This can overcome some of the disadvantages of both types. This combination may result in increased cost.

There are several other features which should be considered. One especially handy feature found on some TR and VLF/TR detectors is "push button" tuning. Any detector will experience electronic drift and will require retuning. This is normally done with the tuning control by turning the knob till the signal is at it's proper threshold. This requires two hands - one is in use already - holding the instrument and the second for tuning. This may be a problem since normally you will be carrying some digging impliment. With push button tuning, one simply depresses a button on the handle - using the same hand that is holding the instrument - and the instrument is electronically returned to its original threshold level. This is a very useful aid to the detector operator.

A second feature which a good metal detector should have is a waterproof search head. Many manufacturers have water resistant search heads only. The instrument should also have an assortment of search head sizes available as accessories.

Also available with many detectors are rechargeable battery packs. This is especially desirable with many of the VLF detectors which draw relatively heavy current and tend to be hard on batteries.

However, the metal detector user must realize that the success of a search is not so much a function of the instrument as it is of the operator. Most agencies which I encounter have an acceptable metal detector available which they hardly ever use. The lack of use usually has resulted because metal detector searches have not been effective in the past. This lack of effectiveness can usually be tied to operator inexperience and a lack of understanding of the operation and the limitations of metal detectors.

Probably the single most important factor in successful metal detector searches is practice. This is especially true of the newer more sophisticated and versatile detectors. Practice means burying objects of different sizes and then detecting them. Compare signal strength with size and depth. Listen to the type of sound for different objects. Practice pinpointing small objects. Practice tuning your detector. Then do some "coinshooting" at a local park or around your house. This will give you a "real" situation. You should find more objects buried deeper and find them faster as you gain experience. Then try using the detector in a crime scene situation.

The following are a few recent examples of metal detector use by the Riverside lab. These illustrate some of the problems and rewards of metal detector use.

A young male had been executed in an orange grove. The body had four bullet wounds with three .22 caliber bullets recovered by autopsy. Two .22 cartridge casings were recovered during crime scene processing. It was felt that two cartridge casings were still at the scene so I brought my VLF detector to the scene. Within a half hour, five cartridge casings and three bullets had been recovered. One of the recovered bullets was in better condition than any removed from the body.

Here the situation was ideal - cleared ground, no non-significant metal and a relatively small area.

In another scene, a shootout between two gangs in a local park resulted in a fatal wound in one of the gang members. The autopsy revealed an entry wound in the chest with an exit under the left arm. A large bruise inside the left arm indicated the bullet had probably hit the inside of the arm and dropped. A search with the metal detector was begun at one end of "dragmarks" which were present. Before the area was completely searched, a detective found the missing bullet in a paved area.

This scene presented several problems. Being a park, the ground was full of gum and cigarette wrappers (tin foil), pop tops, bottle caps, etc. Since each signal must be checked, it was very time consuming. Also, part of the search was near a building. Metal in the building made it impossible to search closer than one to two feet from the building with the VLF detector. Thus in this scene, the metal detector was quite limited.

A third scene was in a rural area where a 187 suspect had left a stolen car. The detectives felt he may have thrown some keys away at the location and they requested aid in searching. The area was searched as well as possible but no keys were found. (I did find a 1945-S fifty cent piece in very good condition.)

The area was heavily over grown so it was not possible to search all the ground area. Since the heavy, three to six foot tall brush covered a large proportion of the ground, a thorough search was not possible. Secondly, there was a large number of pieces of wire - probably from fence building or mending - in the area. These slowed down the search as each signal had to be checked.

An additional scene in the same case was an area which reportedly had been used for target shooting by the suspect with the suspect weapon (which had not been recovered). In a search of this area, we recovered five .38 caliber bullets and five .22 caliber bullets from the impact area and five .38 special casings and five .22 magnum casings from the area where the shooters stood. The informant had said there were six shots of each fired. The entire search was less than 45 minutes.

This was another ideal area with no metal trash. It was, however, in highly mineralized ground and a VLF detector with ground exclusion was necessary.

Several other field calls involved unidentified bodies or remains in rural areas. The metal detector was used to search the areas but no crime-connected objects were found. This lack of bullets and cartridges may in itself be significant.

There is no question that the metal detector can and does play an extremely important part in crime scene searching. It is not, however, a panacea and its limitations must be understood. An understanding of metal detector types and basic operating principles can help when reading all the manufacturers claims.

The questions of whether or not to purchase a metal detector and what type and make of detector to consider are not easy to answer. It is hoped that this article may be of some help should these questions arise.

REFERENCES:

1. Garrett, Charles, "The Ground Canceling VLF/TR Detector", Western and Eastern Treasures, Vol. 12, No. 3, March 1978.
2. Catalogue, P.N.I., Inc., Bounty Hunter Metal Detectors, Tempe, Arizona.
3. Product News From Whites, "A Consumer's Guide to How Your Metal Detector Works", White Electronics, Inc., Sweet Home, Oregon.
4. U. S. Patent 4,030,026, June 14, 1977.
5. Catalogue, Comprehensive, Whites Electronics Inc., Sweet Home, Oregon.
6. Garrett, Charles L., Successful Coin Hunting, Ram Publishing Co., Dallas, Texas.

