RAYMOND D. RAWSON,

CALLED AS A WITNESS HEREIN, HAVING BEEN FIRST DULY SWORN, WAS EXAMINED AND TESTIFIED AS FOLLOWS:

THE COURT: PLEASE HAVE A SEAT OVER HERE, DOCTOR.

THE WITNESS: OKAY.

DIRECT EXAMINATION

BY MR. LEVY:

Q. PLEASE TELL THE JURY YOUR NAME.

A. YES. IT'S RAYMOND D. RAWSON.

Q. I'D LIKE TO REFER TO YOUR CURRICULUM VITAE -- EXHIBIT 117 FOR IDENTIFICATION -- AND ASK YOU SELECTED PORTIONS OF IT.

IS THIS YOUR OFFICE ADDRESS, AT CLARK COUNTY COLLEGE?

A. YES, IT IS.

Q. IS THAT PART OF THE LAS VEGAS UNIVERSITY SYSTEM?

A. YES. IT'S THE UNIVERSITY OF NEVADA SYSTEM.

Q. EXCUSE ME. AND IT'S IN LAS VEGAS?

A. YES.

Q. AND DO YOU HAVE AN ASSOCIATION WITH THE CLARK COUNTY CORONER'S OFFICE?

A. YES. I'M A DEPUTY CORONER, CHIEF MEDICAL EXAMINER.

Q. AND DO YOU HAVE AN ASSOCIATION WITH THE LEGISLATURE?

A. YES, I DO. I'M A STATE SENATOR, IN A ONE SENATOR DISTRICT IN LAS VEGAS.

Q. WITH REGARD TO YOUR EDUCATION, WHERE DID IT START?

A. COLLEGE DEGREE WAS AT U.N.L.V., THEN CALLED NEVADA NORTHERN. IT WAS A BACHELOR OF SCIENCE IN CHEMISTRY AND ZOOLOGY. AND I WENT FROM THERE TO LOMA LINDA UNIVERSITY DENTAL SCHOOL, IN SOUTH CALIFORNIA, AND RECEIVED MY DENTAL DEGREE. IN 1978, I BELIEVE, I RECEIVED A MASTER'S DEGREE, AND THAT WAS IN PHYSICAL ANTHROPOLOGY, WHICH IS ESSENTIALLY THE ANATOMY OF ANTHROPOLOGY. I THEN FOLLOWED WITH A SPECIALIZED COURSE AT THE ARMED FORCES INSTITUTE OF PATHOLOGY, WHICH I RECEIVED A CERTIFICATE. AND I HAVE TO THINK IF THERE IS ANYTHING ELSE THERE. I HAVE SOME BOARD CERTIFICATIONS THAT HAVE AN EDUCATION COMPONENT WITH THEM.

Q. AND WHAT BOARDS?

A. THE AMERICAN BOARD OF FORENSIC ODONTOLOGY AND THE AMERICAN BOARD OF ORAL MEDICINE.

Q. WITH REGARD TO CERTAIN POSITIONS THAT YOU HAVE HELD, IN 1988 TO THE PRESENT, AS I'M INDICATING, WHAT FACULTY WERE YOU ON?

A. ARMED FORCES INSTITUTE OF PATHOLOGY. I DIDN'T

PARTICIPATE LAST YEAR BECAUSE WE WERE IN LEGISLATIVE SESSION. AND I'M ALSO AN ADJUNCT FACULTY AT UNIVERSITY OF NEVADA, LAS VEGAS.

Q. DID YOU IN 1986-87, WHAT WERE YOU -- WHAT WAS YOUR POSITION WITH REFERENCE TO THE AMERICAN BOARD OF FORENSIC ODONTOLOGY?

A. I WAS THE CHAIRMAN OF THAT NATIONAL GROUP.

Q. YOU MENTIONED YOU WERE SENATOR OF DISTRICT 6 IN NEVADA?

A. YES.

Q. AND IN 1985 TO '87 WHAT ACTIVITY DID YOU HAVE WITH THE AMERICAN DENTAL ASSOCIATION?

A. I HAVE TO SEE IF I CAN SEE THAT FROM HERE.

A. OH, I DID SERVE ON THE EDITORIAL REVIEW BOARD FOR SCIENTIFIC JOURNALS, ONE OF THOSE WAS THE AMERICAN DENTAL ASSOCIATION.

