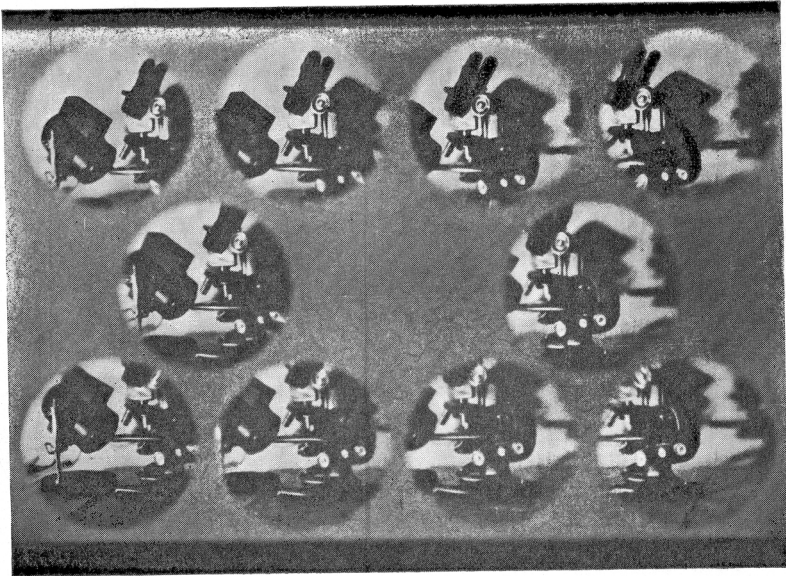


THE
TECHNICIAN

IN THE
POLICE LABORATORY



A SCIENTIFIC PUBLICATION, ISSUED MONTHLY BY THE LABORATORY OF THE MISSOURI STATE HIGHWAY PATROL, THROUGH THE INTEREST AND COOPERATION OF POLICE LABORATORY TECHNICIANS THROUGHOUT THE COUNTRY. "THE TECHNICIAN" IS A NON-PROFIT, AND NON-COPYRIGHTED BULLETIN, EDITED BY THE PERSONNEL OF THE M.S.H.P. LABORATORY.

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THE COVER

THIS MONTH'S COVER PHOTOGRAPH IS REPRESENTATIVE OF THE LABORATORY. TAKEN WITH A SPEED GRAPHIC CAMERA, ON PANATOMIC-X, WITH AN EXPOSURE OF 1 SECOND, F VALUE OF 16. SUBJECT ILLUMINATED WITH ONE PHOTOFLOOD R2 LAMP, APPROXIMATELY 3 FEET FROM THE INSTRUMENTS. PICTURE IS OF A MICROSCOPE AND LAMP, PHOTOGRAPHED THROUGH A GLASS SPOT-PLATE. THE HOLLOW GROUND DEPRESSIONS IN THE PLATE SERVE AS REDUCTION LENSES, PRODUCING THE EFFECT.

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RESPONSIBILITY FOR ALL STATEMENTS MADE IN MATERIAL PUBLISHED IN THIS BULLETIN RESTS WITH THE AUTHOR OF THE PARTICULAR CONTRIBUTION; NEITHER THAT MATERIAL NOR THE EDITORIAL COMMENTS APPEARING HEREIN ARE TO BE CONSIDERED AS NECESSARILY REFLECTING THE VIEWS OR OPINIONS OF THE MISSOURI STATE HIGHWAY PATROL, NOR THE LABORATORY OF THAT DEPARTMENT.

THE TECHNICIAN

THIS FIRST ISSUE OF "THE TECHNICIAN" REPRESENTS WHAT IS PROBABLY THE FIRST SERIOUS ATTEMPT TO INTEREST THE POLICE LABORATORY TECHNICIANS THROUGHOUT THE COUNTRY IN THE PUBLICATION OF A PURELY COOPERATIVE BULLETIN IN WHICH AN EXCHANGE OF INFORMATION, VIEWS AND OPINIONS MAY BE EXPRESSED SOLELY ON SUBJECTS OF INTEREST FROM THE SCIENTIFIC STANDPOINT, AND WHICH HAS AT THE SAME TIME AS ONE OF ITS PRIMARY AIMS THE FORMATION OF AN ORGANIZATION OR SOCIETY OF POLICE LABORATORY TECHNICIANS.

THIS SOCIETY WOULD HAVE AS ITS OBJECTIVE THE SETTING UP OF STANDARDS WHICH WOULD PERMIT THE WORK TO BE DULY RECOGNIZED AS A DISTINCT SCIENTIFIC PROFESSION. THIS WOULD INCLUDE THE ADVANCEMENT OF "ACCEPTED TESTING METHODS AND PROCEDURES", QUALIFICATION STANDARDS, STANDARDIZATION OF REPORT FORMS, OF COURT DISPLAY METHODS, ETC.

SHOULD THE VENTURE MEET WITH THE ENTHUSIASM OF THE VARIOUS POLICE TECHNICIANS CONTACTED, AND SHOULD THEIR SUPPORT BE LOYALLY GIVEN, A GREAT STEP FORWARD WILL HAVE BEEN MADE TOWARD THE ADVANCEMENT OF THIS PROFESSION.

FAILING IN THE ATTEMPT, OUR CONCLUSION MUST BE THAT WE ARE NOT YET READY FOR SUCH A STEP, NOR WILLING TO MAKE THE EFFORT WHICH MAY BE NECESSARY FOR A REALIZATION OF THIS GOAL.

THE EDITOR,

TO THE READER--

THE AIMS AND OBJECTIVES OF THIS PUBLICATION HAVE BEEN BRIEFLY INDICATED IN THE PRECEDING EDITORIAL COMMENT; HOWEVER, SOME ADDITIONAL REMARKS ON THE SUBJECT ARE IN ORDER, AS IS A DISCUSSION OF THE MANNER IN WHICH WE PROPOSE TO CARRY OUT THE IDEA BEHIND THIS PUBLICATION.

THE FIELD OF POLICE SCIENCE, FROM THE STANDPOINT OF THE LABORATORY TECHNICIAN, IS ONE IN WHICH LITTLE HAS BEEN DONE IN THE WAY OF FREE EXCHANGE OF IDEAS, OR STANDARDIZATION OF METHODS. NATURALLY THERE HAS BEEN STANDARDIZATION OF CERTAIN TESTING PROCEDURES, BUT THIS HAS COME ABOUT THROUGH NECESSITY -- LIMITATION IMPOSED UPON THE WORKER BY THE NATURE OF HIS MATERIALS AND METHODS -- RATHER THAN THROUGH A SPECIFIC DESIRE TO DEVELOP AND ADVANCE STANDARD PROCEDURES. IT IS NOT DESIRABLE THAT ANY SCIENTIFIC FIELD SHOULD ADHERE TOO CLOSELY TO PROCEDURES, EITHER IN TESTING METHODS OR OTHERWISE, MERELY BECAUSE THEY ARE "ACCEPTED" AS STANDARD. CHANGE IS ESSENTIAL TO ADVANCEMENT. ON THE OTHER HAND, MANY ADVANTAGES MAY BE ASSOCIATED WITH STANDARDIZATION. IT SERVES TO ENCOURAGE BETTER METHODS; STIMULATES INTEREST IN CONSTRUCTIVE CRITICISM OF THE ACCEPTED PROCEDURES (AND INCIDENTALLY IN THE ADVANCEMENT OF BETTER ONES); IT PERMITS A MORE UNIFORM RESULT TO BE OBTAINED BY DIFFERENT TECHNICIANS, AND ALLOWS A MORE ACCURATE ESTIMATE TO BE MADE OF THE VALUE OF THOSE PROCEDURES FOLLOWED.

THE FIELD OF POLICE SCIENCE WOULD BENEFIT FROM STANDARDIZATION IN OTHER WAYS. IN OFFERING COURT TESTIMONY, FOR EXAMPLE, MUCH TIME ORDINARILY WASTED IN ATTEMPTING TO EXPLAIN TO THE JUDGE AND JURY THE REASONS FOR WHICH A CERTAIN PROCEDURE IS VALID COULD OFTEN BE SAVED BY SAYING--"THIS PROCEDURE HAS BEEN CRITICALLY CONSIDERED BY THE 'AMERICAN SOCIETY OF POLICE LABORATORY TECHNICIANS' AND AFTER A THOROUGH INVESTIGATION OF THE RELIABILITY OF THE METHODS, HAS BEEN ADVANCED BY THEM AS A STANDARD AND ACCEPTABLE TEST. THEIR CONCLUSIONS WERE MADE WITHOUT CONSIDERATION OR REFERENCE TO ANY PARTICULAR CRIMINAL CASE, AND WERE BASED SOLELY ON THE NATURE OF THIS TYPE OF EVIDENCE"--TO BE FOLLOWED BY A BRIEF EXPLANATION OF THE BASIS FOR SUCH A CONCLUSION. NATURALLY IT WILL BE SOME TIME BEFORE WE COULD HOPE TO HAVE ORGANIZED A SOCIETY OF THIS NATURE. IT WILL BE STILL LONGER BEFORE IT WOULD BE ACCEPTED AS AN AUTHORITATIVE SOURCE OF INFORMATION. THIS, HOWEVER, MUST NOT PREVENT US FROM TAKING AN INITIAL STEP IN THAT DIRECTION. IT IS OUR HOPE THAT "THE TECHNICIAN", IN ADDITION TO SERVING AS A CONSTANT SOURCE OF INFORMATION ON TECHNICAL METHODS AND PROCEDURES, WILL LEAD TO THE FORMATION OF SUCH AN ORGANIZATION.

PRESENT PLANS PROVIDE ONLY FOR PUBLICATION OF THIS BULLETIN; FOR THE INTEREST OF THE READER THEY ARE PRESENTED BELOW.

THIS PUBLICATION IS INTENDED TO SERVE AS A MEDIUM OF EXCHANGE OF INFORMATION AND IDEAS BETWEEN POLICE LABORATORY TECHNICIANS THROUGHOUT THE COUNTRY. IT IS A NON-PROFIT AND NON-COPYRIGHTED PERIODICAL, CONTAINING MATERIAL SUBMITTED BY SUBSCRIBING MEMBERS. ALL CONTRIBUTIONS ARE MADE WITHOUT REMUNERATION, THROUGH THE COURTESY OF THE WRITERS. IT MAY BE POSSIBLE, LATER ON, TO PAY A SMALL SUM FOR EACH CONTRIBUTION PUBLISHED.

WHILE ANYONE MAY SUBSCRIBE TO THE PUBLICATION, LITERARY CONTRIBUTIONS WILL BE ACCEPTED ONLY FROM POLICE AND OTHER TECHNICIANS IN NON-PRIVATE LABORATORIES, FROM POLICE SCIENCE STUDENTS, AND FROM MEDICAL OR LEGAL SOURCES.

SUBSCRIPTION RATES WILL DEPEND UPON THE NUMBER OF INDIVIDUALS INTERESTED IN THE PUBLICATION, BUT WILL PROBABLY BE AROUND TWO OR THREE DOLLARS PER YEAR.

IT IS REQUESTED THAT TECHNICIANS INTERESTED IN RECEIVING THIS BULLETIN WRITE TO "THE TECHNICIAN", MISSOURI STATE HIGHWAY PATROL LABORATORY, JEFFERSON CITY, MISSOURI.

REQUESTS SHOULD BE MADE WITHIN THE NEXT THIRTY DAYS IN ORDER THAT WE MAY MAKE FINAL ARRANGEMENTS FOR PRINTING, SUBSCRIPTION RATES, ETC.

SUBJECT MATTER OF MATERIAL ACCEPTABLE FOR PUBLICATION SHOULD FALL INTO ONE OF THE FOLLOWING CATEGORIES:

CRIMINOLOGICAL TESTING METHODS AND PROCEDURES--ORIGINAL AND ACCEPTED.
MEDICO-LEGAL ASPECTS OF CRIMINOLOGY.
LABORATORY CASE REFERENCES OF INTEREST.
INVESTIGATIVE PROCEDURES--CORRECT HANDLING OF EVIDENCE, ETC.
POLICE PHOTOGRAPHY AND PHOTOMICROGRAPHY.
INSTRUMENTS--CARE AND USE OF; NEW DEVELOPMENTS.
TECHNICAL NOTES--ORIGINAL AND FROM THE LITERATURE.
BOOK AND ARTICLE REVIEWS.
QUESTIONS AND ANSWERS.
MISCELLANEOUS DISCUSSIONS--COURT PREPARATION, PROCEDURE, ETC.

SHOULD THERE BE INTEREST IN IT, A MAXIMUM OF ONE ARTICLE PER MONTH MIGHT BE PRINTED ON NON-TECHNICAL SUBJECTS RELATED TO POLICE ACTIVITIES.

ALL THE LITERARY CONTRIBUTIONS SHOULD BE TYPEWRITTEN (DOUBLE-SPACED) AND SENT TO "THE TECHNICIAN". THE MATERIAL WILL BE REVIEWED AND EDITED BY THE MISSOURI STATE HIGHWAY PATROL LABORATORY. IF ACCEPTED IT WILL BE PRINTED UNDER THE NAME OF THE AUTHOR AND THE NAME OF THE LABORATORY FROM WHICH IT ORIGINALLY ISSUED.

LENGTH OF CONTRIBUTIONS IS IMMATERIAL.

MATERIAL, IF ACCEPTED, WILL NOT BE RETURNED TO THE AUTHOR. REJECTED MATERIAL WILL BE RETURNED AT OUR EXPENSE. DUPLICATE COPIES OF ALL MATTER SHOULD BE KEPT BY THE AUTHOR.

CONTRIBUTIONS ARE ACCEPTABLE AT ANY TIME. THE AUTHOR IS REQUESTED TO FURNISH SOME INFORMATION AS TO HIS EDUCATIONAL OR EXPERIENCE BACKGROUND. THIS WILL BE PUBLISHED AT HIS REQUEST.

ORIGINAL AND PREVIOUSLY UNPUBLISHED CONTRIBUTIONS SHOULD BE DISTINCTLY MARKED AS SUCH. OTHERWISE THEY MAY BE REJECTED. COMPLETE REFERENCE SHOULD BE MADE TO ANY PUBLICATION FROM WHICH TECHNICAL NOTES OR ABSTRACTS ARE TAKEN.

HERE, THEN IS THE FOUNDATION UPON WHICH WE EXPECT TO BUILD "THE TECHNICIAN". WE HOPE IT MEETS WITH YOUR APPROVAL. THE SUCCESS OF THE PUBLICATION DEPENDS ENTIRELY UPON THE COOPERATION AND INTEREST OF THE INDIVIDUALS CONTACTED. NOT ONLY MUST SUFFICIENT SUBSCRIPTION FEES BE OBTAINED TO DEFRAY COSTS OF PUBLICATION, BUT MATERIAL FOR PRINTING MUST COME FROM THE SUBSCRIBERS. YOUR SUPPORT WILL BE APPRECIATED.