Plus miscellaneous brochures and catalogues from Whites Electronics, Sweet Home, Oregon; Fisher Research Laboratories, Los Banos, Calif.; PNI, Inc., Tempe, Arizona; Garrett Metal Detectors, Garland, Texas; and Compass Electronics, Forest Grove, Oregon.

Technical Note

EXTRACTION AND COMPARISON OF HAIR DYES

James M. White

I recently complete a case in which hair dye patterns were successfully compared between standard and questioned hairs.

CASE CIRCUMSTANCES

The victim, who routinely dyed her hair black, was beaten and raped by a suspect whom she could name for the police. A search of his house revealed an army jacket with a partially torn shoulder patch. Caught in this patch were 30-50 long black dyed hairs. The victim stated she had recently changed from "Roux Jet" to "Clairol Azure" dye.

MATERIALS

1. Standard hair from victim, measuring 8-13" with 2mm undyed root
2. Questioned hair from suspect's jacket measuring 9½-21", with undyed roots measuring 2-13mm
3. Commercial black hair dyes:
 - a. Clairol Black 124
 - b. Clairol Black 83
 - c. Clairol Azure Black
 - d. Alberto Culver ID Black
 - e. Roux 11 Blue Jet

METHOD

After failing to extract any significant amount of dye with a variety of organic solvents, three standard and three questioned hairs (each with 2 mm undyed root) were digested in 10% NaOH (10 minutes in a boiling water bath). The dye was then extracted into HCCl_3 and the solvent evaporated. The colorless residue was dissolved in 400-500 μl EtOH, to which was then added 50-100 μl Glacial HOAC to restore the chromophore. This was evaporated, redissolved in chloroform and spotted on Silica Gel (250 μm EM Merck) and developed in the fiber system of Macrae¹. (Pyridine/amy1 alcohol/10% Aq NH_4OH ; 4:3:3V/V)

RESULTS

Both the standard and questioned hair produced similar 4 color spot patterns. However the pattern did not match any of the 5 commercial dyes, including the two which she said she had been using. The extracted dyes change quite rapidly upon exposure to light; however, they appeared relatively stable while on the hairs in the dark.

¹Macrae et al. J For Sci v 4 #1 p.117

COPPER BASED INCENDIARY

The Washoe County Sheriff's Department Crime Lab in Reno, Nevada, has reported that within the last six months it had encountered four cases of arson or attempted arson in which an unusual incendiary or its residue had been encountered. Fortunately, in the first case examined, one of the incendiary devices had not ignited. This device consisted of a partial beer can containing approximately 80 grams of a grey powdery material and a cigarette-match delayed ignition mechanism. The grey powder was found to be a copper oxide-based "thermite" mixture. Two companies were found that manufacture such a mixture, the first being Erico Products Incorporated of Solon, Ohio, whose brand name is "Cadweld" and the second being Continental Industries Incorporated of Tulsa, Oklahoma, with their brand "Thermoweld". These materials are available commercially and are used for welding copper buss bars together in large-scale electrical applications. The material can be ignited at approximately 800° F. by the use of an ordinary match. The resulting exothermic reaction produces temperatures in excess of 4000° F. This product is marketed in individual containers of up to one and one-half pound size.

Based upon laboratory tests of extremely small quantities of this material (which shattered porcelain crucibles and then welded them together) the effect of one of these large containers must be quite impressive. Erico Products reported the composition of their product to be as follows:

Copper mill scales (essentially copper oxide) 70-80%
 Aluminum/copper alloy 14-18%
 Fluorspar (calcium fluoride) 1-3%
 Calcium-silicon alloy 1-3%
 Aluminum-vanadium alloy 0-2%
 Tin 0-8%
 Iron mill scale (essentially Fe_3O_4) 0-1%

Information from Continental Industries indicates that their Thermoweld product is very similar in composition and burn characteristics. Unfortunately, a detailed list of components was not available to confirm this.

Tests in the Sacramento DOJ Lab reveal that, upon ignition, a molten slag of quite low viscosity is produced almost immediately. When unconfined, this slag produces a radial splatter pattern of molten droplets. A residue upon cooling is found to consist of a number of small ($\frac{1}{2}$ -2 mm diameter) beads of high purity copper, a black amorphous slag containing aluminum oxide and copper oxides, and masses of brown or blackened "gold" colored metallic copper. Elemental analysis of the small beads of material reveal the presence of copper, aluminum, tin, silicon, calcium, and iron with traces of manganese and titanium.

Small, single-use quantities of Cadweld are packaged in press-top polyethylene vials, with the name "Cadweld" cast onto the top and bottom of each vial. This product, due to its ready availability and extremely high energy reactions, could be used in a wide variety of incendiary devices. In the Washoe County Sheriff's Department cases, the mixture had been used in conjunction with gasoline in a variety of containers, thus resulting in very efficient fires. The ease of ignition of this material lends itself to its use as an igniter in multiple sets of this type. Background information from Reno indicates that devices of this type have been used in a variety of union disputes involving building sites. For further information, feel free to contact David Atkinson of the Crime Laboratory, Washoe County Sheriff's Department, P. O. Box 2915, Reno, Nevada, 89505, or John DeHaan at the Sacramento Lab - DOJ.