Q. FROM 1984 TO THE PRESENT, WHAT'S BEEN YOUR ASSOCIATION WITH NORTHWESTERN UNIVERSITY?

A. I HAVE AN ADJUNCT ASSOCIATE PROFESSOR IN ORAL DIAGNOSIS, RADIOLOGY AND FORENSIC DENTISTRY.

Q. IN 1984 TO '85 WHAT WERE YOU CHAIRMAN OF?

A. THE AMERICAN BOARD OF -- I HAVE TO -- I CAN'T SEE IF THAT'S THE AMERICAN BOARD OF FORENSIC ODONTOLOGY OR IF IT'S THE ODONTOLOGY SECTION OF THE AMERICAN ACADEMY OF FORENSIC SCIENCES.

Q. IS THAT BITE MARK STANDARDS COMMITTEE?

A. OH, OKAY. I ALSO SERVED A NUMBER OF YEARS AS A MEMBER, AND DURING THAT PERIOD OF TIME AS A CHAIRMAN OF THE BITE MARK STANDARDS COMMITTEE.

Q. '82 TO '84, WERE YOU THE CHAIRMAN OF THE ODONTOLOGY SECTION, THE AMERICAN ACADEMY OF FORENSIC SCIENCES?

A. YES, I WAS.

Q. 1980 TO THE PRESENT, WITH REGARD TO THE UNIVERSITY OF NEVADA, WHAT POSITION AS ADJUNCT PROFESSOR DO YOU HOLD?

A. I HAVE AN ADJUNCT FULL PROFESSOR IN THE SCHOOL OR DEPARTMENT OF BIOLOGY.

Q. WITH REGARD TO YOUR DEGREES AND A PROFESSORSHIP HERE IN BIOLOGY, DO YOU HAVE A KNOWLEDGE OF HUMAN TISSUE?

A. YES, I DO.

Q. IS THAT CONSIDERED BIOLOGICAL?

A. YES.

Q. IN 1980 TO '84, WHAT WAS YOUR ASSOCIATION ON BITE MARK STANDARDS? WAS THAT WITH THE AMERICAN ACADEMY OF FORENSIC SCIENCES?

A. YES, IT WAS.

Q. FROM 1979 TO THE PRESENT, WITH REGARD TO THE JOURNAL OF FORENSIC MEDICINE AND PATHOLOGY, WHAT IS YOUR POSITION?

A. AGAIN, I SERVED ON AN EDITORIAL REVIEW BOARD, SEVERAL JOURNALS, AND THAT WAS ONE OF THOSE ALSO.

Q. WITH REGARD TO BEING ON THE STAFF OF THE SUNRISE HOSPITAL IN LAS VEGAS, NEVADA, IN '79 AND '84, WHAT WERE YOU?

A. I WAS CHIEF OF THE DENTAL DEPARTMENT AT THAT TIME. I AM STILL ON STAFF, AND I HAVE MAINTAINED MY PRIVILEGES THERE, ALTHOUGH I DON'T ADMIT VERY MANY PATIENTS NOW.

Q. WHAT ABOUT THE STAFF OF SOUTHERN NEVADA MEMORIAL HOSPITAL IN LAS VEGAS?

A. I HAVE LET THAT STAFF PRIVILEGE GO. THEY ARE A PUBLIC FUNDED UNIVERSITY HOSPITAL. AND THEY DON'T REALLY HAVE A DENTAL PROGRAM GOING RIGHT NOW.

Q. IN 1976 TO THE PRESENT WITH REGARD TO THE CORONER'S OFFICE, WHAT DO YOU DO?

A. WELL, AS THE DEPUTY CORONER, I'M FULLY SWORN AND CAN DO ANYTHING FROM EVIDENCE SEARCHES, PROPERTY ACCOUNTING, TO EXAMINATIONS. AS A CHIEF DENTAL EXAMINER, I'VE -- I'M IN CHARGE OF THE MASS DISASTER PLAN, IDENTIFY ALL THE PEOPLE THAT WERE IN THE MGM GRAND HOTEL FIRE.

Q. DOES THAT INCLUDE EXAMINATION OF BODIES FOR BITE MARKS?

A. YES.

Q. ADULTS AND CHILDREN?

A. YES.

Q. MALES AND FEMALES?

A. YES, BOTH.

Q. HAVE YOU HAD A GOOD DEAL OF EXPERIENCE JUST WITH THE CORONER'S OFFICE IN BITE MARK IDENTIFICATION?

A. YES. WE HAVE NUMEROUS BITE MARKS THAT ARE SEEN THERE.

Q. AND BASED UPON YOUR EXPERIENCE WITH THE CORONER'S OFFICE, WHAT TYPE OF ACTIVITIES ARE BITE MARKS OFTENTIMES ASSOCIATED WITH?