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SOME OBSERVATIONS ON THE BENZIDINE, TEICHMAN, AND TAKAYAMA

(HEMOCHROMOGEN) TESTS FOR BLOOD

BY JOHN E. DAVIS, TECHNICIAN

WITH THE

LABORATORY OF THE MISSOURI STATE HIGHWAY PATROL

PROBABLY THE MOST GENERALLY UTILIZED TESTS FOR BLOOD STAINS IN CRIMINOLOGICAL TESTING LABORATORIES ARE THE BENZIDINE TEST FOR PRELIMINARY EXAMINATION, AND THE TEICHMAN TEST FOR PROOF OF THE PRESENCE OF BLOOD STAINS. OTHER TESTS HAVE BEEN DEVELOPED, HOWEVER, BOTH AS PRELIMINARY AND PROOF-TESTS. THE GUAIAC AND PHENOLPHTHALEIN TESTS, AND THE MALACHITE GREEN REACTION AS PRELIMINARIES--THE HEMOCHROMOGEN TESTS AS PROOF, FOR EXAMPLE.

THE POPULARITY OF THE BENZIDINE TEST IN PREFERENCE TO THE OTHER PRELIMINARY BLOOD TESTS IS PROBABLY BASED MAINLY ON THE GREATER SIMPLICITY OF IT--PARTICULARLY IN PREPARING THE SOLUTIONS--AND THE EASE WITH WHICH IT MAY BE APPLIED. THE SENSITIVITY, WHILE REPORTED TO BE LESS THAN THAT OF SOME OF THE OTHERS, IS CERTAINLY GREAT ENOUGH TO SATISFY THE NEEDS OF THE POLICE TECHNICIAN, CONSIDERING ITS NON-SPECIFICITY.

THE TEICHMAN (HEMIN) TEST AS A BLOOD-SPECIFIC REACTION IS A STANDARD PROCEDURE FOLLOWED NOT ONLY IN THE POLICE LABORATORY, BUT IN MEDICAL ANALYSES OF VARIOUS KINDS AS WELL. WHILE THE SIMPLICITY OF THE TEICHMAN TEST IS GREAT, PROBABLY THE MAIN REASON FOR ITS SO FREQUENT AND GENERAL APPLICATION IS BASED ON THE FACT THAT OTHER PROOF-TESTS HAVE NOT BEEN SO WIDELY DISCUSSED IN THE LITERATURE, DEVELOPED, NOR PUBLICISED GENERALLY.

ALTHOUGH THE BENZIDINE AND TEICHMAN TESTS HAVE PROVED QUITE SATISFACTORY IN OUR LABORATORY, INASMUCH AS VARIOUS MATERIALS HAVE BEEN REPORTED TO EITHER GIVE MISLEADING RESULTS OR TO PREVENT A POSITIVE REACTION, A NUMBER OF TESTS WERE RUN BY US ON KNOWN MATERIALS FOR THE PURPOSE OF DEMONSTRATING WHAT MIGHT BE EXPECTED TO BE OBTAINED AS A RESULT IN TESTS ON CONTAMINATED SPECIMENS OF BLOOD. THE OBSERVATIONS MADE WERE RECORDED FOR OUR FILES, AND ARE PRESENTED HERE FOR THE INTEREST IT MAY HAVE FOR OTHERS IN THE FIELD.

GENERAL DISCUSSION OF THE TESTS OTHER THAN THAT DIRECTLY PERTAINING TO THE SPECIFIC EXPERIMENTS CONDUCTED IN OUR LABORATORY IS MADE IN SPITE OF THE FACT THAT SUCH DISCUSSION HAS BEEN RATHER EXTENSIVELY PUBLISHED ALREADY. THIS PARTICULARLY FOR THOSE WHO MAY NOT BEFORE HAVE HAD SUCH MATERIAL AT HAND.

TESTS OF THE TYPE TO BE DESCRIBED ARE OF INTEREST FROM A NUMBER OF STANDPOINTS. WHETHER THEY BE ORIGINAL, OR MERE REPETITION OF THE WORK OF OTHERS IN THE FIELD THE OBSERVATIONS MADE MAY BE CONSIDERED OF VALUE IF THEY DO NO MORE THAN SUPPLY SOME ADDITIONAL DATA ON EXPERIMENTAL METHODS, PROCEDURES--DATA WHICH MAY SERVE TO CORROBORATE OR TO CONTRADICT PREVIOUSLY PUBLISHED CONCLUSIONS.

IT IS TO BE EXPECTED THAT CONTRADICTORY STATEMENTS WILL BE FOUND IN THE VARIOUS SCIENTIFIC PUBLICATIONS FROM TIME TO TIME, ESPECIALLY AS REGARDS THE BEST TESTING PROCEDURE OR TECHNIQUE; THE EFFECT OF CONTAMINATING SUBSTANCES ON THE SENSITIVITY OF THE TESTS; THE DEGREE OF CERTAINTY WITH WHICH AN IDENTIFICATION CAN BE MADE OR A CONCLUSION DRAWN, ETC. IT THEREFORE BECOMES NECESSARY FOR THE

INDIVIDUAL LABORATORY ANALYST TO EITHER TAKE AT ITS FACE VALUE THE CONCLUSIONS OF ONE OR A FEW AUTHORITIES WITHOUT TESTING SUCH CONCLUSIONS HIMSELF, OR ELSE TO ACTUALLY PERFORM EXPERIMENTAL TESTS IN WHICH HE CHECKS THE RESULTS OF OTHERS. THE LATTER PROCEDURE IS OBVIOUSLY THE BETTER AND HAS DISTINCT ADVANTAGES OVER THE FORMER. IN THE FIRST PLACE, IT GIVES HIM INVALUABLE EXPERIENCE IN TESTING PROCEDURES--EXPERIENCE WHICH WOULD NOT ORDINARILY BE GAINED IN THE ROUTINE EXAMINATIONS FOLLOWED IN ACTUAL CASE WORK--AND PROVIDES MATERIAL FROM WHICH HE MAY BECOME BETTER ABLE TO INTERPRET THE RESULTS WHICH ARE OBTAINED IN CRIMINAL CASES. SECONDLY IT ENABLES THE INDIVIDUAL NOT ONLY TO DETERMINE WHICH PROCEDURES MAY PRODUCE THE BEST RESULTS, BUT ALSO TO FIND OUT WHICH METHODS HE HIMSELF IS BEST EQUIPPED AND ABLE TO PERFORM. NO DOUBT A LARGE PERCENTAGE OF THE CONTRADICTORY STATEMENTS FOUND IN THE LITERATURE ARE DUE MORE TO INDIVIDUAL DIFFERENCES IN ABILITY AND TECHNIQUE IN RUNNING AND INTERPRETING CERTAIN TESTS THAN IN THE ACTUAL DIFFERENCES IN THE SENSITIVITY AND RELIABILITY OF THE TESTS THEMSELVES. THIRDLY IT ESTABLISHES A FOUNDATION OF FIRST-HAND KNOWLEDGE UPON WHICH THE LABORATORY MAN CAN DRAW AND BASE HIS CONCLUSIONS; THIS BEING OF ESPECIAL VALUE IN THE EXPLANATIONS OF TESTS, THEIR VALIDITY, SIGNIFICANCE, ETC. IN COURT TESTIMONY. AUTHORITATIVE REFERENCES SHOULD BE USED AS A SUPPLEMENT TO, AND NOT A SUBSTITUTE FOR, PERSONAL PRACTICAL EXPERIENCE.

IT WAS PRIMARILY FOR THESE REASONS THAT THE TESTS DESCRIBED BELOW WERE PERFORMED IN OUR LABORATORY.

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THE BENZIDINE TEST

IT IS WELL RECOGNIZED THAT THIS TEST, WHILE NOT AT ALL SPECIFIC FOR BLOOD, IS ONE OF THE MOST SENSITIVE THAT WE HAVE FOR THE DETECTION OF STAINS WHICH MAY BE BLOOD. IT IS PRIMARILY A "NEGATIVE" TEST, BEING MORE RELIABLE WHEN A NEGATIVE RESULT IS OBTAINED THAN WHEN A POSITIVE ONE RESULTS, AS FAR AS BLOOD DETECTION IS CONCERNED.

THE TEST IS QUITE SENSITIVE, HAVING BEEN REPORTED TO HAVE GIVEN POSITIVE REACTIONS IN A BLOOD DILUTION AS HIGH AS 1:300,000.*

IN THIS CONNECTION IT IS IMPORTANT TO REALIZE THE EFFECT WHICH THE PROPORTIONS OF THE VARIOUS REAGENTS IN THE TESTING SOLUTION MAY HAVE, THEIR STRENGTH, ETC. (WE GENERALLY USE A SATURATED ALCOHOLIC-ACETIC ACID SOLUTION OF BENZIDINE, AND AN APPROXIMATELY 6 PER CENT SOLUTION OF PEROXIDE, APPLIED SEPARATELY TO THE FILTER PAPER.)**

IN THE PERFORMANCE OF THIS TEST, THE GENERALLY ACCEPTED METHOD CONSISTS OF MOISTENING A CLEAN FILTER PAPER WITH DISTILLED WATER OR SALINE SOLUTION, PRESSING IT TO THE SUSPECTED BLOOD STAIN (OR LEAVING IT IN CONTACT WITH THE AREA FOR VARYING LENGTHS OF TIME DEPENDING ON THE APPARENT AGE, CONCENTRATION, ETC. OF THE STAIN) REMOVING THE FILTER PAPER AND THEN APPLYING THE REAGENT SOLUTIONS. THE REAGENT SOLUTIONS MAY BE MIXED IMMEDIATELY BEFORE USE, OR ELSE APPLIED CONSECUTIVELY TO THE FILTER PAPER. A POSITIVE REACTION IS INDICATED BY THE FORMATION OF A BLUE COLOR. AT LEAST TWO AND PREFERABLE THREE IDENTICAL TESTS SHOULD BE RUN ON EACH POSITIVELY REACTING AREA BEFORE A DEFINITE CONCLUSION IS DRAWN AS TO THE RESULTS OF THE TEST. FROM TIME TO TIME FOREIGN

*MODERN CRIMINAL INVESTIGATION--SODERMAN AND O'CONNELL, PAGE 226.

MATERIALS IN THE FILTER PAPER WILL GIVE A POSITIVE REACTION, AS OF COURSE WILL MANY SUBSTANCES OTHER THAN BLOOD. THIS INCIDENTALLY SUGGESTS ONE GOOD REASON WHY IT IS BETTER TO APPLY THE REAGENTS TO THE FILTER PAPER SEPARATELY THAN TO MIX THEM BEFORE APPLYING. THE REASON BEING THAT STRONG OXIDIZING AGENTS MAY GIVE A BLUE COLOR WITH THE BENZIDINE SOLUTION ALONE REGARDLESS OF WHETHER OR NOT PEROXIDE IS PRESENT. SHOULD THE SOLUTIONS BE ADDED SEPARATELY TO THE PAPER, SUCH A REACTION WILL BE DETECTED. IF THEY ARE MIXED BEFORE APPLYING, THE RESULTS MAY BE MISLEADING.

THE REACTION SHOULD NEVER BE CARRIED OUT ON THE GARMENT OR OBJECT SUBMITTED FOR EXAMINATION. TO DO SO MAY RESULT IN A FAILURE TO OBTAIN FURTHER TESTS, AND UNNECESSARILY ALTERS THE CHARACTER OF THE EVIDENCE.

THE RESULTS OF ALL TESTS PERFORMED ON CONTAMINATED SPECIMENS OF BLOOD IN OUR LABORATORY ARE PRESENTED AT THE LAST OF THIS PAPER.

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THE TEICHMAN TEST

IN THE TEICHMAN (OR HEMIN) TEST, WE HAVE A BLOOD-SPECIFIC TEST WHICH IN ITS POSITIVE FORM IS ACCEPTED WITHOUT QUESTION AS DEFINITE INDICATION OF THE PRESENCE OF BLOOD.

THE HEMIN TEST IS A MICROCHEMICAL TEST, INTERPRETED BY MICROSCOPIC EXAMINATION. VARIOUS MODIFICATIONS OF THE PROCEDURE HAVE BEEN ADVOCATED, BOTH IN METHOD OF PERFORMANCE, AND IN THE REAGENTS APPLIED.

ORIGINALLY THE TEST CONSISTED OF PLACING A SMALL FRAGMENT OF THE STAINING MATERIAL ON A GLASS MICROSCOPE SLIDE, ADDING A SMALL CRYSTAL OF COMMON SALT, COVERING WITH A COVER-GLASS, ALLOWING GLACIAL ACETIC ACID TO RUN UNDER THE COVER-SLIP, HEATING GENTLY OVER A SMALL FLAME, ALLOWING THE PREPARATION TO COOL, AND EXAMINING IT UNDER THE MICROSCOPE.

ONE MODIFICATION OF THIS CONSISTED IN USING A SOLUTION IN GLACIAL ACETIC ACID, OF 0.1% EACH OF KI, KBR, AND KCl. IN THIS CASE THE CRYSTAL OF SALT WAS NOT FIRST ADDED TO THE PREPARATION TO BE TESTED.

IT IS THIS SOLUTION WHICH WE USE IN OUR LABORATORY FOR THE TESTING OF BLOOD STAINS. VARIOUS CLAIMS HAVE BEEN MADE AS TO ITS GREATER SENSITIVITY

**ACTUALLY THE IMPORTANCE OF THE GREAT SENSITIVITY OF THIS TEST, OR VARIATION IN SENSITIVITY WHICH MAY OCCUR WITH VARIATION IN COMPOSITION OF THE REAGENT, WOULD SEEM TO HAVE BEEN OVER-STRESSED IN THE LITERATURE. CONSIDERING THE FACT THAT (WITHOUT FURTHER PROOF) THE ONLY CONCLUSION WHICH A POSITIVE TEST WILL PERMIT IS THAT BLOOD MAY BE PRESENT, IT WOULD APPEAR THAT EXCEPTIONAL SENSITIVITY HAS NO GREAT PRACTICAL VALUE. OBVIOUSLY THE MORE SENSITIVE THE REACTION THE MORE NUMEROUS WILL BE THE INSTANCES IN WHICH THE TECHNICIAN WOULD OBTAIN A POSITIVE TEST. BUT ON THE OTHER HAND WHEN IT IS REALIZED THAT A POSITIVE TEST MEANS RELATIVELY LITTLE OF ITSELF, AND THAT HIGHER SENSITIVITY ALWAYS INCREASES THE POSSIBILITY THAT SUBSTANCES OTHER THAN BLOOD MAY BE CAUSED TO REACT, THE IMPORTANCE OF SENSITIVITY VARIATIONS IN PRELIMINARY TESTS SEEMS TO DECREASE.

(AS COMPARED WITH THE USE OF SALT AND GLACIAL ACETIC ACID SEPARATELY) AND ITS GREATER DEPENDABILITY. OUR EXPERIENCE WOULD INDICATE THAT THERE IS SOME BASIS IN FACT FOR THESE CLAIMS ALTHOUGH WE HAVE RUN NO CONTROLLED TESTS ON IT.

REGARDLESS OF WHICH REAGENT OR METHOD IS USED, HOWEVER, THERE ARE A NUMBER OF FACTORS WHICH MUST BE CONSIDERED IN INTERPRETING THE RESULTS. THE MATERIAL TESTED SHOULD BE DRY, AND NOT MOIST AS WOULD BE A DROP OF FRESH BLOOD. SHOULD THE STAINING MATERIAL HAVE BEEN EXTRACTED WITH WATER, THE EXTRACT SHOULD BE ALLOWED TO DRY AT ROOM TEMPERATURE ON THE SLIDE BEFORE APPLYING THE REAGENT. IF A SALINE EXTRACT WAS MADE, PROBABLY THE BETTER REAGENT TO APPLY WOULD BE PURE GLACIAL ACETIC ACID, INASMUCH AS EXCESSIVE QUANTITIES OF SALT SEEM TO DECREASE THE SENSITIVITY OF THE TEST.