Mark F. Kalchik - San Luis Obispo "Miniregional" Laboratory

Introduction:

It has been 20 years since the isolation of psilocybin was first reported from *Stropharia* (now *Psilocybe*) *cubensis* [1]. In that time psilocybin has been found in other species of the genus *Psilocybe* [2-6], plus the genera *Panaeolus* [2,7,8], *Conocybe* [3], *Copelandia* [8] and *Gymnopilus* [9]. The number of species containing psilocybin and/or psilocin are still being expanded.

A flurry of analyses were performed in the 1960's on the genera *Psilocybe* and *Panaeolus* after the discovery of psilocybin. Since the 1960's work has slowed. However, in the past few years the forensic community has been faced with the task of identifying psilocybin and/or psilocin in mushrooms. Because of this a number of studies have recently been carried out.

Since the mushroom itself is not controlled but the chemicals contained are, a botanical identification is not necessary. Sometimes, though, it would be helpful to know the genus to which the mushroom belongs. This can allow background information to be developed for working with the mushroom.

We received several mushrooms to be analysed as part of a larger drug case. The mushrooms were received as a dried sample but with features intact. A section of gill was removed and the spores viewed. The spore color was a rust brown color and using this along with the physical characteristics the mushroom has tentatively been identified as a *Conocybe* mushroom using Miller [10]. Benedict, et al [3] found that various species of *Conocybe* contains psilocybin and/or psilocin. Brady, et al [11] found a separate species that contained alpha-amanitin. However, there have been no reports of the psilocybin type compounds occurring with the amanitin type compounds in the same mushrooms.

Extraction:

First the mushrooms are thoroughly dried at 50°C for 5 hours. Then between 0.1 and 1 gram is ground to a powder. The powder is then extracted with 25 ml of methanol for one hour at 220 cycles per seconds on a rotating table. The extract is filtered into an evaporating dish and evaporated to about 1 ml on a steam bath. The concentrated extract is placed in the freezer for about one hour and then centrifuged, the clear or yellow solution being used for further testing.

Analysis:

The van Urks screening test was positive indicating indole alkaloids.

The UV spectrum (Fig. 1) is very different from previous UV spectra [12,13] and is not characteristic of the 4-hydroxyindoles [14]. I am not familiar with the type of structure which would produce this type of spectra.

Concentrated extract (approx. 3 ul each) was spotted on three 5x10 cm TLC plates [15]. These were developed in 3 systems. After development the plates were air dried and sprayed with fresh 5% p-dimethylaminobenzaldehyde in concentrated hydrochloric acid. The psilocybin appears as a red-violet spot. Psilocin was indicated as a blue spot but no standard was available.

Some of the concentrated extract was streaked along a line 19 cm long and 1 cm from the bottom of a 20x20 cm plate [15]. The plate was developed in system 1. After air drying several bands were located with UV light. The bands at rf's 0.9, 0.3, and 0.1 were removed and extracted into methanol.

The UV spectra were recorded [Fig. 2,3] for the bands at 0.3 (psilocybin area) and 0.1 (psilocin area). However, the positions are being interfered with by an unknown compound(s) as indicated by the UV spectra for the area between 0.1 and 0.3 [Fig. 4]. By subtracting Fig. 4 from Fig. 2 the spectra for psilocybin can be seen [Fig. 5].

The curve of the unknown compound [Fig. 4] is very similar to the basic alpha-amanitin curve [16]. Testing of the extract against *Amanita phalloides* indicated amanitin type compounds which could not be identified using system 1 and a system of methanol: methylethylketone (1:1)[17].

The area at rf=0.9 is responsible for the characteristic UV [Fig. 6].

Table 1

<u>Solvent Systems</u>	<u>Unk.</u>	<u>Psilocybin</u>	<u>Unk.</u>	<u>Psilocin</u>
S-1	.10	.10	.32	N/A
S-2	.19	.19	-	N/A
S-3	.33	.32	.60	N/A
S-1 Methanol: ammonium hydroxide (100:1.5)				
S-2 N-Propanol: 5% ammonium hydroxide (5:2)				
S-3 N-Butanol: acetic acid: water (4:1:1)				

Summary:

A new type of mushroom has been encountered which introduced some problems in analysis. The UV spectrum is not indicative of mushrooms containing psilocybin although psilocybin is present. Also the mushroom contains an amanitin like compound(s) which interferes with portions of the analysis.

I want to thank Lance Gima for the *Amanita phalloides*.

- [1] Hofmann, A.; Heim, R.; Brack, A.; Kobel, H.; Experientia, 14, 107 (1958)
- [2] Ott, J.; Guzman, G.; Lloydia; 39; 258 (1976)
- [3] Benedict, R.G.; Brady, L.R.; Smith, A.H.; Tyler, V.E.; Lloydia; 25; 156 (1962)