A. WELL, I HAVE SPENT A FAIR AMOUNT OF TIME STUDYING THIS, JUST BECAUSE OF INTEREST IN IT. THERE'S A HIGH CORRELATION BETWEEN BITING ACTIVITY AND SEX CRIMES, BITING ACTIVITY AND FIGHTING.

Q. HAVE YOU ALSO SEEN THEM IN HOMICIDE CASES -- IN 1968 TO THE PRESENT -- WITH REGARD TO THE PRACTICE OF DENTISTRY? WHAT IS YOUR -- WHAT IS YOUR PRACTICE?

A. I STARTED PRACTICE IN 1968 IN THE PRIVATE PRACTICE OF DENTISTRY, AND I HAVE MAINTAINED SOME PRIVATE PRACTICE THROUGHOUT.

Q. HAVE YOU CONSULTED TO VARIOUS AGENCIES?

A. YES.

Q. DOES THAT INCLUDE THE VERNAL DISTRICT ATTORNEY IN '85?

A. YES.

Q. AND DID IT ALSO INCLUDE THE GLENDALE, WISCONSIN DISTRICT ATTORNEY?

A. YES.

Q. HAVE YOU CONSULTED TO THE EDITORIAL BOARD OF THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION IN '85 THROUGH '87?

A. YES.

Q. HAVE YOU CONSULTED WITH THE SEATTLE DISTRICT ATTORNEY IN '85?

A. YES.

Q. AND IN '84, DID YOU CONSULT WITH THE VENTURA COUNTY DISTRICT ATTORNEY?

A. YES.

Q. WHAT KINDS OF CONSULTING DID YOU TO?

A. ALL OF THOSE WERE ASSOCIATED WITH BITE MARKS, EXCEPT THE EDITORIAL REVIEW BOARD. THAT ALSO DEALT WITH ARTICLES ON BITE MARKS, BUT THE OTHERS WERE ACTUAL CASES THAT THEY HAD CONCERN ABOUT.

Q. HOW ABOUT -- WHAT WAS YOUR ACTIVITY IN CONSULTING WITH THE NEVADA STATE BOARD OF DENTAL EXAMINERS IN '90 -- '82 THROUGH '91?

A. THEY WERE ISSUES OF PEER REVIEW AND LICENSURE. THERE WERE VARIOUS ACTIONS THAT WERE DIRECTED TOWARDS REMOVING LICENSURE FROM CERTAIN DENTISTS, AND I DID REVIEW CASES FOR THE BOARD.

Q. WHAT CONSULTING DID YOU DO FOR PINAL COUNTY -- WE CALL THEM DEPUTY COUNTY ATTORNEYS; YOU MENTIONED DISTRICT ATTORNEY, IN 1980.

A. THAT WAS WHAT WAS TOLD TO ME TO BE A SENSATIONAL CAR ACCIDENT WHERE AN INDIVIDUAL HAD HIT THE DASHBOARD, AND BY DEMONSTRATING WHO HIT THE DASHBOARD AND WHAT POSITION THEY HIT, THEY WERE ABLE TO DETERMINE WHO WAS DRIVING THE CAR. THERE WERE SOME FATALITIES OUT OF IT.

Q. DOES THAT HAVE SOMETHING TO DO WITH DENTITION?

A. YES.

Q. AND NYE COUNTY DISTRICT ATTORNEY, YOU CONSULTED WHAT ISSUE THERE?

A. THAT WAS BITE MARK CASE. I BELIEVE THAT IS THE -- LET'S SEE. IT WAS NOT THE PRECEDENCE CASE, BUT IT WAS AN EARLY CASE IN NEVADA.

Q. HOW ABOUT IN 1978, HAVE YOU CONTINUOUSLY BEEN CONSULTING WITH THE CLARK COUNTY DISTRICT ATTORNEY?

A. YES.

Q. WHAT TYPES OF CASES?

A. THAT ALSO WAS AN EARLY CASE IN NEVADA, AND THAT MAY ALSO BE THE PRECEDENCE CASE.

Q. AND WITHOUT GOING OVER WHAT YOU HAVE HELD IN 1977 TO THE PRESENT, THE MASS DISASTER PROGRAM WITH THE CLARK COUNTY CORONER'S OFFICE, WHAT DOES THAT HAVE TO DO WITH WITH DENTAL IDENTIFICATION?

A. WELL, AS THE CHIEF DENTAL OFFICER, I'M RESPONSIBLE FOR THE DENTAL IDENTIFICATION OF ANY VICTIMS OF A MASS DISASTER. WE HAVE A PLAN AND GO THROUGH AN EXERCISE TO KEEP PEOPLE TUNED AND CURRENT ON THE METHODS OF IDENTIFYING PEOPLE FROM THEIR TEETH.