WITH PRACTICE, EXTREMELY MINUTE AMOUNTS OF MATERIAL MAY BE DEMONSTRATED SATISFACTORILY TO BE BLOOD. GENERALLY SPEAKING, HOWEVER, IF AN EXTRACT HAS BEEN MADE, IT WILL ALMOST NECESSARILY HAVE TO BE COLORED A DEFINITE PINK (AS SEEN IN SOLUTION) IF A RELIABLE CONCLUSION IS TO BE DRAWN. THIS MAY THEN BE CONCENTRATED ON THE SLIDE BY SUCCESSIVELY ALLOWING DROPS OF IT TO DRY IN ONE SMALL AREA ON A SLIDE BEFORE THE TEST IS RUN.

ON ACTUAL MATERIAL, SUCH AS CLOTH, PAPER AND POROUS MATERIALS GENERALLY, AN EXCELLENT METHOD OF EXTRACTION MAY BE FOUND IN FILLING THE SMALL END OF A CAPILLARY PIPETTE (GLASS TUBING DRAWN OUT TO ABOUT THE DIAMETER OF PENCIL LEAD OR LESS) WITH DISTILLED WATER OR SALINE, AND FORCING IT OUT ONTO THE STAINED AREA AFTER WHICH IT IS IMMEDIATELY WITHDRAWN WITH THE SAME PIPETTE. THE PROCEDURE IS CONTINUED UNTIL A PINK TO RED COLORATION IS OBSERVED IN THE EXTRACT. WITH CARE THIS METHOD MAY PROVE SATISFACTORY ON VERY MINUTE SPOTS OF BLOOD ON CLOTH, CONCRETE, ETC., AND FREQUENTLY GIVES BETTER RESULTS IN THE TEST THAN WOULD DIRECT UTILIZATION OF THE MATERIAL ITSELF.

IT IS FREQUENTLY NECESSARY TO REPEAT THE TEST ON THE SAME SPECIMEN TWO OR THREE TIMES BEFORE A CONCLUSION IS DRAWN. WHEN WARMING THE PREPARATION, CARE SHOULD BE TAKEN TO PREVENT OVERHEATING. IT SHOULD NOT BE ALLOWED TO GO ALL THE WAY TO DRYNESS, BUT RATHER COOLED WHILE STILL MOIST WITH THE REAGENT. THE HEMIN CRYSTALS WHICH MAY FORM ARE INSOLUBLE IN THE REAGENT WHEN COLD, AND PRECIPITATE OUT AS BROWNISH RED RHOMBIC CRYSTALS. THE SHAPE OF THESE CRYSTALS MAY VARY SOMEWHAT WITH THE CONDITIONS OF THE TEST, TECHNIQUE, ETC., AS WELL AS WITH THE AGE AND CONDITION OF THE MATERIAL TESTED. ATYPICAL CRYSTALS MAY BE DUMBBELL SHAPED, LENTICULAR, "BEAN SHAPED", HEXAGONAL, FEATHERY, ETC. FREQUENTLY SUCH ATYPICAL CRYSTALS MAY BE CHANGED INTO THE MORE CHARACTERISTIC RHOMBIC TYPE BY REPEATED TESTS ON THE SAME PREPARATION. AT OTHER TIMES SUCH REPEAT TESTS SEEM TO HAVE NO EFFECT, IN WHICH CASE THE EXPERIENCE OF THE TECHNICIAN MAY ALLOW HIM TO DRAW A CONCLUSION ONE WAY OR ANOTHER.

WE HAVE NOTED PARTICULARLY IN TESTING DRIED STAINS THE PRESENCE OF LENTICULAR AND DUMBBELL SHAPED CRYSTALS. IN STAINS CONTAMINATED WITH TANNIC ACID, THE CRYSTALS APPEAR LIGHTER IN COLOR, AND ARE THIN REGULAR HEXAGONAL PLATES OFTEN INTERSECTING A SINGLE STRAIGHT NEEDLE-LIKE CRYSTAL. LARGE FEATHERY CRYSTALS WERE ONCE OBTAINED FROM A SPOT ON A HIT-AND-RUN TRUCK. THE STAIN WAS SUSPECTED BY THE TECHNICIAN TO BE OF INSECT ORIGIN RATHER THAN HUMAN, CONSIDERING ITS POSITION ON THE MACHINE. (PRECIPITIN TEST NOT RUN). AT TIMES THE CRYSTALS FORM TWINS WHICH GIVE THEM THE APPEARANCE OF BEING THICK RODS WITH NOTCHED ENDS. VARIOUS OTHER PECULIARITIES MAY BE OBSERVED FROM TIME TO TIME, AND ARE FREQUENTLY OF INTEREST TO THE TECHNICIAN.

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THE TAKAYAMA (HEMOCHROMOGEN) TEST

THIS TEST IS ONE WHICH, LIKE THE HEMIN TEST, MAY BE CONSIDERED IN ITS POSITIVE FORM AS PROOF OF THE PRESENCE OF BLOOD. FOR SOME REASON OR OTHER THE TEST HAS NOT BEEN SO WIDELY ADOPTED AS HAS THE TEICHMAN TEST, NOR HAS REFERENCE BEEN SO OFTEN MADE TO IT IN THE LITERATURE.

ACCORDING TO BODANSKY (*) HEMOCHROMOGENS OF VARIOUS COMPOSITION MAY BE FORMED BY THE REACTION BETWEEN HEME (PRODUCT OF TREATMENT OF HEMIN WITH SODIUM HYDROXIDE IN THE PRESENCE OF A REDUCING REAGENT), AND ANY OF THE FOLLOWING: ALBUMIN, PYRIDINE, NICOTINE, PIPERIDINE, HYDRAZINE, CYANIDE, AMMONIA, GLYCINE, AND OTHER ORGANIC NITROGENOUS COMPOUNDS.

HEMOCHROMOGENS MAY BE IDENTIFIED BY SPECTROSCOPIC METHODS. THE PYRIDINE HEMOCHROMOGEN SERVES AS A CONVENIENT MICRO-CHEMICAL TEST WHICH LIKE THE TEICHMAN TEST IS BASED ON THE FORMATION OF CHARACTERISTIC CRYSTALS.

THE NAME "TAKAYAMA TEST" IS DERIVED FROM THE NAME OF THE MAN WHO FIRST SUGGESTED THE PARTICULAR REAGENT USED IN THE TEST. THE REAGENT, AS MADE UP IN OUR LABORATORY, CONSISTS OF 65 CC OF DISTILLED WATER, 2 CC OF 6 N SODIUM HYDROXIDE IN 8 CC OF DISTILLED WATER, 20 CC OF PYRIDINE, AND 1 CC OF GRANULATED SUGAR DISSOLVED IN 5 CC OF WATER. THESE ARE SEPARATELY MIXED AND THEN COMBINED TO FORM THE REAGENT WHICH IS KEPT IN A BROWN BOTTLE.

THE EXACT PROPORTION OF THE COMPONENTS DOES NOT SEEM TO BE TOO IMPORTANT, AND ALTHOUGH THE REAGENT IS SUPPOSED TO DETERIORATE WITHIN A FEW MONTHS TIME WE HAVE BEEN CONSTANTLY USING THE REAGENT FROM ONE BOTTLE FOR OVER A YEAR NOW, AND STILL FIND IT QUITE SATISFACTORY.

IN TESTING, THE SUSPECTED MATERIAL IS PLACED ON A SLIDE, COVERED WITH A COVER SLIP, AND A DROP OF THE REAGENT ALLOWED TO FLOW UNDER THE COVER GLASS. GENTLE HEAT IS THEN APPLIED FOR A FEW SECONDS--THE PREPARATION ALLOWED TO COOL, AND EXAMINATION MADE WITH A MICROSCOPE FOR THE CRYSTALS WHICH MAY FORM. IF NOT TOO DILUTE, THE MATERIAL NEED NOT FIRST BE DRIED, INASMUCH AS A PART OF THE REAGENT IS WATER. THIS MAKES THE TEST SOMEWHAT MORE CONVENIENT TO RUN THAN THE TEICHMAN, PARTICULARLY WHEN TIME IS SHORT AND EXTRACTIONS MUST BE MADE. FOR EXTRACTIONS, PURE WATER IS TO BE PREFERRED TO SALINE.

WE HAD BEEN USING THE TEICHMAN TEST EXCLUSIVELY IN THE LABORATORY FOR SOME TIME BEFORE THE HEMOCHROMOGEN TEST WAS INVESTIGATED. ACCORDINGLY THE FIRST SET OF TESTS RUN WERE ON KNOWN PURE BLOOD SAMPLES, AND THE RESULTING CRYSTALS CAREFULLY OBSERVED. IT WAS NOTED PARTICULARLY THAT A NUMBER OF DIFFERENTLY SHAPED CRYSTALS MAY BE OBTAINED. THESE MAY OCCUR EVEN IN THE SAME TEST SPECIMEN, AND ALSO VARYING WITH THE CONDITIONS OF THE TEST, TECHNIQUE, ETC.

THE OUTSTANDING CONSISTENT CHARACTERISTIC OF THESE CRYSTALS IS THEIR LIGHT STRAWBERRY-PINK COLOR. IN SIZE THE CRYSTALS MAY RANGE FROM HARDLY VISIBLE AT 100 MAGNIFICATION, TO LARGER THAN TEICHMAN CRYSTALS OR EVEN FLORENCE SEMEN-TEST CRYSTALS. SIZE RANGE IN A GIVEN TEST DROP AT ANY ONE TIME IS GENERALLY NOT SO GREAT AS THIS THOUGH, UNLESS PARTICLES OF BLOOD ARE BEING TESTED WHICH HAVE NOT DISSOLVED EXCEPT ON THE OUTER SURFACES.

VARIATIONS IN SHAPE AND APPEARANCE OF THE CRYSTALS ARE PARTICULARLY NOTE-

*PHYSIOLOGICAL CHEMISTRY, BY MEYER BODANSKY. PRINTED BY JOHN WILEY.
1935 EDITION. PAGE 242.

WORTHY. THEY MAY APPEAR AS FEATHERY-ARMED STAR-LIKE RADIATES, WITH FROM THREE TO FIVE OR MORE ARMS. OTHERS APPEAR AS SMOOTH-ARMED STARS. WHEN SMALL, THEY MAY APPEAR ONLY AS MINUTE NEEDLE-LIKE CRYSTALS IN WHICH THE COLOR IS HARDLY VISIBLE AND THEY MAY APPEAR DARKER THAN USUAL. OFTEN THESE MAY FORM INTO "BUNDLES OF WHEAT" AGGREGATES. MORE CHARACTERISTIC, HOWEVER, ARE THE MANY CRYSTALS SHAPED SOMEWHAT LIKE FLORENCE'S SEMEN-TEST CRYSTALS. THESE MAY APPEAR AS A SINGLE PLATE, OR AS AGGREGATES OF PLATES; AS SINGLE CROSSES WITH WIDE ARMS TAPERING TO A POINT AT THE ENDS, (LENTICULAR ARMS) ETC. OTHERS HAVE NO DEFINITE DESCRIBABLE SHAPE, LOOKING LIKE "TUMBLEWEEDS", BUNDLES OF RIBBON, ETC.

FREQUENTLY SOME TIME MUST BE ALLOWED TO PASS BEFORE CRYSTALS ARE OBTAINED. THE PRESENCE OF A STRAWBERRY-PINK COLOR IS, HOWEVER, AN EXCEPTIONALLY GOOD INDICATION OF THE PRESENCE OF BLOOD EVEN IN THE ABSENCE OF THE CRYSTALS.

THIS TEST SEEMS TO HAVE CERTAIN DEFINITE ADVANTAGES OVER THE TEICHMAN TEST, YET IN OTHER WAYS HAD DISADVANTAGES NOT ENCOUNTERED IN THE HEMIN TEST.

IN THE FIRST PLACE, SOMEWHAT MORE EXPERIENCE WITH THE TEST IS REQUIRED FOR A PROPER INTERPRETATION OF IT THAN IS NEEDED IN THE HEMIN TEST, DUE PARTICULARLY TO THE GREATER VARIATION IN THE FORM TAKEN BY THE HEMOCHROMOGEN CRYSTALS. ALSO, MORE CARE MUST BE TAKEN IN PROPERLY APPLYING THE TEST, AS IT SEEMS RATHER SENSITIVE TO OVER-HEATING, AND SOME OTHER FACTORS OF TECHNIQUE. IN ADDITION, EXCEPT WITH A GOOD BIT OF EXPERIENCE, A FAILURE TO OBTAIN A POSITIVE TEST THE FIRST TIME MAY PRECLUDE THE POSSIBILITY OF OBTAINING ONE AT ALL ON THAT PARTICULAR SLIDE. (WITH MORE EXPERIENCE THIS SITUATION MAY BE LARGELY OVERCOME.)

ADVANTAGES OVER THE TEICHMAN TEST ARE OFFERED IN THE FACT THAT THE TEST, WHEN PROPERLY APPLIED, SEEMS SOMEWHAT MORE SENSITIVE THAN THE TEICHMAN TEST. FURTHER IT IS POSSIBLE TO RUN THIS TEST ON MATERIAL ALREADY TESTED WITH THE TEICHMAN REAGENT, FREQUENTLY WITH POSITIVE RESULTS. WE HAVE NEVER BEEN ABLE TO OBTAIN HEMIN CRYSTALS ON SPECIMENS TREATED WITH THE TAKAYAMA REAGENT. FIRST THOUGH, THE FACT THAT A CERTAIN PINK COLORATION OBTAINED IN THE TAKAYAMA TEST MAY BE USED AS STRONG PRESUMPTIVE INDICATION OF THE PRESENCE OF BLOOD IS ANOTHER ADVANTAGE OVER THE TEICHMAN TEST. AS WILL BE MENTIONED BELOW, A LARGE NUMBER OF PINK AND RED DYES WERE TESTED WITH THE REAGENT, BUT IN NO INSTANCE WAS A COLOR OBTAINED WHICH WAS INDISTINGUISHABLE FROM THE PINK COLOR OBTAINED WITH BLOOD. SOME EXPERIENCE IS REQUIRED FOR RECOGNITION OF THIS COLOR.

THE REAGENT GENERALLY NEEDS TO BE APPLIED ONLY ONE TIME. THE TEST DROP SHOULD NOT BE EVAPORATED TO DRYNESS. SHOULD CRYSTALS NOT APPEAR WITH THE PINK COLORATION, PLACING THE SPECIMEN IN THE REFRIGERATOR FOR TEN OR FIFTEEN MINUTES MAY RESULT IN THEIR APPEARANCE.