FIG. 1

Mushroom Extract
2-8-78 mfk



FIG 2-3

TLC(T-1) Mushroom Extract
2-8-78 mfk

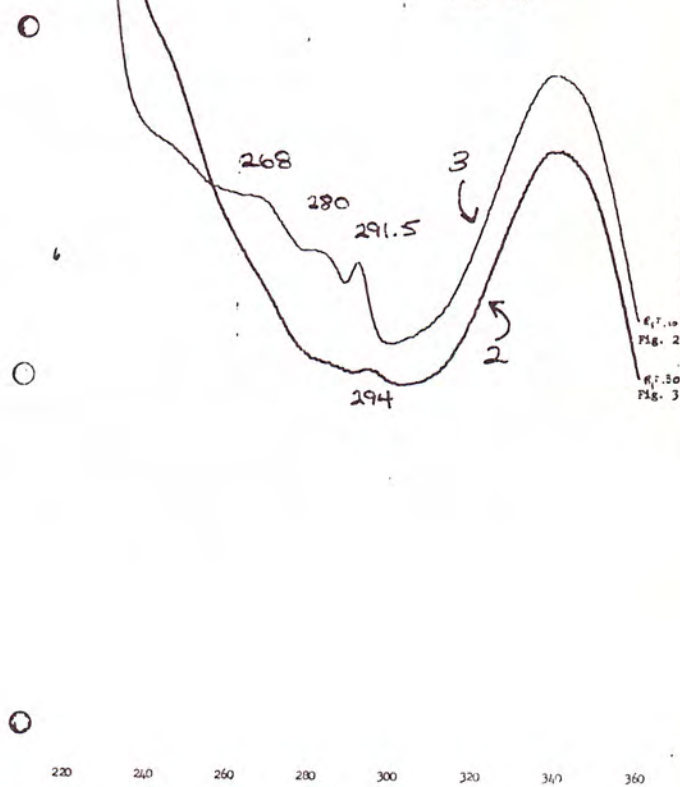


FIG 5

-36-

TLC(T-1) Mushroom Extract
Fig. 5 $r_f 1 - r_f 1,3$
2-8-78 mfk

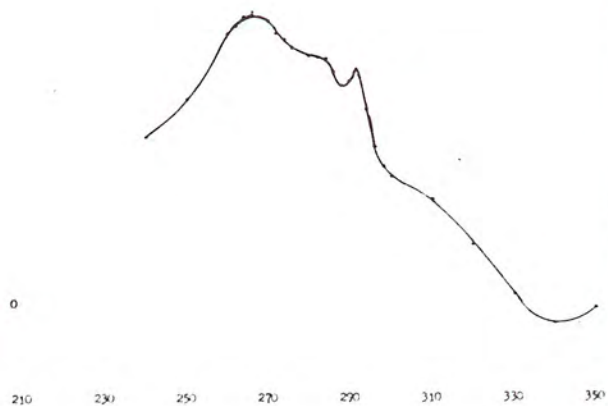
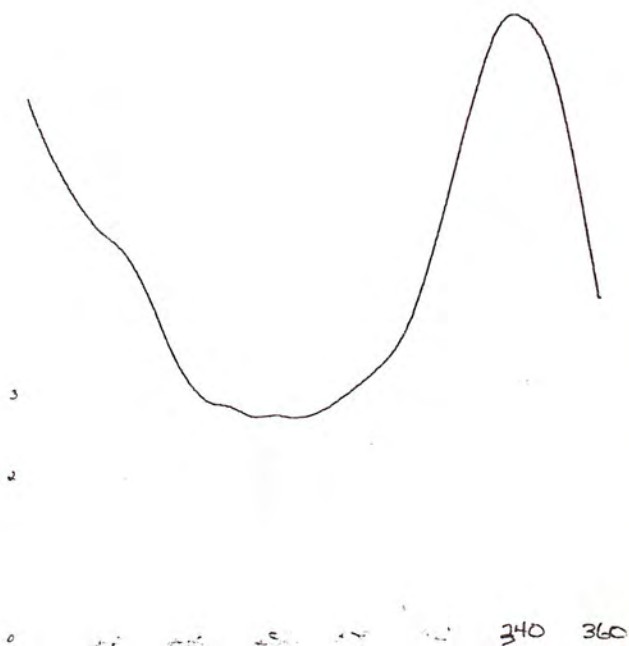