Q. WHAT PROFESSIONAL ORGANIZATIONS DO YOU BELONG TO?

A. MANY OF THEM, BUT THE AMERICAN ACADEMY OF FORENSIC SCIENCES, AMERICAN BOARD OF FORENSIC ODONTOLOGY, AMERICAN DENTAL ASSOCIATION, AND IT HAS VARIOUS COMPONENTS. I THINK -- OH, FEDERATION DENTAIRE INTERNATIONALE -- I NOTICED WHEN I CAME DOWN FOR THIS I HAVE A DUE STATEMENT ON MY DESK FROM HOME. SO I DON'T KNOW HOW THAT WILL SHOW TODAY, IF I'M IN OR OUT. IT'S AN INTERNATIONAL ORGANIZATION THAT'S AVAILABLE FOR DENTISTS.

Q. JUST WITH REGARD TO ONE HONOR, WHAT DOES IT MEAN FACULTY AWARD OF MERIT, CLARK COUNTY COMMUNITY COLLEGE, SPRING OF '89?

A. IT'S AN AWARD GIVEN TO OUTSTANDING FACULTY, AND ONLY A CERTAIN PERCENTAGE OF FACULTY CAN RECEIVE THEM.

Q. IS THIS IN THE AREA OF TEACHING OR ADMINISTRATION?

A. TEACHING.

Q. WHAT IS YOUR -- WHAT DO YOU TEACH THERE?

A. I TEACH IN A DENTAL HYGIENE PROGRAM, AND I TEACH A VARIETY OF COURSES, BUT RADIOLOGY, ORAL PATHOLOGY,

ANESTHESIA. THE BASIC ORAL BIOLOGY, PHARMACOLOGY.

Q. WITH REGARD TO LECTURES AND RESEARCH PRESENTATIONS, IN 1991, AND IN PRIOR YEARS, HAVE YOU GIVEN BITE MARK CASE MANAGEMENT SEMINARS TO NORTHWESTERN UNIVERSITY?

A. YES. WE'VE GIVEN, I THINK, LAST YEAR WAS OUR 10TH ANNIVERSARY OF A POST-DOCTORAL COURSE FOR DENTISTS IN BITE MARKS, BITE MARK TECHNOLOGY, AND TECHNIQUES. AND IT'S A COMPLEX COURSE THAT'S BEEN GIVEN AT NORTHWESTERN AND DRAWS PEOPLE FROM ALL OVER THE COUNTRY.

Q. IN 1987 DID YOU GIVE A LECTURE, SEMINAR, ON CLASSIFICATION OF BITE MARKS TO THE AMERICAN ACADEMY OF FORENSIC SCIENCES?

A. YES.

Q. IN 1986 WHAT WAS THE MASS DISASTER SYMPOSIUM BEFORE THE AMERICAN DENTAL ASSOCIATION IN CHICAGO?

A. THIS IS WHEN I WAS CHAIRMAN OF THE AMERICAN BOARD OF FORENSIC ODONTOLOGY. AND WE ORGANIZED A SPECIAL THREE-DAY SEMINAR IN CHICAGO. THE AMERICAN BOARD AND THE AMERICAN DENTAL ASSOCIATION CAME TOGETHER TO SPONSOR THIS. THEY -- WE BROUGHT IN, OH, MAYBE 300 EXPERTS FROM ALL OVER THE COUNTRY. THE F.A.A. EVERYONE THAT WAS INVOLVED WITH MASS TRANSPORATION AND POTENTIAL CATASTROPHE AND ESSENTIALLY DEVELOPED A PROTOCOL OR A FORMAT FOR HANDLING MASS DISASTER IN THE FUTURE.

Q. IN 1985 YOU GAVE AN ORIGINAL PAPER ON DISTORTION ANALYSIS TO THE AMERICAN BOARD OF FORENSIC ODONTOLOGY; IS THAT CORRECT?

A. YES.

Q. WHAT DO YOU MEAN BY DISTORTION ANALYSIS?

A. I HAVE BEEN INVOLVED FOR MANY -- 12 OR 14 YEARS IN LOOKING AT THE ISSUE OF DISTORTION, AND THIS WAS A PAPER THAT BROUGHT SOME OF THOSE POINTS OUT TO ALL OF THE MEMBERS OF THE ACADEMY AND OF THE BOARD. AND IT'S SIMPLY PUT ON THE TABLE, SOME OF THE ISSUES THAT WE NEED TO BE ABLE TO ANALYZE. OUT OF THAT HAS COME A -- OH, A LOT OF WORK THAT HAS REALLY FURTHERED OUR SCIENCE.