RESULTS OF OUR EXPERIMENTS INDICATES THAT FREQUENTLY A TEST MAY BE OBTAINED WITH THIS PROCEDURE IN CASES WHERE A NEGATIVE TEICHMAN IS OBTAINED. THE LITERATURE INDICATES THAT THIS MAY BE ACCEPTED AS A PROOF-TEST FOR BLOOD. GONZALES, VANCE, AND HELPERN IN THEIR "LEGAL MEDICINE AND TOXICOLOGY" (PAGE 288) FOR EXAMPLE, STATES "THIS TEST IS A POSITIVE INDICATION OF BLOOD PIGMENT AND REACTS WITH NO OTHER SUBSTANCE". WHILE IT MAY BE TRUE THAT A SPECTROSCOPIC EXAMINATION OF THE REACTION PRODUCTS WOULD IN NO CASE GIVE RESULTS IDENTICAL TO THAT OBTAINED WITH BLOOD, OUR OBSERVATIONS INDICATE THAT THE REAGENT DOES VERY DEFINITELY REACT WITH A NUMBER OF SUBSTANCES OTHER THAN BLOOD, IN SOME INSTANCES PRODUCING CRYSTALS WHICH MIGHT, BY AN INEXPERIENCED

TECHNICIAN, BE MISTAKEN FOR A POSITIVE BLOOD TEST.*

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THE TESTS ON CONTAMINATED BLOOD SPECIMENS PREPARED IN THE LABORATORY

FOR TESTING PURPOSES, DROPS OF UNDILUTED FRESH BLOOD WERE PLACED IN THE DEPRESSIONS OF A WHITE PORCELAIN SPOT-PLATE. TWELVE SUCH SPOTS WERE MADE, AND CONTAMINATED AS FOLLOWS. (THE AMOUNT OF CONTAMINATING MATERIAL ADDED WAS IN EACH CASE EQUAL TO, OR GREATER THAN THE VOLUME OF BLOOD USED, EXCEPT IN SPOT (3), WHERE THE AMOUNT OF RUST WAS LESS THAN THE VOLUME OF BLOOD.)

- (1) CONCENTRATED HYDROCHLORIC ACID
- (2) CONCENTRATED SULFURIC ACID
- (3) CONCENTRATED NITRIC ACID
- (4) GLACIAL ACETIC ACID
- (5) CONCENTRATED SODIUM HYDROXIDE
- (6) LIME (CALCIUM OXIDE)
- (7) SANDY SOIL, CONTAMINATED WITH MOTOR OIL
- (8) PLASTER FROM A WALL
- (9) TANNIC ACID, SOLID POWDER
- (10) URINE
- (11) ETHYL ALCOHOL
- (12) UNCONTAMINATED CONTROL
- (13) IRON RUST
- (14) LEAD FILLINGS (FROM A BULLET)
- (15) EXTRACT OF A SEMEN STAIN FROM CLOTH

IN ADDITION TO THESE, BLOOD SPOTS (THE BLOOD DILUTED WITH FOUR PARTS OF WATER BEFORE APPLICATION) WERE PLACED DIRECTLY ON THE FOLLOWING MATERIALS, AND LATER TESTED.

- | | |
|--------------------------|-------------------------------|
| (16) WALL PLASTER | (19) TILE - TERRA COTTA |
| (17) WOOD-PONDEROSA PINE | (20) WALLPAPER |
| (18) LEATHER GUN HOLSTER | (21) SOIL, SANDY, OILY. LARGE |
| (A) HAIR SIDE--SURFACED | EXCESS OF SOIL, WELL MIXED |
| (B) FLESH SIDE | WITH BLOOD. |

*TESTS RUN ON A LARGE NUMBER OF DYE-STUFFS INDICATES THAT CRYSTALLINE PRODUCTS ARE OBTAINABLE WITH MANY OF THE RED DYES. CRYSTALS ALMOST IDENTICAL IN FORM TO THE BLOOD CRYSTALS ARE FREQUENTLY OBTAINED FROM RED INKS, RED PENCIL "LEAD", ETC. EXCEPT THAT THEY ARE EITHER PALE ORANGE OR PURPLE. AS A MATTER OF FACT THIS REACTION BETWEEN THE TAKAYAMA REAGENT AND RED DYE-STUFFS HAS SUGGESTED THAT IT MIGHT BE A CONVENIENT REAGENT FOR THE IDENTIFICATION OF SUCH DYES AND PIGMENTS AS OCCURS IN PAINTS, CRAYONS, COSMETICS, ETC. OUR EXPERIMENTS IN THIS FIELD HAVE NOT BEEN COMPLETED, BUT THERE IS DEFINITE INDICATION THAT IT MAY PROVE A PRACTICAL TESTING TECHNIQUE. IT HAS ALREADY BEEN APPLIED IN ONE OR TWO INSTANCES AND SUCCESSFULLY DIFFERENTIATED MINUTE PARTICLES OF ORGANIC PAINTS WHICH WERE NOT OTHERWISE DISTINGUISHABLE.

THE BLOOD SPOTS WERE ALLOWED TO REMAIN FOR THREE DAYS BEFORE TESTS WERE BEGUN. MOST OF THE SPOTS HAD DRIED BY THIS TIME. FOR TESTING PURPOSES, A DROP OF DISTILLED WATER WAS ADDED TO EACH OF THE SPOTS, THE SOLUTION REMOVED AND DRIED ON A GLASS SLIDE FOR TESTS. WHEN IT WAS NOT POSSIBLE TO OBTAIN A GREAT ENOUGH CONCENTRATION OF BLOOD BY THIS MEANS, A PARTICLE OF THE SOLID MATERIAL OR SUBSTRATE WAS TAKEN. A SMALL WOOD SPLINTER WAS TESTED IN (17).

JUST BEFORE TESTING, THE COLORS OF THE SPOTS WERE NOTED, AND APPEARED AS FOLLOWS:

- | | |
|------------------------|-------------------------|
| (1) ORANGISH BROWN | (12) DARK RED |
| (2) BROWNISH ORANGE | (13) MEDIUM DARK RED |
| (3) BROWNISH YELLOW | (14) MEDIUM DARK RED |
| (4) DARK RED | (15) BROWNISH |
| (5) DARK REDDISH BROWN | (16) DARK RED TO BROWN |
| (6) YELLOWISH-GREEN | (17) DARK RED TO BROWN |
| (7) DARK RED | (18) DARK RED TO BROWN |
| (8) DARK RED | (19) DARK RED TO BROWN |
| (9) DARK RED | (20) DARK RED |
| (10) DARK RED | (21) STAIN NOT APPARENT |
| (11) DARK RED | |

THE FOLLOWING RESULTS WERE OBTAINED WITH THE BENZIDINE TEST APPLIED TO THESE STAINS: (- INDICATES A COMPLETELY NEGATIVE REACTION, * A POSITIVE AND FAIR REACTION, ** A VERY GOOD POSITIVE REACTION).

- | | | |
|--------|---------|--|
| (1) ** | (9) ** | THE TEST WAS NOT APPLIED TO (16) THROUGH (19). |
| (2) - | (10) ** | |
| (3) ** | (11) ** | A WATER, AND A SALINE EXTRACT OF (21) GAVE WEAK AND SLOW POSITIVE TESTS. A GLACIAL ACETIC ACID EXTRACT GAVE GOOD POSITIVE TESTS. |
| (4) ** | (12) ** | |
| (5) - | (13) ** | |
| (6) - | (14) ** | |
| (7) ** | (15) ** | |
| (8) ** | | |

THE TEST, APPLIED TO THE CONTAMINATING SUBSTANCES ALONE (SANS BLOOD) WAS NEGATIVE IN EVERY CASE EXCEPT WITH IRON RUST, WHERE A SLOW POSITIVE REACTION WAS OBTAINED.

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THE FOLLOWING IS THE RESULT OF THE TESTS ON THESE SPECIMENS WITH THE TEICHMAN PROCEDURE.

- | | | |
|--------|------------|---|
| (1) - | (11) ** | (20) ** |
| (2) - | (12) ** | (21) * SATISFACTORY EXTRACT NOT OBTAINED. |
| (3) - | (13) ** | |
| (4) * | (14) ** | |
| (5) - | (15) ** | |
| (6) - | (16) ** | |
| (7) ** | (17) ** | |
| (8) * | (18) (A) * | |
| (9) * | (B) - | |
| (10) * | (19) ** | |

RESULTS OF THE TAKAYAMA HEMOCHROMOGEN TEST ARE PRESENTED BELOW:

- (1) -
- (2) -
- (3) -
- (4) **
- (5) **
- (6) * DIFFICULTY OBTAINED, PINK COLOR RESTORED
- (7) **
- (8) *
- (9) **
- (10) **
- (11) **
- (12) **
- (13) AND (14) PREVIOUSLY DESTROYED -- NOT TESTED
- (15) **
- (16) *
- (17) *
- (18) (A) **
- (B) -
- (19) -
- (20) *
- (21) PREVIOUSLY DESTROYED -- NOT TESTED

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TECHNICAL NOTES

* THE EXAMINATION OF CHEMICALLY DEVELOPED GROUND-OFF SERIAL NUMBERS MAY
 * SOMETIMES BE FACILITATED BY A METHOD APPLIED IN OUR LABORATORY FROM
 * TIME TO TIME, BUT WHICH APPEARS NOT TO HAVE BEEN MENTIONED BEFORE IN
 * THE LITERATURE OR OTHERWISE. THE EXAMINATION MAKES USE OF THE FLUOR-
 * ESCENT PROPERTIES OF OILS, AND CONSISTS IN PLACING A THIN FILM OF A
 * FLUORESCENT OIL OVER THE NUMBERS WHICH HAVE BEEN CHEMICALLY DEVELOPED.
 * THE OIL WILL NATURALLY FILL UP ALL OF THE DEPRESSIONS REPRESENTED BY
 * THE NUMBERS, AND FORM A LAYER OVER THE AREA SURROUNDING THESE DEP-
 * RESSIONS. IF THE NUMBER BE EXPOSED TO ULTRA-VIOLET IRRADIATION, THEY
 * MAY BECOME MORE EASILY VISIBLE THAN THEY WERE UNDER WHITE-LIGHT
 * EXAMINATION DUE TO THE FACT THAT THE INCREASED THICKNESS OF OIL IN
 * THE DEPRESSIONS RESULTS IN A BRIGHTER FLUORESCENCE AT THAT POINT.
 * ACCORDINGLY THE NUMBERS MAY BECOME MORE EASILY DISCERNABLE. THIS TEST
 * IS NOT ALWAYS MORE SATISFACTORY THAN MERE WHITE-LIGHT EXAMINATION BUT
 * IT IS AT TIMES AND IS CERTAINLY WORTH TRYING.

JED

WE REGRET TO ANNOUNCE THAT ONE OF THE ARTICLES SUBMITTED TO US FOR PUBLICATION, AND WHICH WE HAD PREPARED TO PRINT, HAS ALREADY APPEARED IN ANOTHER OF THE LAW ENFORCEMENT JOURNALS; FOR THIS REASON IT IS BEING DELETED FROM THE PAGES OF "THE TECHNICIAN".

WHILE WE MAY LATER ARRANGE TO REPRINT MATERIAL OF THIS NATURE -- PARTICULARLY OF OUTSTANDING PREVIOUSLY PUBLISHED ARTICLES -- WE FEEL AT PRESENT THAT IT WOULD BE INADVISABLE TO DUPLICATE MATTER ALREADY PUBLISHED IN OTHER JOURNALS. ALL CONTRIBUTIONS SHOULD BE ORIGINAL AND NOT PREVIOUSLY PUBLISHED.

ON THE IDENTIFICATION OF AN UNKNOWN ORGANIC COMPOUND

By JOHN E. DAVIS (1)

THE POLICE LABORATORY IS FREQUENTLY CONFRONTED WITH THE PROBLEM OF IDENTIFYING SOME UNKNOWN MATERIAL WHICH IS SUSPECTED BY THE INVESTIGATOR TO HAVE BEEN USED WITH CRIMINAL INTENT. IN THE TOXICOLOGICAL END OF THE WORK, FOR EXAMPLE, CASES OFTEN COME IN WITH A REQUEST THAT A CERTAIN SPECIMEN BE EXAMINED FOR POISONS. IF THE SPECIMEN IS A FOOD OR DRUG SAMPLE, IT IS SOMETIMES POSSIBLE TO MAKE THE DETERMINATION WITHOUT GOING THROUGH ANY DETAILED LABORATORY PROCEDURE. ISOLATION OF THE COMPONENTS OF SUCH SAMPLES CAN FREQUENTLY BE MADE MECHANICALLY BY SEPARATION UNDER THE MICROSCOPE, OR EVEN WITH THE UNAIDED EYE.

ALTHOUGH THE TECHNICIAN MAY BE ABLE TO QUICKLY DETERMINE WHAT FOREIGN MATERIALS ARE PRESENT IN A SAMPLE, OR AT LEAST TO DETERMINE WHETHER OR NOT ANY OF THE COMMONLY ENCOUNTERED POISONS ARE PRESENT, IT SOMETIMES BECOMES NECESSARY FOR HIM TO ACTUALLY IDENTIFY ANY FOREIGN MATERIALS FOUND, REGARDLESS OF WHETHER OR NOT THEY REACT POSITIVELY TO TESTS FOR POISONOUS SUBSTANCES. SUPPOSE, FOR INSTANCE, THAT A SAMPLE IS SUBMITTED WITH A REQUEST THAT IT BE EXAMINED FOR COMMON ALKALOIDAL POISONS. AN EXAMINATION MAY REVEAL THAT SOME APPARENTLY-FOREIGN ORGANIC MATERIAL IS PRESENT IN THE SPECIMEN WHICH IS WHITE, AND CRYSTALLINE IN NATURE. GROUP-TESTS, AND SPECIFIC ALKALOIDAL TESTS MAY PROVE THAT THE MATERIAL IS NOT AN ALKALOID. AT THIS POINT THE TECHNICIAN CAN MAKE HIS REPORT-- STATING THAT NO COMMON ALKALOIDS ARE PRESENT. IN HIS OWN INTEREST, HOWEVER, THE REPORT AND EXAMINATION SHOULD NOT BE CONSIDERED AS FINAL. TIME PERMITTING, HE SHOULD DO EVERYTHING POSSIBLE TO IDENTIFY THE MATERIAL FOUND. THIS IS ADVISABLE FOR A NUMBER OF REASONS. IN THE FIRST PLACE IT PROVIDES VALUABLE EXPERIENCE IN TESTING TECHNIQUE AND GIVES HIM A CHANCE TO EXERCISE HIS INGENUITY. SECONDLY, THE RESULTS OF HIS PREVIOUS DETERMINATIONS AND THE REPORT WILL BECOME MORE CERTAIN IF HE IS ABLE TO IDENTIFY THE MATERIAL. THIRDLY, IT WILL ENABLE HIM TO BECOME SO FAMILIAR WITH THAT PARTICULAR SUBSTANCE THAT HE WILL UNDOUBTEDLY RECOGNIZE IT THE NEXT TIME HE SEES IT IN MUCH SHORTER TIME, IF NOT IMMEDIATELY -- AND IT MAY HAVE GREAT IMPORTANCE OR SIGNIFICANCE IN THE NEXT CASE. THIS LATTER COMMENT SUGGESTS ANOTHER REASON WHY HE SHOULD IDENTIFY THE MATERIAL -- NAMELY THAT THE SUBSTANCE, REGARDLESS OF WHETHER OR NOT IT IS AN ALKALOID, MAY HAVE SOME DEFINITE VALUE AND SIGNIFICANCE IN THIS PARTICULAR CASE WHICH EVEN THE INVESTIGATOR WOULD NOT HAVE SUSPECTED. THUS THE LABORATORY MAY ASSIST AN INVESTIGATOR IN THE DETECTION OF AN OFFENSE WHICH WOULD OTHERWISE HAVE GONE UNNOTICED.