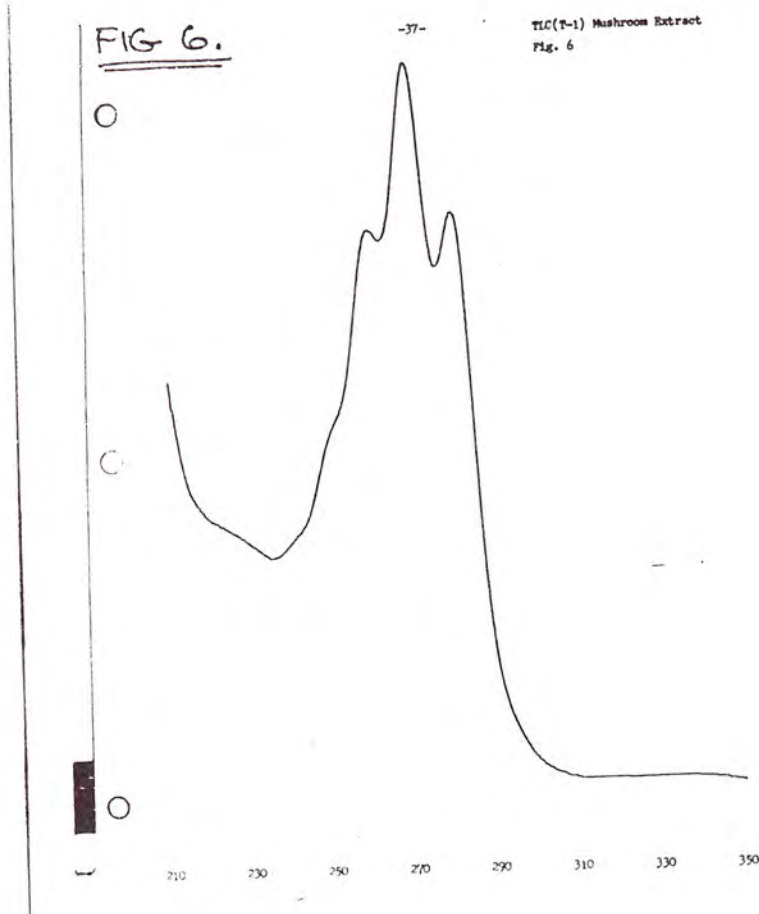
FIG 4

-35-

TLC(T-1) Mushroom Extract
Fig. 4 $r_f 1,3$
2-8-78 mfk



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- [5] Hofmann, A.; Heim, R.; Tschertter, H.; C.R. Acad. Sci. Paris; 257; 10 (1963)
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- [9] Hatfield, G.M.; Valdes, L.J.; Smith, A.H.; Lloydia; 41; 140 (1978)
- [10] Miller, O.K., Jr.; Mushrooms of North America; E.P. Dutton; 24,198 (1977)
- [11] Brady, L.R.; Benedict, R.G.; Tyler, V.E.; Stuntz, D.E.; Malone, M.H.; Lloydia; 38; 173 (1975)
- [12] Kalchik, M.; TIE Line; 4(2); 19 (1977)
- [13] Miller, D.S.; Microgram; 5; 5 (1972)
- [14] Troxler, F.; Seeman, F.; Hofmann, A.; Helv. Chim. Acta; 42; 2073 (1959)
- [15] E. M. Merck Silica Gel with fluorescent indicator
- [16] Wieland, T.; Progress in the Chemistry of Organic Natural Products; Springer-Verlag, Wien; 25; 214 (1967)
- [17] Raaen, H.P.; J. Chromatog.; 38; 403 (1968)



Minutes of the First Drug Chemistry Peer Group Meeting

Held At The Drug Enforcement Administration,

Special Testing and Research Laboratory

McLean, Virginia

May 4-5, 1979

Present were: Joseph L. Peterson, Executive Director, Forensic Science Foundation; John O. Sullivan, Manager, Forensic Science Programs, LEAA; Stanley P. Sobol, DEA, Co-ordinator; Cecil L. Hider, California Dept. of Justice, Goleta, CA; William P. Marshall, Idaho Dept. of Health & Welfare, Boise, Idaho; James M. Moore, DEA, McLean, VA; F. Taylor Noggle, Jr., Alabama Dept. of Forensic Sciences, Auburn, AL; Alexander M. Stirton, II, Penn. State Police Crime Lab, Bethlehem, PA; Philip R. Whittle, Ph.D., Regional Crime Lab, Missouri Southern State College, Joplin, Missouri.

The meeting began at 8:30 a.m. and was called to order by Joseph L. Peterson, D. Crim., Executive Director of the Forensic Sciences Foundation, Inc. A short presentation on the status of forensic certification programs in toxicology, odontology, psychiatry anthropology, and documents examinations was given. During the discussion a question concerning certification of individuals conducting toxicological examinations in the nation's crime laboratories was clarified by Dr. Peterson. He stated the American Board of Forensic Toxicology (ABFT) has agreed to assume responsibility for drafting guidelines for an alternate certification track where a Ph.D. would not be a minimum requirement. The ABFT has indicated, though, their interest is in certifying general toxicologists, not individuals specializing in a single area such as blood alcohol analyses. Persons interested in making input into these ABFT guidelines should contact either:

Larry B. Howard, Ph.D., State Crime Laboratory, P.O. Box 1456, Atlanta, Georgia 30301, (404) 656-6055

or

Robert V. Blanke, Ph.D., MCV Hospital Toxicology Laboratory, Box 696, MCV Station, Richmond, Virginia 23298, (804) 786-0272.

The Drug Chemistry Peer Group is to have a final package for presentation to the Criminalistics Certification Study Committee by August 1979 and a package prepared for presentation and balloting by the fall 1979 meetings of the regional organizations.

Officers for the Drug Chemistry Peer Group were nominated and elected by the members of the Peer Group. Cecil Hider was elected to serve as Chairman and Taylor Noggle was elected to serve as Secretary.

The Peer Group began by defining the scope of the task which it would be considering and defined forensic drug chemistry as follows:

Forensic Drug Chemistry is that profession and scientific discipline directed to the recognition, identification, and evaluation of suspected controlled substances.

The areas in which forensic drug chemists would be required to show proficiency would be in (1) presumptive tests, (2) separation techniques, (3) identification techniques, and (4) quantitative techniques.

In order to qualify for certification the applicant must meet the following requirements:

Formal Education

An earned baccalaureate degree in a natural science or appropriately related field from an accredited institution. The degree must include courses in inorganic chemistry, organic chemistry, qualitative analysis and quantitative analysis. The applicant is required to submit a transcript for verification.