THE PRACTICE FOLLOWED BY SOME LABORATORIES OF MAKING ONLY THE SPECIFIC DETERMINATION REQUESTED SHOULD BE DISCOURAGED. PARTICULARLY IS THIS TRUE WHERE TIME PERMITS THE TECHNICIAN TO MAKE MORE THOROUGH EXAMINATION OF HIS EVIDENCE. THE LABORATORY ANALYST, OF ALL PERSONS, SHOULD KNOW THE VALUE OF EVIDENCE. HE HAS BEEN TRAINED IN ITS VALUE AS WELL AS IN TESTING METHODS. HE SHOULD TAKE ADVANTAGE OF THIS KNOWLEDGE AND UTILIZE IT TO THE BENEFIT BOTH OF HIMSELF, AND OF THOSE WHO DEPEND UPON HIM FOR INFORMATION OF A TECHNICAL NATURE.

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CASES IN WHICH IT IS NECESSARY TO MAKE DETERMINATIONS OF THE TYPE MENTIONED ABOVE COME TO THE ATTENTION OF EVERY LABORATORY TECHNICIAN. SOME OF THESE ARE QUITE INTERESTING FROM THE STANDPOINT OF THE PROCEDURE WHICH MAY BE FOLLOWED IN THE IDENTIFICATION OF THE MATERIAL.

DIFFERENT TECHNICIANS WOULD FOLLOW DIFFERENT METHODS. MANY WOULD FOLLOW SCHEMATIC PROCEDURES AS OUTLINED IN STANDARD TEXTS, SUCH AS NOYES, OR KAMM. OTHERS MIGHT USE MODIFICATIONS OF THESE PROCEDURES. WITHOUT DOUBT A SCHEMATIC PROCEDURE OF SOME SORT SHOULD BE FOLLOWED WHERE APPLICABLE. AT LEAST THERE SHOULD BE A DEFINITE REASON FOR EACH STEP TAKEN IN MAKING THE ANALYSIS. REGULAR ANALYTICAL SCHEMES ARE SOMETIMES INFLEXIBLE, HOWEVER, AND DO NOT QUITE MEET THE NEEDS OF THE TECHNICIAN. IN SOME INSTANCES THE ANALYST MAY PREFER TO RUN CERTAIN TESTS, OR MAKE VARIOUS EXAMINATIONS WITHOUT REFERENCE TO ANY PARTICULAR SET SCHEME, ON THE POSSIBILITY THAT AN IDENTIFICATION MAY BE EFFECTED MORE QUICKLY AND EASILY. IF THIS FAILS, HE MAY THEN PROCEED IN A MORE SYSTEMATIC MANNER. WHILE THIS METHOD WOULD PROBABLY BE DISCOURAGED BY THE MORE PEDANTIC INDIVIDUAL, IT DOES HAVE THE ADVANTAGE OF SERVING AS A MUCH MORE EDUCATIONAL PROCESS (AS FAR AS THE TECHNICIAN HIMSELF IS CONCERNED) THAN THE MERE FOLLOWING OF SYSTEMS WORKED OUT BY OTHERS; FURTHER IT MAY STIMULATE HIS INTEREST IN MAKING THE IDENTIFICATION, IN THAT IT ALLOWS FREE EXPRESSION OF THOUGHT, AND APPLICATION OF "ORIGINAL" METHODS. THE PLEASURE DERIVED FROM MAKING AN IDENTIFICATION IN ONES OWN MANNER IS FREQUENTLY SUFFICIENT TO ENCOURAGE MORE WORK ON THE SUBJECT, AND MORE THAN PAYS FOR THE LITTLE EXTRA TIME CONSUMED IN EFFECTING THE IDENTIFICATION.

THE WRITER IS PARTICULARLY INTERESTED IN CHEMICAL MICROSCOPY AND THE IDENTIFICATION OF MATERIALS ON THE BASIS OF THEIR CRYSTALLINE APPEARANCE AS SEEN UNDER MICROSCOPIC MAGNIFICATION. THE APPEARANCE OF MATERIALS, AND THEIR CRYSTALLINE FORM, VARIES SUFFICIENTLY UNDER DIFFERENT CONDITIONS OF FORMATION (SOLVENTS USED, CONCENTRATION, MANNER IN WHICH PRECIPITATED, ETC.) AS TO SERVE AS A VALUABLE PRELIMINARY METHOD OF EXAMINATION OF UNKNOWN SUBSTANCES. FOR OUR CONVENIENCE IN THE LABORATORY, WE HAVE A PHOTOGRAPHIC FILE CONTAINING PHOTOMICROGRAPHS OF A NUMBER OF ORGANIC AND INORGANIC SUBSTANCES COMMONLY ENCOUNTERED IN CRIMINOLOGICAL WORK. IN ADDITION TO THESE, PHOTOMICROGRAPHS OF VARIOUS CRYSTALS OBTAINED IN MICRO-CHEMICAL TESTS FOR ORGANICS AND INORGANICS ARE HELPFUL, AND SUCH A FILE IS MAINTAINED BY OUR LABORATORY.

FOR THE IDENTIFICATION OF MATERIALS ONLY SUSPECTED TO BE POISONOUS, HOWEVER, (BUT WHICH MAY NOT BE), A FILE SHOULD BE KEPT ON MISCELLANEOUS NON-POISONOUS MATERIALS. ACCORDINGLY WE HAVE MADE IT A POLICY TO FILE PHOTOMICROGRAPHS OF ALL SUCH SUBSTANCES ENCOUNTERED IN CASE WORK, FOR REFERENCE IN THE FUTURE.

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ONE OF THE FIRST CASES ASSIGNED TO THE WRITER, WHICH NECESSITATED AN EXAMINATION OF THE TYPE BEING DISCUSSED, IS OF INTEREST.

A SMALL BOTTLE OF SUGAR WAS SENT IN TO THE LABORATORY, WITH A REQUEST THAT IT BE EXAMINED FOR POISONOUS MATERIALS. (L-1045). NO INDICATION OF THE NATURE OF THE SUSPECTED POISON WAS GIVEN IN THE REPORT, NOR THE REASONS FOR BELIEVING IT TO BE CONTAMINATED, BEYOND THE FACT THAT A MAN AND HIS WIFE WERE HAVING TROUBLE, AND THAT AFTER USING SOME OF THIS SUGAR IN HIS COFFEE ONE MORNING, HE HAD BECOME QUITE ILL.

AN EXAMINATION WAS MADE, AND THE FOLLOWING LABORATORY REPORT SUBMITTED. (THE SUGAR WAS IDENTIFIED AS SUCH BEFORE THESE TESTS WERE RUN.)

VISUAL EXAMINATION INDICATED THAT THERE WAS SOME FOREIGN WHITE PARTICLES IN THE SUGAR. EXAMINATION MADE UNDER THE DISSECTION MICROSCOPE CONFIRMED THIS, BUT GAVE NO NEW INDICATION OF ITS

NATURE. NO OTHER FOREIGN MATERIAL WAS OBSERVED, THE OTHER MATERIAL BEING SUGAR CRYSTALS. THE FOREIGN PARTICLES WERE PICKED OUT WITH A GLASS THREAD, AND FURTHER EXAMINED.

(1) IN COLD WATER THE FOREIGN MATERIAL IS INSOLUBLE, BUT IT DID DISINTEGRATE INTO TWO TYPES OF MATERIAL. ONE PART LOOKED LIKE CRYSTALLINE MATERIAL (BUT WAS NOT IN CLEAR-CUT CRYSTAL FORM, BEING RATHER LARGE ROUGHLY SHAPED PARTICLES) AND THE OTHER MATERIAL RESEMBLED STARCH GRAINS. (SOME OF THESE APPEARED SIMILAR TO ARSENIC TRIOXIDE CRYSTALS.)

(2) THE MATERIAL WAS SOLUBLE IN HOT WATER, AND UPON COOLING, CRYSTALS OF A LONG NEEDLE-LIKE SHAPE SEPARATED OUT, WHICH GREW THICKER AND INTO PLATES. THEIR SHAPE SUGGEST STRYCHNINE TO SOME EXTENT, BUT TESTS FOR THIS HAD BEEN NEGATIVE. THE STARCH-LIKE GRAINS SWELLED UP WITH THE ADDITION OF HOT WATER, AND GAVE AN IODINE-STARCH REACTION. CONCLUSIONS WAS THAT THEY WERE STARCH. ARSENIC TESTS (GUTZEIT) WERE NEGATIVE.

(3) MICRO TESTS FOR LEAD ACETATE WERE NEGATIVE. (THE CRYSTALS ARE QUITE SIMILAR TO THOSE OF LEAD ACETATE, BUT THE SOLUBILITIES DID NOT CHECK.)

(4) THE CRYSTALS WERE SOLUBLE IN DILUTE SODIUM HYDROXIDE, AND REPRECIPITATE IN DIFFERENT FORM UPON ADDITION OF DILUTE ACID.

(5) THE MATERIAL SEEMED TO BE SOLUBLE IN ALCOHOL AND ETHER. ALTHOUGH IT WAS NOT SEPARATED FROM THE STARCH, HEATING CAUSED IT TO SUBLIME.

(THE PARTICLES BEING TESTED -- THE ONES PICKED OUT OF THE SUGAR -- WERE ABOUT THE SIZE OF A PINHEAD, OR SMALLER.)

(6) A NUMBER OF THE PARTICLES WERE SEPARATED FROM THE SUGAR, AND EXTRACTED WITH ETHER (IN WHICH SUGAR AND STARCH ARE INSOLUBLE), CRYSTALLIZED OUT ON A SMALL WATCH GLASS, AND RECRYSTALLIZED FROM ALCOHOL. LARGE SILKY CRYSTALS RESULTED.

(7) THESE CRYSTALS WERE TESTED WITH THE GROUP-TEST REAGENTS FOR ALKALOIDS, AS WELL AS WITH ALKALOID-SPECIFIC TESTS. ALL TESTS WERE NEGATIVE.

(8) IT WAS CONCLUDED NOT TO BE ANY OF THE COMMON NON-VOLATILE, NON-ALKALOIDAL ORGANIC POISONS ON THE BASIS OF SOLUBILITY, AND APPEARANCE. SOME OF THESE WERE TESTED FOR, HOWEVER (BARBITURATES, ETC.) WITH NEGATIVE RESULTS.

(9) MICRO-CHEMICAL TESTS FOR POISONOUS METALS AND RADICALS WERE NEGATIVE. THESE WERE RUN IN SPITE OF THE FACT THAT THE MATERIAL WAS APPARENTLY ORGANIC.

(10) AFTER COMPLETION OF THESE TESTS, MORE CAREFUL OBSERVATION WAS MADE OF THE CRYSTALS AND THEIR FORM. THEIR SIZE, SHAPE, AND SILKY APPEARANCE SUGGESTED SALICYLIC ACID. COMPARISON WITH KNOWN SALICYLIC ACID WAS MADE, BUT INDICATED SOME DIFFERENCE

BETWEEN THEM. A FERRIC-CHLORIDE TEST RUN ON THE UNKNOWN MATERIAL WAS NEGATIVE. THE SAME TEST APPLIED TO THE CRYSTALS OBTAINED BY DISSOLVING THE MATERIAL IN DILUTE SODIUM HYDROXIDE, AND THEN REPRECIPITATING WITH ACID WAS POSITIVE FOR PHENOLICS. MILLONS TEST WAS ALSO POSITIVE.

(11) INASMUCH AS OIL OF WINTERGREEN IS MADE FROM SALICYLIC ACID BY TREATMENT WITH METHYL ALCOHOL AND SULFURIC ACID, THIS WAS APPLIED AS A TEST TO THE CRYSTALS OBTAINED AS DESCRIBED ABOVE. THE TEST WAS POSITIVE -- OIL OF WINTERGREEN BEING DETECTED BY ITS ODOR. KNOWN SALICYLIC ACID REACTED IN THE SAME WAY IN CONTROL TESTS.

(12) THE CONCLUSION WAS DRAWN THAT A SALICYLATE WAS BEING EXAMINED, BUT TESTS IN THE LITERATURE WHICH WERE DESIGNED TO DIFFERENTIATE THE SALICYLATES FAILED TO PROVE SATISFACTORY ON THE SMALL AMOUNT OF MATERIAL AT HAND.

(13) A MELTING POINT DETERMINATION WAS MADE, AND THE SUBSTANCE FOUND TO MELT ROUGHLY BETWEEN 119 AND 121 DEGREES CENTIGRADE. THE MELTING POINT WAS NOT SHARP, AND THE MELT WAS TURBID. THE MATERIAL WAS NOT AS PURE AS WOULD BE DESIRED FOR AN ACCURATE DETERMINATION.

(14) THE ONLY SALICYLIC ACID DERIVATIVES LISTED IN THE REFERENCES, HAVING MELTING POINTS EVEN NEAR THIS TEMPERATURE ARE ASPIRIN, AT 135 DEGREES, AND MAGNESIUM SALICYLATE AT 121 DEGREES. THE LATTER, HOWEVER, IS INSOLUBLE IN ALCOHOL, AND WAS RULED OUT AS A POSSIBILITY.

(15) COMPARISON WAS THEN MADE WITH A KNOWN ASPIRIN TABLET. UPON CRUSHING THE TABLET IN COLD WATER, THE APPEARANCE WAS IDENTICAL TO THE UNKNOWN PARTICLES, EXCEPT THAT THE STARCH GRAINS WERE LARGER AND OF A DIFFERENT TYPE. (THIS WAS MY FIRST KNOWLEDGE OF STARCH BEING USED AS A BINDER IN MANUFACTURE OF PILLS -- AND THE FIRST OCCASION ON WHICH I HAD ANY NECESSITY OF EXAMINING PILLS). THE CRYSTALS OBTAINED FROM A HOT WATER SOLUTION OF THESE KNOWN ASPIRIN TABLETS ARE IDENTICAL TO THOSE OBTAINED IN THE UNKNOWN, AND ARE ALSO IDENTICAL IN ALL OTHER REACTIONS OBSERVED (AS DESCRIBED ABOVE), SOLUBILITIES, ETC.

CONCLUSION WAS DRAWN THAT THE MATERIAL WAS A DERIVATIVE OF SALICYLIC ACID, BEING ALMOST CERTAINLY ASPIRIN, PROBABLY CRUSHED ASPIRIN TABLETS.

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A SECOND CASE OF SIMILAR NATURE IS PRESENTED FOR THE INTEREST OF THE READER. THIS PARTICULAR CASE SERVES AS AN EXCELLENT ILLUSTRATION OF THE MANNER IN WHICH AN UNKNOWN SUBSTANCE MAY BE IDENTIFIED EVEN WHEN ONLY A SMALL AMOUNT IS USED FOR TESTING. THE FACT THAT THE MATERIAL HAD AN ODOR SIMILAR TO THAT OF CAMPHOR, WAS, OF COURSE, A GREAT AID IN SUGGESTING THE PROCEDURE TO BE FOLLOWED. ON THE OTHER HAND, THE WRITER HAD NEVER BEFORE SEEN OR EVEN HEARD OF THIS PARTICULAR COMPOUND; FROM THIS STANDPOINT THE PROCEDURE WAS INTERESTING. THE FACT THAT TESTS FOR SUCH COMPOUNDS WERE NOT FOUND IN THE LITERATURE

(15)

INDICATE THE VALUE OF COMPARATIVE IDENTIFICATION METHODS.