Work Experience

The applicant must have a minimum of two years forensic science laboratory experience during which time duties included the qualitative and quantitative analysis of suspected controlled drugs. Experience should include familiarization with: (1) chromatography, (2) spectrometry, (3) microscopy, (4) wet chemical methods, and (5) the origin and chemistry of controlled substances. Applicants must be engaged in the practice of forensic drug chemistry at the time of application in order to be certified as a forensic drug chemist.

Note: Each Peer Group member should discuss with his regional organization whether a statement concerning the applicants area of endeavor should be included at this point. This would be a statement with regard to case work, research, supervision, or teaching.

Court Experience, Publications, Professional Activities

Court experience, publications, and membership in professional organizations are not required in order to become an applicant for certification as a Forensic Drug Chemist.

Type of Examination to be Given and Preparation of a Sample Exam

The Drug Chemistry Peer Group recommended a combination examination consisting of (1) a written test and (2) a proficiency test.

The Written Examination

The written examination will consist of approximately 50-100 primarily objective questions. Included in the examination will be questions in the following areas:

I. Spectrometry - Theory and Application

- A. UV-Vis
- B. IR
- C. GC/MS
- D. Fluorescence

II. Chromatography - Theory and Application

- A. TLC
- B. GLC
- C. HPLC
- D. Column Chromatography

- III. Microscopy - Theory and Application
 - A. Microcrystalline Tests
 - B. Polarizing Microscope
 - C. Melting Point Determination
 - D. Optical Crystallography
- IV. Wet Chemical Methods - Theory and Application
 - A. Spot Tests
 - B. Solvent Extractions
 - C. Distillations
 - D. Derivatization
 - E. Volumetric and Gravimetric Analysis
- V. Origin and Chemistry of Controlled Substances
 - A. Synthesis and/or Manufacture
 - B. General Structural Relationships
 - C. Isomers

The members of the Peer Group should formulate questions from each of the areas with the following members giving special emphasis to the areas outlined below.

Spectrometry - James M. Moore

Chromatography - Philip R. Whittle

Microscopy - William P. Marshall & Cecil L. Hider

Wet Chemical Methods - F. Taylor Noggle, Jr.

Origin & Chemistry of Controlled Substances - Alexander M. Stirton, II

The questions which are prepared will be screened at the next Peer Group meeting and these questions will be combined into the first examination. Each member should bring approximately twelve (12) copies of the sample questions to facilitate the screening process.

A syllabus or bibliography should be prepared to provide the applicant with a study guide for the examination as well as having several sample questions to show the type examination.

Each member of the Peer Group should also prepare questions on the more general area of criminalistics as outlined by the Criminalistics Certification Study Committee (CCSC) in the minutes of the Fifth Meeting.

- I. Basic Principles of Identification and Individualization
- II. Scientific Methodology
- III. Evidence Handling
- IV. Basic Microscopy
- V. Communication
- VI. Legal Aspects and Court Testimony
- VII. Literature of Criminalistics
- VIII. General Knowledge of Criminalistics

The examination is tentatively scheduled to be given only once a year. Each Peer Group representative should solicit comments from the regional organizations concerning frequency of the examination and the mechanics of

administering the exam. The two mechanisms suggested for administering the examination were: (1) give the examination in conjunction with a regularly scheduled local organization meeting and (2) the appointment of regional examination committees to administer the examination at sites more conveniently located to applicants. Control of the examination must be maintained at all times to insure the secrecy of the test.

The Proficiency Test

The proficiency test will consist of five unknown samples which will be mailed to the applicants at one time with a specified period for completion and return of the results. Each applicant is required to identify all five samples correctly. Two of these samples would also require quantitation. An exact percentage on the samples to be quantitated will not be required but only certain acceptable limits will be considered accurate. Alexander M. Stirton, II, will develop a graph for members of the Peer Group showing acceptable values for proficiency samples to be quantitated.

The samples to be given to applicants will be substances which are currently being encountered in forensic science laboratories.

"Grandfathering"

Candidates who possess a minimum of 5 years forensic science laboratory experience during which time duties included the qualitative and quantitative analysis of suspected controlled drugs with experience including familiarization with: (1) chromatography, (2) spectrometry, (3) microscopy, (4) wet chemical methods, and (5) the origin and chemistry of controlled drugs may be certified for a period of two years. After the two year period in order to maintain certification the applicant will be subjected to the written examination process and proficiency testing.

Recertification

After the forensic drug chemist has been certified for a period of 5 years (?) there must be a process of recertification. Recertification may be attained by either of the following methods:

I. Accumulating 100 points by documentation of the following:

College Courses for Credit	20 points
Seminars and Workshops	15 points
Teaching	20 points
Publications(scientific)	20 points
Presentations at	
Scientific Meetings	10 points
Training	10 points
Meetings	5 points

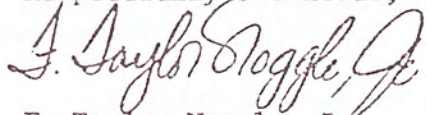
or

II. Submitting to a written examination and three (3) proficiency tests.

Dr. Peterson agreed to circulate to all Peer Group members application forms from the other certifying boards.

The next meeting was scheduled for July 6-7, 1979, at the DEA Laboratory in Dallas, Texas, with an alternate date of July 13-14, 1979.

Respectfully submitted,

A handwritten signature in cursive script, reading "F. Taylor Noggle, Jr.", written in dark ink.

F. Taylor Noggle, Jr.
Secretary

FTN:jf/11/02

MINUTES

SECOND SEROLOGY PEER GROUP MEETING
PALM BEACH, FLORIDA
JUNE 21-22, 1979

The meeting was called to order at 9:00 a.m., June 21, 1979, by Committee Chairperson W. C. Stuver. The following persons were in attendance:

Henry C. Lee, representing NEAFS

Cornelius Glen McWright, representing MAAFS

Donald C. MacLaren, representing NWAFS

George F. Sensabaugh, representing CAC

Mark D. Stolorow, representing MAFS

Willard C. Stuver, representing SAFS

Sally Williams, representing SWAFS

Joseph L. Peterson, monitor, Forensic Sciences Foundation, Inc.

Introductory remarks were made by Mr. Stuver, charging the committee with the crucial task of producing a clear and comprehensive package describing the certification proposal to the forensic serology community.

Minutes prepared by Mr. MacLaren of the first meeting of the Serology Peer Group in Kenner, Louisiana, April 28-29, 1979, were discussed and approved.

Dr. Peterson reported on the progress of the other forensic science certification programs, in particular, the AFTE National Peer Group and the Drug Chemistry Peer Group.

Representatives from each regional forensic science association gave a brief progress report concerning topics discussed by national peer group members with their regional groups since the first meeting of the national peer group. The general attitudes expressed by the regional groups were conveyed to the committee. Responses from each region were then discussed in regard to particular topics including:

1. Minimum education requirements.
2. Minimum professional requirements.
3. Minimum requirements for work experience.
4. Certain temporary and limited waivers of qualifications.

PEER GROUP MEETING MINUTES

Page 2

5. The proposed structure and content of the written and practical examinations.
6. The formation of a bibliography as a study guide for candidates.
7. The requirements and logistics of recertification.

At this point, it was proposed and agreed to commence with the preparation of the actual written documents which would constitute the committee's "work product" consisting of three parts:

1. A list of qualifications for application and a brochure-style description of the processes of examination, recertification, and temporary waivers of required qualifications.
2. An additional report detailing more thoroughly the scope and actual mechanics (places, dates, topics, costs) of the written and practical examinations.
3. A set of sample questions representative of the written examination, including both technical questions dealing directly with forensic serology and general questions dealing with criminalistics and evidence handling procedures as they relate to forensic serology.

Part I was prepared and approved by the end of the first day of the meeting which was adjourned at 5:15 p.m., June 21, 1979.

The meeting was reconvened at 8:15 a.m. on June 22, 1979, with all parties in attendance.

The committee proceeded directly into the tasks of preparing a detailed written explanation of the proposed logistics for the certification process and a set of sample questions representing the written examination.

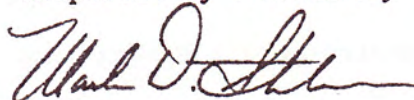
During the course of deliberation on the central issues, the positions of each region were reported by the representatives and, not infrequently, considerable discussion was required in order to establish a consensus opinion. Objections which were raised were noted and recorded and it was agreed to let the written "work product" reflect the substance of the actual decisions or compromises that were finally achieved.

However, it was requested to have the minutes reflect two points in particular. First, a reminder that the timetable for certification is only tentative and depends entirely on how expeditiously the national ballot (scheduled for Fall 1979) can be taken and evaluated on the question of certification. Second, it was agreed that a syllabus or list of references to assist as a study guide can be prepared at an appropriate future date, also pending the outcome of the national ballot.

PEER GROUP MEETING MINUTES
Page 3

With the completion of all three parts of the "work product" the meeting was adjourned at 3:30 p.m. on June 22, 1979.

Respectfully submitted,

A handwritten signature in dark ink, appearing to read "Mark D. Stolorow". The signature is fluid and cursive, with a long horizontal stroke at the end.

Mark D. Stolorow
Meeting Secretary

June 26, 1979

THE WORK PRODUCT FOLLOWS

CERTIFICATION
IN
FORENSIC SEROLOGY

QUALIFICATIONS & REQUIREMENTS

1. GENERAL QUALIFICATIONS

Applicants must be persons of good moral character and scientific integrity with high ethical and professional standing.

2. EDUCATIONAL QUALIFICATIONS

Applicants must possess a minimum of an earned baccalaureate degree in a natural science or an appropriate related field from an accredited institution. Accredited institutions are those approved by regional accrediting commissions recognized by the U.S. Office of Education. Other institutions may be approved at the discretion of the Board.

3. PROFESSIONAL EXPERIENCE

- A. Applicants must have a minimum of one year experience (including on-the-job training) actively working in the field of forensic serology. Qualifying activities may include casework, teaching, research, and supervision.
- B. Applicants must be working in the field of forensic serology at the time of application for certification.
- C. Applicants will be required to submit as references the names and addresses of two individuals who can attest to the applicant's qualifications. At least one of the references must be an individual actively working in the field of forensic serology at the time of application for certification.
- D. Applicants are required to furnish (on the application) a record of appropriate professional activities in keeping with the concept that "Forensic Serology is the science directed to the recognition; identification, individualization, and evaluation of physiological material related to law-science matters".