THE CASE IN QUESTION WAS ONE IN WHICH TWO TABLETS OR PILLS HAD BEEN SUBMITTED FOR A NARCOTIC EXAMINATION, INASMUCH AS THE SUSPECTS IN THE CASE HAD BEEN USING THEM HYPODERMICALLY (APPARENTLY).

A SECOND SPECIMEN WAS SUBMITTED AS PROBABLY BEING MORPHINE.

THE LABORATORY REPORT WHICH WAS MADE OUT ON THE CASE IS PRESENTED BELOW:

THE EXAMINATION

- (Q-1) TWO BROWN TABLETS, PROBABLY 5 GRAIN SIZE.
- (Q-2) WHITE POWDER SUSPECTED TO BE MORPHINE COMPOUND.

- (1) INASMUCH AS Q-2 WAS SUSPECTED TO BE MORPHINE, TESTS WERE RUN FIRST ON THIS MATERIAL, FOR MORPHINE. MICROSCOPIC OBSERVATION DID NOT REVEAL CLEAR-CUT CRYSTALS, BUT INDICATED A CRYSTALLINE MATERIAL. THE MATERIAL IS SOLUBLE IN CHLOROFORM, BUT ONLY SMALL PRISMS SEPARATE.

TWO MICRO-CHEMICAL TESTS WERE RUN ON THIS MATERIAL. THE FIRST OF THESE WAS OF A DILUTE HYDROCHLORIC ACID SOLUTION OF THE SPECIMEN, TESTED WITH MARME'S REAGENT. THE FINE NEEDLES, CHARACTERISTIC OF MORPHINE WERE OBTAINED, AND CHECKED WITH KNOWN MORPHINE TEST. THEY WERE IDENTICAL. THE SECOND TEST WAS WITH WAGNER'S REAGENT. THE PLATES AND JAGGED-EDGE NEEDLES CHARACTERISTIC OF MORPHINE WERE PRESENT IN ABUNDANCE. CHECKED WITH KNOWN MORPHINE. RESULTS IDENTICAL IN BOTH CASES.

SUFFICIENT MATERIAL WAS LEFT FOR A COLOR TEST WITH MOLYBDIC-SULFURIC ACID. THE PURPLE COLORATION PRODUCED WAS VERY PROMINENT. MORPHINE GIVES A LIKE REACTION.

CONCLUSION: THE SPECIMEN Q-2 IS A MORPHINE COMPOUND. MAY BE ADULTERATED, BUT DOUBTED TO BE SO.

- (2) EXAMINATION OF Q-1 WAS THEN BEGUN. ONE OF THE PILLS WAS CUT INTO HALF, AND ONE DIVIDED. THUS ONE-FOURTH OF A TABLET WAS TESTED (THIS IS ALL THAT WAS CONSUMED IN THE ENTIRE TESTING PROCESS).

THE MATERIAL WAS PLACED IN A TEST TUBE FOR LATER TESTING. ONE MINUTE FRAGMENT WAS TESTED FOR SOLUBILITY, AND IT WAS NOTED THAT THE MATERIAL WAS INSOLUBLE IN WATER, BUT SOLUBLE IN ALCOHOL. STARCH GRAINS ARE PRESENT IN LARGE AMOUNT. THE ALCOHOL EXTRACT LEAVES CLEAR CRYSTALS IN THE FORM OF NOTCHED-END AND PYRAMID-END PLATES, ALSO IN FEATHERY AND SMOOTH CROSSES, DEPENDING ON HOW THEY ARE BROUGHT DOWN (CONCENTRATION, ETC). SALTING OUT OF ALCOHOL SOLUTION (WITH WATER) GAVE THE BEST OPPORTUNITY TO OBSERVE THEM.

A COMPLETE SERIES OF GROUP-TESTS FOR ALKALOIDS WERE RUN ON A FILTRATE OF AN ALCOHOLIC EXTRACT OF ONE FOURTH OF A PILL. IN NO CASE WAS A REACTION OBTAINED EXCEPT THAT WATER SOLUTIONS OF

THE REAGENTS PRECIPITATED THE UNKNOWN MATERIAL IN CRYSTALS AS DESCRIBED ABOVE.

THE ODOR OF THE MATERIAL, WHETHER IN ALCOHOL, OR BETTER IN WATER, REMINDED ME OF CAMPHOR. ACCORDINGLY REFERENCE WAS MADE TO THE PHARMACOPEA FOR CAMPHORATED COMPOUNDS. AFTER SOME TESTING OF VARIOUS CAMPHORATED COMPOUNDS, A MELTING POINT TEST WAS RUN ON THE UNKNOWN AND DETERMINED TO BE BETWEEN 68 AND 78 DEGREES (TEST RUN QUITE RAPIDLY, HENCE WIDE RANGE). THE SOLUBILITY AND ODOR, WITH THE MELTING POINT ELIMINATED CERTAIN OF SUSPECTED COMPOUNDS, INCLUDING EPHEDRINE, BENZIDRINE, ETC., AND SUGGESTED MONOBROMO-CAMPHOR.

A VISIT TO THE DRUG STORE WAS MADE, AND A SAMPLE OF BROMO CAMPHOR OBTAINED FOR COMPARISON.

THIS MONOBROMO-CAMPHOR WAS TESTED AND THE FOLLOWING OBSERVATIONS MADE:

IT HAS AN ODOR IDENTICAL WITH THE UNKNOWN SPECIMEN.
IT IS SOLUBLE IN ALCOHOL AND CRYSTALS IDENTICAL TO THOSE OBTAINED FROM UNKNOWN APPEAR UPON ADDITION OF WATER.
IT IS LISTED AS HAVING A MELTING POINT OF 74-76 DEGREES CENTIGRADE.
IT REACTS WITH NO REAGENTS APPLIED, INCLUDING THE GROUP-TEST ALKALOID REAGENTS.
IT DOES NOT FLUORESCENCE.

A NEW MELTING POINT DETERMINATION WAS RUN ON THE UNKNOWN SAMPLE. IT WAS CAREFULLY MADE, AND THE TEMPERATURE VERY SLOWLY RAISED. THE MATERIAL MELTED PRIMARILY FROM 74 TO 76 DEGREES, WITH MOST OF IT GOING EXACTLY ON 75 DEGREES. IT SUBLIMES AT THIS POINT. IT IS AN ORGANIC HALOGEN AS PROVEN BY COPPER SPIRAL TEST. IT HAS NO FLUORESCENCE. KNOWN M. B. CAMPHOR LIKEWISE HAS NO FLUORESCENCE, AND IT GIVES POSITIVE HALOGEN TEST.

CONCLUSION: THE GREAT SIMILARITY BETWEEN THE UNKNOWN MATERIAL AND MONOBROMO-CAMPHOR MAKES ME CERTAIN BEYOND REASONABLE DOUBT THAT THE TWO SPECIMENS ARE IDENTICAL, AND THAT THE UNKNOWN SPECIMEN IS THIS DRUG, MIXED WITH STARCH, AND NO OTHER MATERIAL IN APPRECIABLE QUANTITIES.

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A NOTE ON THE USE OF INFRA-RED PHOTOGRAPHY

By RALPH F. TURNER, LABORATORY
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INFRA-RED PHOTOGRAPHY HAS BEEN USED BY POLICE TECHNICIANS FOR MANY YEARS DURING THE COURSE OF ROUTINE LABORATORY WORK. RESULTS ARE USUALLY VARIED IN NATURE, AND WHEN PARTICULARLY FAVORABLE RESULTS ARE OBTAINED IT IS USUALLY GRATIFYING. THIS AUTHOR HAS KEPT A RECORD OF PHOTOGRAPHS MADE WITH INFRA-RED AND ULTRA-VIOLET RAYS OVER A PERIOD OF YEARS AND IS RECORDING THIS PARTICULAR CASE FOR WHATEVER VALUE IT MAY HAVE FOR TECHNICIANS WHO MAY ENCOUNTER SIMILAR PROBLEMS.

A PIECE OF PAPER WAS BROUGHT TO THE LABORATORY WITH THE REQUEST THAT AN ATTEMPT BE MADE TO RESTORE THE WRITING WHICH WAS BELIEVED TO BE ON THE DOCUMENT. THE PAPER WAS THE SIZE OF A SMALL PERSONAL CHECK AND LOOKED VERY MUCH LIKE A PIECE OF HEAVY CARBON PAPER. IT WAS STAINED A DEEP BLUE-BLACK AND WAS VERY FLIMSY. WE WERE INFORMED THAT THIS PIECE OF PAPER HAD BEEN FOUND IN THE INK WELL OF A CHECK CANCELLING MACHINE USED IN A BANK. IT WAS BELIEVED THAT THE PAPER WAS A CHECK WHICH HAD BEEN LOST APPROXIMATELY TWO MONTHS PRIOR TO ITS DISCOVERY. THE PAPER HAD ABSORBED SUCH A QUANTITY OF INK AS TO CAUSE ITS FLIMSY APPEARANCE, AS MENTIONED ABOVE.

A PANCHROMATIC PHOTOGRAPH WAS TAKEN OF THE DOCUMENT WHICH RESULTED IN NOTHING BUT A BLANK NEGATIVE. EXAMINATION WITH ULTRA-VIOLET LIGHT DID NOT REVEAL ANYTHING OF SIGNIFICANCE. THE DOCUMENT WAS THEN PHOTOGRAPHED WITH INFRA-RED FILM. THE SOURCE OF ILLUMINATION WAS TWO 15 AMP CARBON ARC LIGHTS IN REFLECTORS. EASTMAN INFRA-RED FILM AND A WRATTEN 87 FILTER WERE USED. THE EXPOSURE WAS 4 MINUTES AT F:22. THE FILM WAS DEVELOPED FOR 7 MINUTES IN EASTMAN DK 60-A DEVELOPER AT 72°F. A VERY SATISFACTORY NEGATIVE WAS OBTAINED BY MEANS OF WHICH IT WAS POSSIBLE TO READ ALL OF THE PRINTING ON THE FACE OF THE CHECK AND ALSO SUCH INFORMATION AS THE DATE, AMOUNT, PAYEE, PAYER, ETC. FORTUNATELY THIS WRITING WAS IN PENCIL AND COULD BE READ WITH EASE. THE BACK OF THE CHECK WAS PHOTOGRAPHED IN THE SAME MANNER, BUT NOTHING OF SIGNIFICANCE COULD BE DEVELOPED. IT WAS THOUGHT THAT BECAUSE THE CANCELLATIONS ON THE BACK WERE PROBABLY MADE WITH AN INK WHICH CLOSELY RESEMBLED THAT USED IN THE INKWELL OF THE CANCELLING MACHINE, SUFFICIENT DIFFERENTIATION BETWEEN THE TWO COULD NOT BE RECORDED ON THE FILM.

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THE IDENTIFICATION OF SEMINAL STAINS

By JOHN E. DAVIS

THIS DISCUSSION IS NOT ONE INTENDED TO PRESENT ANY NEW INFORMATION ON THE SUBJECT OF THE TESTING OF SEMINAL STAINS, BUT RATHER IS ONE RAISING A QUESTION CONCERNING THE TYPE OF CONCLUSION WHICH MAY BE SAFELY DRAWN FROM RESULTS OF PRELIMINARY, AND PROOF TESTS FOR SEMEN. IT IS NOT INTENDED TO BE TAKEN AS AN ATTEMPT TO RE-EVALUATE THE SIGNIFICANCE OF PRESENT TEST FOR SEMEN STAINS. ON THE CONTRARY, THE DISCUSSION IS BEING WRITTEN MORE FOR THE PURPOSE OF OBTAINING A RESPONSE FROM OTHER TECHNICIANS, IN THE HOPE THAT SOME INFORMATION WILL BE RECEIVED WHICH CAN BE USED AS A MORE CONCRETE BASIS FOR SUCH CONCLUSIONS AS DO APPEAR RELIABLE IN THESE EXAMINATIONS.

TWO TYPES OF TESTS ARE USED IN THE EXAMINATION OF SUSPECTED SEMINAL STAINS -- THE PRELIMINARY TESTS, AND A PROOF-TEST.

THE FIRST OF THESE MAY INVOLVE AN ULTRA-VIOLET EXAMINATION, OR MICRO-CHEMICAL DETERMINATIONS. THE PROOF TEST DEPENDS UPON THE ISOLATION AND IDENTIFICATION OF COMPLETE SPERMATOCYTES.

THERE ARE TWO QUESTIONS WHICH MAY NOW BE RAISED. THE FIRST OF THESE WOULD ASK "JUST WHAT SIGNIFICANCE MAY BE ATTACHED TO A POSITIVE PRELIMINARY TEST FOR SEMEN?"; THE SECOND QUESTION ASKS "IS THE ISOLATION OF ONLY ONE SPERMATOCYTE SUFFICIENT FOR PROOF, OR SHOULD TWO OR POSSIBLY THREE BE ISOLATED BEFORE FINAL PROOF IS CONSIDERED AS DEMONSTRATED"?

IN REPLY TO THE FIRST QUESTION, WE MIGHT ANSWER THAT THE TESTS MUST BE CONSIDERED SEPARATELY, AND PROCEED ON THE FOLLOWING BASIS:

CONSIDERING FIRST THE QUESTION OF FLUORESCENCE OF SEMINAL STAINS, WE NOTE THAT MANY SUBSTANCES OTHER THAN SEMEN FLUORESCENCE WITH AN APPEARANCE IDENTICAL TO THAT OF SEMEN. FOR THIS REASON, NO GREAT SIGNIFICANCE MAY BE ATTACHED TO THIS FLUORESCENCE. THIS IS PARTICULARLY TRUE IN VIEW OF THE FACT THAT OTHER SUBSTANCES WHICH ARE COMMONLY FOUND IN REGIONS SUSPECTED TO CONTAIN SEMEN STAINS (PERSPIRATION, URINE, ETC. ON CLOTHING, E.G.) FLUORESCENCE ALMOST IDENTICALLY TO THE SEMEN-FLUORESCENCE.

ACCORDINGLY WE MAY CONCLUDE THAT A BLUE-WHITE FLUORESCENCE INDICATES THAT SEMEN MAY BE PRESENT, BUT THAT NO DEFINITE PROOF OF ITS PRESENCE IS PROVIDED.

LET US NEXT CONSIDER THE MICRO-CHEMICAL TESTS FOR THESE STAINS. OF THESE, THE FLORENCE TEST IS, WITHOUT DOUBT, THE MOST COMMONLY EMPLOYED METHOD. THE PROCEDURE DEPENDS ON A REACTION BETWEEN THE REAGENT (A CONCENTRATED AQUEOUS SOLUTION OF IODINE IN POTASSIUM IODIDE) AND ONE OF THE CONSTITUENTS OF SEMEN. THIS REACTING CONSTITUENT OF SEMEN IS SUPPOSED TO BE CHOLINE. (AN ORGANIC COMPOUND -- TRIMETHYL -- OXYETHYL -- AMMONIUM -- HYDROXIDE -- RESULTING FROM HYDROLYSIS OF LECITHIN, AND WHICH MAY BE FOUND IN MATERIALS OTHER THAN SEMEN. IT MAY RESULT FROM PUTREFACTIVE DECOMPOSITION OF FATTY SUBSTANCES, FOR EXAMPLE. IN THE BODY, CHOLINE IS SUPPOSED TO GIVE RISE TO TRIMETHYLAMINE AND OTHER DECOMPOSITION PRODUCTS WHICH ARE THEN EXCRETED.)*

HENCE EVEN THE PRESENCE OF CHOLINE IN A STAINED AREA COULD NOT BE ACCEPTED ALONE AS PROOF OF THE PRESENCE OF SEMEN.

FOR THIS REASON IT HAS BEEN CUSTOMARY IN THE POLICE LABORATORY TO ACCEPT A POSITIVE FLUORESCENCE AND FLORENCE TEST AS ONLY INDICATIVE OF THE PROBABLE PRESENCE OF SEMEN. PROOF, WE ARE TOLD, MUST REST ON THE ISOLATION OF COMPLETE SPERMATOZOA.

OTHER PRELIMINARY TESTS OF A MICRO-CHEMICAL NATURE MAY BE RUN, HOWEVER. THE MERK INDEX LISTS TWO. THE FIRST OF THESE DEPENDS ON THE REACTION BETWEEN SPERMIN (A CONSTITUENT OF SEMEN) AND A HOT AQUEOUS SOLUTION OF GOLD TRIBROMIDE. THE SECOND OF THESE IS BASED ON A REACTION BETWEEN SOME CONSTITUENT OF SPERMATIC FLUID AND A REAGENT MADE FROM NAPHTHOL YELLOW-S. (ALTHOUGH THEY HAVE BEEN ORDERED, WE DO NOT HAVE EITHER OF THE ABOVE MENTIONED REAGENTS IN OUR LABORATORY AT PRESENT, AND HAVE NOT BEEN ABLE TO APPLY NOR EVALUATE THE TESTS DESCRIBED.)

THE "BARBERIO TEST", BASED ON CRYSTALS OBTAINED WITH PICRIC ACID AND SEMEN, HAS ALSO BEEN ADVOCATED AS PRELIMINARY. THE CRYSTALS WHICH THE WRITER HAS OBTAINED IN THIS TEST DO NOT APPEAR PARTICULARLY CHARACTERISTIC NOR PECULIAR, ALTHOUGH IN THE ABSENCE OF SEMEN SUCH CRYSTALS HAVE NOT BEEN NOTED.

IT WOULD SEEM, IN SOME RESPECTS, THAT A MORE POSITIVE CONCLUSION SHOULD BE VALID IN THOSE INSTANCES IN WHICH A POSITIVE REACTION IS OBTAINED IN ALL PRELIMINARY TESTS RUN. IN OTHER WORDS, IT APPEARS TO THE WRITER THAT POSSIBLY WE HAVE BEEN A LITTLE RELUCTANT TO DRAW A POSITIVE CONCLUSION AS A RESULT OF PRELIMINARY TESTS. IT IS OF COURSE TRUE THAT RAPE CASES (THE CASE MOST FREQUENTLY INVOLVING SEMINAL STAINS), AND THE CHARGE OF RAPE OR OTHER SEX OFFENSES, ARE SERIOUS MATTERS. THE TECHNICIAN WOULD RATHER STAY ON THE SAFE SIDE, NATURALLY, THAN TO MAKE UNWARRANTED STATEMENTS WHICH MIGHT UNJUSTLY INCRIMINATE AN INDIVIDUAL. ON THE OTHER HAND, PROBABLY FEW IF ANY CASES EVER COME TO THE ATTENTION OF THE POLICE TECHNICIAN, IN WHICH THE VARIOUS PRELIMINARY TESTS FOR SEMEN WOULD BE OBTAINED IN POSITIVE FORM, BUT WHAT SEMINAL STAINS WOULD ACTUALLY BE PRESENT. THIS FACTOR, IT WOULD APPEAR, HAS NOT BEEN TAKEN SUFFICIENTLY INTO CONSIDERATION IN EVALUATING THESE TESTS. IN ADDITION, THE CIRCUMSTANCES SURROUNDING THE OFFENSE MAY ADD STILL MORE TO THE CERTAINTY OF THE RESULTS. EXAMINATION FOR SEMINAL STAINS OCCURS ONLY IN CASES OF RAPE OR OTHER SEX OFFENSES. IN SUCH OFFENSES THERE IS GENERALLY SOME DEFINITE INDICATION OF THE POSSIBLE PRESENCE OF SEMEN STAINS. FREQUENTLY EVEN THE AREA WHICH SHOULD FIRST BE SEARCHED IS INDICATED.

THE ARGUMENT AGAINST ACCEPTING THIS LATTER AS A VALID EXCUSE FOR INCREASING THE SIGNIFICANCE OF PRELIMINARY TESTS WOULD PROBABLY BE THAT IT IS BASED ON BIAS. IN OTHER WORDS, THAT WITHOUT ANY KNOWLEDGE OF THE TYPE OF OFFENSE, OR THE MANNER OF COMMISSION, THAT A TECHNICIAN MIGHT BE LESS WILLING TO DRAW A POSITIVE CONCLUSION IN THE CASE -- AND THAT IT IS THEREFORE NOT BASED ON A "PURELY SCIENTIFIC" FOUNDATION. THIS, OF COURSE, IS TRUE. BUT AS A MATTER OF FACT THE SAME ARGUMENT COULD BE USED IN REGARD TO MANY OF THE OTHER DETERMINATIONS WHICH ARE CONSIDERED AS VALIDLY MADE. CONCLUSIONS IN DOCUMENT CASES, SUSPECTED POISONINGS, FIREARMS EXAMINATIONS, AND OTHERS WILL AT TIMES INVOLVE THIS FACTOR OF "BIAS" THOUGH THE TECHNICIAN HIMSELF MAY NOT EVEN REALIZE IT. WHETHER OR NOT WE ACCEPT THIS AS A VALID ARGUMENT, THERE

*"PHYSIOLOGICAL CHEMISTRY" BY BODANSKY. JOHN WILEY & SONS, N.Y., N.Y.

REMAINS THE SIMPLE FACT (AS STATED ABOVE) THAT THE POLICE TECHNICIAN RARELY IF EVER WOULD ENCOUNTER ANY MATERIAL WHICH WILL REACT POSITIVELY TO THE PRELIMINARY TESTS, AND YET NOT HAVE BEEN THE RESULT OF A SEMINAL STAIN. CERTAINLY THIS CAN BE USED AS A RELIABLE MEASURE OF THE PROBABLE SIGNIFICANCE OF THE TESTS.

MAY HE BE CERTAIN "BEYOND ALL REASONABLE DOUBT" IN SUCH CASES? IF SO, PERHAPS RECONSIDERATION OF THE MATTER IS IN ORDER.

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IN THE PROOF-TEST FOR SEMINAL STAINS WE ENCOUNTER THE SECOND QUESTION, NAMELY, JUST HOW MANY COMPLETE SPERMATOZOA MUST BE ISOLATED FROM THE STAIN BEFORE PROOF IS DEMONSTRATED?

EVERY POLICE TECHNICIAN IS AWARE OF THE DIFFICULTY SO OFTEN MET WITH IN ATTEMPTING TO ISOLATE AND IDENTIFY SPERM CELLS FROM THESE STAINS. THE FREQUENCY WITH WHICH EVIDENCE STAINS OF THIS TYPE HAVE DRIED OUT SINCE COMMISSION OF THE OFFENSE, AND THE SUBSEQUENT PROBLEMS RESULTING FROM THIS ARE WELL KNOWN TO HIM. IN ATTEMPTING TO PROVE THE PRESENCE OF SEMEN IN A STAIN WHICH HAS REACTED POSITIVELY TO ALL PRELIMINARY TESTS FOR IT, MANY HOURS MAY BE SPENT IN SEARCH FOR THE SPERMATOZOA. IN THESE SEARCHINGS, THE MICROSCOPIST WILL FIND MANY PARTICLES WHICH RESEMBLE PARTS OF THE SPERMATOZOA -- POSSIBLY INCOMPLETE FRAGMENTS OF THEM, POSSIBLY SOME FOREIGN MATERIALS WHICH ONLY SIMULATE PARTS OF THE SPERM CELL. YET HE IS WARNED NEVER TO STATE THAT SEMEN IS PRESENT UNLESS A WHOLE AND COMPLETE SPERMATOZOA IS FOUND. LUCK MAY BE WITH HIM IN THE EXAMINATION, THOUGH, AND SUCH A CELL BE FOUND. HE HAS THEN THE PROBLEM OF MAKING CERTAIN THAT IT IS ACTUALLY A SPERM CELL, AND NOT SOMETHING ELSE. THIS IS NOT ALWAYS SO EASY AS IT SOUNDS. CELLS ISOLATED FROM DRIED STAINS ARE NOT ALWAYS IN THE BEST OF CONDITION. THEY ARE SOMETIMES SHRUNKEN OR SWOLLEN OUT OF SHAPE, OR FOR OTHER REASONS APPEAR ATYPICAL. FOREIGN MATERIAL OTHER THAN SPERM CELLS MAY AT TIMES RESEMBLE SUCH CELLS TO A MARKED DEGREE. OF COURSE HIGH MAGNIFICATIONS, EVEN OIL IMMERSION, MAY BE USED IN THE EXAMINATION, BUT EVEN THEN THERE MAY BE SOME DOUBT. IF THE SPECIMEN HAS BEEN STAINED, THE STAIN MAY NOT HAVE "TAKEN" QUITE THE SAME AS IN A FRESH SPECIMEN. IF NOT STAINED, THE EXAMINATION MAY BE MORE DIFFICULT.

HOW SURE CAN ONE BE, THEN, OF THE IDENTIFICATION OF A SINGLE SPERMATOZOA? SUPPOSE WE SAY THAT INASMUCH AS PRELIMINARY TESTS WERE POSITIVE FOR SEMEN, THAT THE LIKELIHOOD IS THAT SEMINAL STAINS ARE PRESENT -- THAT THEREFORE THE IDENTIFICATION AS A SPERMATOZOA IS PROBABLY CORRECTLY MADE. BUT THIS ARGUMENT IS OPEN TO TWO POSSIBLE ATTACKS. IN THE FIRST PLACE IT COULD BE CALLED A "BIASED" IDENTIFICATION -- THAT WITHOUT KNOWLEDGE OF THE RESULTS OF PRELIMINARY TESTS THE TECHNICIAN MIGHT NOT BE SO WILLING TO MAKE A DEFINITE STATEMENT. (AND INCIDENTALLY, IF THIS ARGUMENT IS NOT VALIDLY MADE HERE, THEN THE SIMILAR ARGUMENT FOR BIAS PRESENTED ABOVE, IN THE DISCUSSION OF PRELIMINARY TESTS, IS LIKEWISE INVALID.) SECONDLY, ON THIS BASIS THE TECHNICIAN IS ACTUALLY PLACING MORE CONFIDENCE IN THE RESULTS OF PRELIMINARY TESTS THAN HE IS IN THE APPARENT PRESENCE OF A SPERM CELL. SO THAT HIS CONCLUSION IS MADE PRIMARILY ON THE RESULTS OF THOSE TESTS, AND SECONDARILY ON THE RESULT OF THE PROOF-TEST.

FURTHER EVIDENCE FOR THE PROBABLE CORRECT IDENTIFICATION OF THIS CELL MAY BE PRESENTED BY THE MICROSCOPIST AT THIS POINT. HE MAY STATE THAT WHILE ONLY ONE SPERM CELL WAS FOUND IN WHOLE AND COMPLETE (AND HENCE "IDENTIFIABLE") FORM, THAT MANY OTHER PARTICLES WERE FOUND IN THE SLIDE WHICH APPEARED ALMOST

CERTAINLY TO BE PARTS (HEADS AND TAILS) OF SPERMATOZOA. BUT, OF COURSE, THIS EVIDENCE SHOULD NOT REALLY BE CONSIDERED IN THE IDENTIFICATION. IN THE FIRST PLACE, WE KNOW THAT THESE PARTICLES -- EVEN IF ACTUALLY PARTS OF A SPERM CELL -- ARE NOT, OF THEMSELVES, IDENTIFIABLE. IF THIS WERE NOT TRUE, IT WOULD BE UNNECESSARY FOR THE TECHNICIAN TO SPEND SO MUCH TIME IN TRYING TO FIND COMPLETE CELLS. FURTHER, EVERY TECHNICIAN KNOWS THAT EVEN IF AN EXTRACT BE MADE OF AN UNSTAINED PIECE OF CLOTH, THAT PARTICLES RESEMBLING SPERM CELLS AND FRAGMENTS THEREOF WILL OFTEN BE FOUND. EVEN WITH STAINING, (AND SOMETIMES MORESO) THIS ILLUSION WILL BE OBSERVED. WITH WHAT RELIABILITY, THEN, CAN HE DRAW A DEFINITE CONCLUSION FROM WORK ON SUSPECTED STAINS?

PRACTICALLY SPEAKING, PROBABLY THIS QUESTION DOES NOT COME UP TO THE EXTENT BROUGHT OUT HERE. SPERM CELLS MAY BE IDENTIFIED BEYOND ALL REASONABLE DOUBT IN SOME INSTANCES. THIS MAY BE TRUE WHETHER ONLY ONE, OR A NUMBER OF CELLS, ARE FOUND. BUT THERE ARE BORDERLINE CASES. THE CELL ISOLATED MAY BE LYING IN A PECULIAR POSITION -- PART OF THE TAIL MAY BE BROKEN OFF -- THE HEAD MAY BE CONTRACTED OR SWOLLEN OUT OF SHAPE -- THE STAIN MAY NOT HAVE TAKEN JUST RIGHT -- THE SIZE OF THE CELL MAY APPEAR A TRIFLE GREAT OR TOO SMALL -- THE CELL MAY BE PARTIALLY CONCEALED BY FOREIGN PARTICLES IN THE FIELD OF VIEW, OR IT MAY BE ADHERING TO FIBROUS MATTER -- THESE AND OTHER FACTORS MAY MAKE EXAMINATION DIFFICULT.

UNDER CERTAIN CIRCUMSTANCES THE TECHNICIAN IS LIKELY TO BE A LITTLE DOUBTFUL AS TO JUST WHAT CONCLUSION SHOULD BE DRAWN -- YET HE MAY BE PRETTY CERTAIN IN HIS OWN MIND. THE CONCLUSION ACTUALLY DRAWN WILL DEPEND LARGELY ON HIS OWN PERSONAL EXPERIENCE IN EXAMINATIONS OF THIS TYPE. TO A DEGREE, HOWEVER, IT WILL INVOLVE SOME OF THE FACTORS PRESENTED ABOVE.

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WHAT ARE OUR CONCLUSIONS TO BE? THE WRITER DOES NOT KNOW. THE SUBJECT DOES DEFINITELY SEEM OPEN TO QUESTION, HOWEVER. PERHAPS SOME OF THE READERS WOULD CARE TO CRITICISE THE ABOVE DISCUSSION, OR TO OFFER SOME ADDITIONAL COMMENT ON THE SUBJECT.