4. EXAMINATIONS

- A. Applicants who meet the requirements set forth in the preceeding sections will be allowed to take a comprehensive written examination on basic principles of forensic serology.

Certification in Forensic Serology
Qualifications & Requirements
Page 2

- B. Applicants who pass the written examination will be further required to pass a practical examination to demonstrate proficiency in the analysis and interpretation of physiological evidence.
- C. Applicants will be required to complete the written and practical sections of the examination within a period of two years following approval of their applications.
- D. Applicants who fail either the written or practical examinations may apply within a period of one year for one re-examination without any additional fee.

5. RECERTIFICATION

- A. Certification will be valid for a period of five years.
- B. Application for recertification must be made within the five-year period of certification.
- C. Recertification will be granted on the basis of an evaluation of the applicants' documentation of continuing education and other demonstration of professional advancement (including, for example, participation in workshops, seminars, symposia, research, and presentation or publication of formal papers related to forensic serology).
- D. Recertification will be valid for a period of five years.

6. TEMPORARY WAIVERS

A. Temporary Waiver of Educational Requirement

For a period of one year from the official date of the announcement that applications for certification will be accepted, the requirement of a baccalaureate degree will be waived for otherwise qualified applicants.

B. Temporary Waiver of Examination Requirement

For a period of one year from the official date of the announcement that applications for certification will be accepted, applicants who have a minimum of five years experience actively working in forensic serology as of the date of this announcement, and who are otherwise qualified, may be certified without being required to take either the written or practical examination.

Certification granted under the conditions of this temporary waiver of examination will expire three years following the date of certification.

Certification in Forensic Serology
Qualifications & Requirements
Page 3

In order to be recertified, individuals certified under this temporary waiver of examination must pass the written and practical examination.

SUPPLEMENTAL INFORMATION

1. WRITTEN EXAMINATION

The written examination will be administered twice annually at the locations and dates of the meetings of the regional forensic science associations. Membership in a regional forensic science association is not required to gain admission into the examination. The examinations will be proctored by the regional serology peer group committees. Questions appearing on the examinations will be selected from those submitted by individual peer group committees from the regional forensic science associations. The responsibility for the preparation, administration, and evaluation of the written examination rests with the National Serology Peer Group.

2. PRACTICAL EXAMINATION

The practical examination will be administered upon successful completion of the written examination. The nature of the practical examination will be simulated case situations which will be mailed to the candidate for examination within the candidate's own laboratory facility. Specific instructions will accompany the samples. The responsibility for the preparation, administration, and evaluation of the practical examination rests with the National Serology Peer Group.

Certification in Forensic Serology
Supplemental Information
Page 4

3. SCOPE OF THE EXAMINATIONS

A. General

1. The following topics were derived from the nationwide survey:
 - a. Identification of blood
 - i. Catalytic tests
 - ii. Crystal tests
 - iii. Anti-human hemoglobin serum
 - iv. Electrophoretic methods
 - b. Determination of species origin (immunological methods)
 - c. Individualization of blood
 - i. Red cell antigens
 - ii. Isozymes
 - iii. Serum proteins
 - iv. Miscellaneous
 - d. Semen identification
 - i. Microscopical
 - ii. Chemical
 - iii. Immunological
 - iv. Electrophoretic
 - e. Semen or semen/vaginal fluid mixtures
 - f. Saliva identification
 - g. Urine identification
 - h. Other (for example, sex determination, menstrual blood, bloodstain pattern distribution)
2. In addition, candidates will be held responsible for the relevant general concepts in biochemistry, genetics and immunology.
3. In addition to testing, specific knowledge in forensic serology, the written examination will include questions in the following general areas regarded as common skills in criminalistics:
 - a. Basic principles of identification and individualization
 - b. Scientific methodology
 - c. Evidence handling
 - d. Basic microscopy
 - e. Communication
 - f. Legal aspects and court testimony
 - g. Literature of criminalistics
 - h. General knowledge of criminalistics

B. Written Examination

The written examination will consist of 100 objective questions that can be completed within a two-hour period. The following are sample questions: (See Attachment)

C. Practical Examination

1. The practical examination will represent simulated case situations and may include the following:
 - a. Characterization of liquid whole blood
 - b. Characterization of dried bloodstains
 - c. Characterization of dried stains from physiological fluids other than blood
2. Candidates will be evaluated on the basis of their approach to the problem, their analytical methods, and their conclusions. Candidates will be permitted a reasonable period of time to complete the practical examination.

4. BIBLIOGRAPHY

A list of suitable bibliographies will be prepared by the National Serology Peer Group and made available to applicants in order to assist them in locating reference material pertinent to the subject matter which will appear on the examinations.

5. COST OF CERTIFICATION

The cost of certification is estimated at \$75 for the application fee (applicable as well to other areas of criminalistics certification) and \$50 for the examinations fee.

6. COST OF RECERTIFICATION

The Criminalistics Certification Study Committee has not presented any estimate for the cost of recertification, however, they are expected to be nominal.

7. TIMETABLE (PROJECTED DATES)

April 1, 1980 - Announcement date of acceptance of applications for certification in forensic serology. (This date also marks the deadline for the 5-year experience requirement in order to qualify for the temporary waiver of examination.)

Fall - 1980 - First written examination

Early - 1981 - First certification in forensic serology