INFORMATION AS TO THE OCCURRENCE OF CHOLINE AND SPERMIN WOULD BE OF INTEREST; OF THEIR FLUORESCENT PROPERTIES, IF ANY; OF THE LIKELIHOOD THAT THEY WOULD OCCUR IN A FLUORESCENT MEDIUM -- OR IN URINE. PERHAPS THERE ARE OTHER MICRO-CHEMICAL TESTS FOR SEMEN WHICH HAVE NOT BEEN NOTED BY US. INFORMATION OR COMMENT ON ANY OF THESE MATTERS WOULD BE APPRECIATED.

THE ATTITUDE OF OTHER TECHNICIANS ON THE PROBLEMS OF THE "PROOF-TEST" WOULD BE OF INTEREST. CASE REFERENCES ILLUSTRATING THE POINTS BROUGHT OUT WOULD BE ACCEPTABLE.

THE SUBSCRIBERS ARE ENCOURAGED TO SUBMIT ANY INFORMATION OR SUGGESTIONS WHICH MAY OCCUR TO THEM IN REGARD TO THIS PROBLEM.

HAVE WE UNWISELY ACCEPTED, WITHOUT QUESTION, THE STATEMENTS OF THE AUTHORITIES ON THE SUBJECT. OR DO WE, ON THE OTHER HAND, UNJUSTLY QUESTION THEM NOW? WHAT IS YOUR ATTITUDE?

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TECHNICAL ABSTRACTS AND NOTES

THIS SECTION IS DEVOTED TO A LISTING OF ABSTRACTS AND NOTES
APPEARING IN OTHER JOURNALS WHICH MAY BE OF INTEREST TO TECHNICIANS.

A. FROM "CHEMICAL ABSTRACTS"

- (1) "A SIMPLE METHOD FOR DETERMINATION OF ALCOHOL IN BLOOD". RICHARD K. ANDERSON. AM. J. CLIN. PATH., TECH. SECT. 6, 85-9 (1942).
- (2) "AN OUTBREAK OF ACUTE FLUORIDE POISONING". H. S. INGRAHAM AND A. J. FLOOD. N.Y. STATE J. MED. 43, 41-4 (1943).
- (3) "METHOD FOR CHEMICAL ANALYSIS OF RESIDUES LEFT BY PYROXYLIN POWDERS TO EVALUATE DATA OF THE SHOOTING". HERCULES VIERIA DE CAMPOS, ANAIS ASSOS. QUIM. BRAZIL 1, 18-25 (1942).
- (4) "DETECTION OF NICOTINE STAINS ON PAPER". T. J. WARD, ANALYST, 67, 355 (1942).

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* TECHNICAL NOTE
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* ALTHOUGH ARSENIC TRIOXIDE IS SOLUBLE IN VARIOUS REAGENTS, FOR THE
* PURPOSE OF TESTING BY CHEMICAL MICROSCOPY, WE HAVE FOUND THAT TREAT-
* MENT WITH PERCHLORIC ACID, (WITH SUBSEQUENT MICRO-TESTS FOR ARSENATE
* ION) PROVIDES THE MOST CONVENIENT METHOD OF PROCEDURE.
*
* A SMALL AMOUNT OF THE MATERIAL SUSPECTED TO BE ARSENIC TRIOXIDE IS
* PLACED ON THE CORNER OF A MICROSCOPE SLIDE, A DROP OF PERCHLORIC ACID
* (70%) SOLUTION ADDED TO THE SPECIMEN, AND SLOWLY DRIED OVER A MICRO-
* BURNER. THE MATERIAL WILL GIVE OFF WHITE FUMES AS IT DRIES, BUT SHOULD
* BE TAKEN ALL THE WAY TO DRYNESS. IT MAY THEN BE DISSOLVED IN WATER AND
* A MICRO-CHEMICAL TEST (WITH SILVER NITRATE, E.G.) APPLIED. IF THE
* CRYSTALS WERE ARSENIC TRIOXIDE, A POSITIVE ARSENATE TEST SHOULD RESULT.
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BOOK REVIEWS

- (1) "ELEMENTS OF POLICE SCIENCE", BY ROLLIN M. PERKINS, THE FOUNDATION PRESS, INC., (CHICAGO, ILL., 1942). Pp. 651. \$4.75.

THE LITERATURE RELATING TO LAW ENFORCEMENT IS INCREASING IN A REGULAR AND COMMENDABLE MANNER, BUT OCCASIONALLY A PUBLICATION APPEARS WHICH IS OF PARTICULARLY NOTEWORTHY CALIBER, SUCH AS "ELEMENTS OF POLICE SCIENCE" BY ROLLIN M. PERKINS, PROFESSOR OF LAW AT THE UNIVERSITY OF IOWA AND DIRECTOR OF THE IOWA PEACE OFFICER'S SHORT COURSE. THE AUTHOR'S BACKGROUND HAS ENABLED HIM TO PRODUCE AN AUTHORITATIVE VOLUME CONTAINING DISCUSSIONS OF VARIOUS ASPECTS OF POLICE WORK BY COMPETENT REPRESENTATIVE MEMBERS OF THE LAW ENFORCEMENT PROFESSION AND A DISSERTATION ON CRIMINAL LAW WHICH IS SOUND, COMPLETE, AND WRITTEN IN TERMS SIMPLE AND UNDERSTANDABLE.

PROSPECTIVE READERS SHOULD NOT BE MISLED BY THE TITLE. THE BOOK IS WRITTEN FOR AN DEDICATED TO "THE GUARDIANS OF LAW AND ORDER". TECHNICIANS CANNOT EXPECT TO USE THE VOLUME AS A REFERENCE BOOK; LAWYERS CANNOT USE IT AS A CASE BOOK; NOR CAN OFFICERS USE IT AS A MANUAL. THERE ARE, HOWEVER, PARTS WHICH ARE OF IMPORTANT AND NECESSARY INTEREST TO ALL MEMBERS OF THE LAW ENFORCEMENT PROFESSION.

PROFESSOR PERKINS HAS DIVIDED THE BOOK INTO TWO PARTS, THE FIRST COVERING "SPECIAL PROBLEMS OF POLICE SCIENCE", THE SECOND AN "INTRODUCTION TO CRIMINAL LAW". PART ONE CONSISTS OF TWELVE CHAPTERS, MOST OF THEM WRITTEN BY AUTHORITIES IN THEIR RESPECTIVE FIELDS. INCLUDED ARE THE FOLLOWING SUBJECTS: "THE BEGINNING OF LAW ENFORCEMENT" AND "INTRODUCTION TO SCIENTIFIC CRIME DETECTION", WRITTEN BY PROFESSOR PERKINS; "CRIMINAL INVESTIGATION" BY AUGUST VOLLMER; "DETECTION OF COUNTERFEIT MONEY" BY FRANK J. WILSON; "POLICE COURTESY" BY OSCAR G. OLANDER; "ON THE WITNESS STAND" BY MASON LADD, DEAN OF COLLEGE OF LAW, UNIVERSITY OF IOWA; "MOULAGE" BY R. W. NEBERGALL; "PHOTOGRAPHY" BY FREDERICK W. KENT; "FINGERPRINTS" BY HAROLD J. E. GESELL; "FIRST AID" BY DR. FRED J. JARVIS; "REVOLVER SHOOTING" BY LT. COL. J. F. BUTLER, U.S. ARMY; AND TWO CHAPTERS, "THE LAW OF ARREST" AND "AN EXPERIMENT IN TRAFFIC SAFETY" ALSO BY PROFESSOR PERKINS.

SOME OF THESE SUBJECTS HAVE, OF COURSE, BEEN COVERED IN OTHER PUBLICATIONS. THE CHAPTERS ON "POLICE COURTESY" AND "CONDUCT ON THE WITNESS STAND" ARE PARTICULARLY GOOD. FROM "POLICE COURTESY" WE QUOTE:

"THE WHOLE GOSPEL OF POLICE COURTESY IS BUILT ON THE ABILITY TO SHOW RESPECT TO OTHERS, IN BOTH TRIVIAL AND IMPORTANT CONTACTS. THUS YOU INVITE RESPECT IN RETURN. BY MAKING A SINCERE EFFORT TO UNDERSTAND THE OTHER PERSON'S POINT OF VIEW, YOU ACQUIRE THE KEY TO UNDERSTANDING AND GOOD JUDGEMENT IN YOUR POLICE CONTACTS. BE CAREFUL NOT TO MAKE A POSITIVE STATEMENT ON A SUBJECT ON WHICH YOU ARE NOT INFORMED. THERE IS ALWAYS THE RISK OF MAKING EMBARRASSING MISTAKES. 'WHEN IN DOUBT, KEEP STILL', GENERALLY SPEAKING, IS A GOOD RULE IN CONVERSATION. REFRAIN FROM DISCUSSING POLITICS OR RELIGION. LEARN TO TAKE CONSTRUCTIVE CRITICISM WITHOUT JUSTIFYING YOURSELF. IT IS A GOOD WAY TO LEARN WHAT PEOPLE THINK IS WRONG WITH YOU."

COURTESY, PRESENTATION OF EVIDENCE, PREPARATION OF A CASE AND CONDUCT ON THE WITNESS STAND ARE SUBJECTS DISCUSSED IN POLICE TRAINING COURSES. DOUBTLESS INSTRUCTORS CHARGED WITH THESE DUTIES CAN GAIN MANY NEW AND HELPFUL IDEAS FROM A CONSIDERATION OF PROFESSOR PERKINS BOOK.

THE SECOND PART OF THE BOOK IS INFINITELY VALUABLE TO THE POLICE OFFICER, REGARDLESS OF HIS RANK, ASSIGNMENT, OR DUTIES. IT IS INDEED DIFFICULT FOR THE OFFICER TO HAVE A SOUND, YET CONCISE IDEA OF CRIMINAL LAW WHICH WILL ENABLE HIM TO ACT INTELLIGENTLY IN THE PURSUANCE OF HIS DUTIES. THE AUTHOR DOES NOT ATTEMPT TO ELABORATE ON LAWS, STATUTES OR ORDINANCES FOR EACH CITY OR STATE. RATHER, HE GIVES CLEAR CUT DEFINITION AND EXPLANATION OF THE MULTITUDE OF CRIMES WHICH CONSTITUTE OFFENSES AGAINST PERSONS OF INDIVIDUALS, HABITATIONS OF INDIVIDUALS, PROPERTY OF INDIVIDUALS, MORALITY AND DECENCY, PUBLIC PEACE, COMFORT AND FEDERAL OFFENSES. THERE ARE ALSO CHAPTERS ON CAUSATION, THE GUILTY MIND, SPECIAL DEFENSES AND PARTIES TO CRIME. THE VOLUME IS CONCLUDED WITH AN APPENDIX ON "UNIFORM ACTS ON FRESH PURSUIT AND EXTRADITION".

INEXPERIENCED RECRUITS TO THE RANKS OF LAW ENFORCEMENT WOULD DO WELL TO STUDY THOROUGHLY "ELEMENTS OF POLICE SCIENCE"; EXPERIENCED OFFICERS CAN LEARN FROM IT WAYS TO IMPROVE THE CALIBER OF THEIR WORK; EXECUTIVE POLICE OFFICIALS CAN ACQUIRE A MORE COMPREHENSIVE UNDERSTANDING OF WHAT TO EXPECT OF THEIR MEN.

WE HEARTILY RECOMMEND "ELEMENTS OF POLICE SCIENCE" FOR ALL POLICE LIBRARIES.

RALPH F. TURNER
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KANSAS CITY, MISSOURI

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IN ACKNOWLEDGMENT: --

WE WISH TO THANK THE EDITORS OF THE I.A.C.P.
"NEWS LETTER" FOR THE SPACE DEVOTED TO AN ANNOUNCE-
MENT OF "THE TECHNICIAN" IN THEIR APRIL ISSUE. WE
HAVE RECEIVED NUMEROUS REQUESTS FOR A COMPLIMENTARY
FIRST ISSUE OF THIS TECHNICAL PAMPHLET AS A RESULT OF
THAT ANNOUNCEMENT.

OF INTEREST:-

THIS PUBLICATION, AS HAS BEEN STATED IN THE INTRODUCTORY COMMENTS, IS DESIGNED IN THE INTEREST OF THE LABORATORY TECHNICIAN-- NOT THE CRIMINAL INVESTIGATOR GENERALLY. WE HAVE RECEIVED A NUMBER OF REQUESTS FROM VARIOUS SOURCES FOR A COPY OF THIS PUBLICATION. SOME OF THESE REQUESTS HAVE OBVIOUSLY COME FROM INDIVIDUALS PRIMARILY INTERESTED IN INVESTIGATIVE METHODS AND PROCEDURES, AND ALTHOUGH THEY WILL BE INTERESTED IN TECHNICAL DATA TO AN EXTENT, WOULD PROBABLY LIKE SOME INFORMATION ON LESS TECHNICAL MATERIAL THAN WOULD ORDINARILY BE INCLUDED HEREIN.

IN ADDITION TO THIS PUBLICATION, PUT OUT BY THE M.S.H.P. LABORATORY, THE DEPARTMENT ISSUES A WEEKLY BULLETIN WHICH IS SENT OUT TO A NUMBER OF LAW ENFORCEMENT AGENCIES. IN THE PAST IT HAS LISTED STOLEN AUTOS, PENITENTIARY RELEASES, ETC. ONLY. BEGINNING WITH THE MAY 7 BULLETIN, AND CONTINUING INDEFINITELY, A SINGLE PAGE WILL BE INCLUDED IN IT ON CRIMINAL INVESTIGATIVE PROCEDURES, HANDLING OF EVIDENCE, CASE REFERENCES, ETC., PREPARED BY THE PERSONNEL OF THE LABORATORY. THIS MATERIAL WILL BE MICROGRAPHED. IN THE INTEREST OF OUR SUBSCRIBERS, WE WILL INCLUDE WITH EVERY ISSUE OF "THE TECHNICIAN" A COPY OF EACH OF THESE WEEKLY NOTES. ACCORDINGLY EACH MONTH THERE WILL BE EITHER FOUR OR FIVE PAGES OF ADDITIONAL MATERIAL SENT OUT. MANY OF OUR READERS WILL PROBABLY FIND THAT THESE NOTES ARE ON MATERIAL WITH WHICH THEY ARE ALREADY QUITE FAMILIAR, AND THAT MAY BE OF LITTLE OR NO VALUE TO THEM. TO OTHERS, HOWEVER, THEY WILL PROVIDE A CONVENIENT AND CONCISE SOURCE OF INTERESTING AND PRACTICAL INFORMATION.

IT IS TO BE UNDERSTOOD THAT THE SUBSCRIPTION FEE TO "THE TECHNICIAN" DOES NOT OBLIGATE US TO FURNISH THESE EXTRA NOTES. THEY WILL BE SUPPLIED, GRATIS, TO EVERY SUBSCRIBER SO LONG AS WE CONTINUE PRINTING THEM. THEY ARE NOT TO BE CONSTRUED AS A PART OF "THE TECHNICIAN", NOR AS NECESSARILY FORMING A SUPPLEMENT TO IT.

THE EDITOR