ONE THING WAS A SPECIAL SCALE THAT WE DEVELOPED SO THAT WE CAN READ DISTORTION, UNDERSTAND IT, AND EVEN CORRECT FOR IT.

Q. I HAVE -- I'M HOLDING UP A SCALE THAT DR. PIAKIS UTILIZED IN HIS TESTIMONY. IS THIS WHAT YOU'RE TALKING ABOUT?

A. YES, THAT'S CALLED A.B.F.O. NUMBER 2. IT'S THE AMERICAN BOARD OF FORENSIC ODONTOLOGY SCALE NUMBER 2, AND I DESIGNED SCALE NUMBER 1, WHICH WAS USED SHORT-TERM. GAVE US THE IDEA AND THE VERIFICATION TO BE ABLE TO BUILD THE SECOND SCALE.

Q. AND SO YOU'RE FAMILIAR WITH DISTORTION AND ITS COMPONENTS?

A. YES.

Q. WHAT -- AND TO THE NEVADA CRIMINALISTS, IN 1985, YOU GAVE A LECTURE ON FORENSIC ODONTOLOGY. WHAT DID THAT INVOLVE?

A. THAT WAS RECOGNITION OF BITE MARK INJURIES IN CHILDREN AND RAPE SUSPECTS, AND THE PROPER HANDLING OF THE EVIDENCE SO THAT IT WOULDN'T BE WASTED.

Q. IN 1985 YOU GAVE A LECTURE IN CAT SCANING AS AN AID TO BITE MARK INVESTIGATIONS. WHAT WAS THAT ABOUT?

A. CAT SCANNING IS KIND OF A SOPHISTICATED TECHNOLOGY FOR MEDICINE. BUT IT ALSO LENDS ITSELF TO SOME DENTAL PROCEDURES, AND WE'RE ABLE TO USE A CAT SCANNING DEVICE TO RECORD PRECISELY THE BITING EDGES OF THE TEETH. AND I PIONEERED THAT TECHNIQUE, AND THEN REPORTED ON IT AT THAT MEETING.

Q. NOW, IN 1984 YOU GAVE A POST-DOCTORAL PRESENTATION ON BITE MARK TECHNIQUES AND RESEARCH DIRECTIONS AT NORTHWESTERN UNIVERSITY. WHAT DO YOU MEAN BY POST-DOCTORAL PRESENTATION?

A. THIS -- ONE OF THE PREREQUISITES TO GET INTO THAT COURSE WAS TO BE A GRADUATE DENTIST, HAD TO HAVE A DOCTORATE DEGREE.

Q. SO IT IS AN ADVANCED STUDY OF BITE MARK TECHNIQUES AND ANALYSIS?

A. YES.

Q. WHAT DID YOU DO IN 1984 BY WAY OF BITE MARK STANDARDS BEFORE THE AMERICAN ACADEMY OF FORENSIC SCIENCE? WHAT DO YOU MEAN BY STANDARDS IN BITE MARKS?

A. WELL, PART OF DEALING WITH THE STANDARDS COMMITTEE WAS TO DEVELOP WHAT NOW IS REFERRED TO AS GUIDELINES FOR FORENSIC DENTISTS. AND WE'VE CONCENTRATED ON ISSUES OF EVIDENCE COLLECTION, PHOTOGRAPHY, TISSUE PRESERVATION. THERE'S A NUMBER OF OTHER ITEMS, AND THIS HAS DEVELOPED A GUIDELINE FOR FORENSIC DENTISTS TO KIND OF CHECK OFF AS THEY ARE DOING A CASE. IT'S RARE THAT EVERYTHING IN THE GUIDELINES CAN BE FOLLOWED, BUT IT'S AN IDEAL SITUATION.

Q. IN 1984 IS THAT ABOUT THE SAME AS THE BITE MARK WORKSHOP BEFORE THE AMERICAN BOARD OF ODONTOLOGY?

A. WELL, IT'S AT THE SAME TIME AND IT'S SOME OF THE SAME PEOPLE WERE WORKING ON IT AND THE PRODUCTS ALL RELATED TOGETHER. IT WAS AN EXTREMELY PRODUCTIVE TIME IN OUR FIELD. IT'S KIND OF A NEW FIELD, AND MANY OF THE GUIDELINES AND STANDARDS WERE BEING LAID DOWN AT THAT TIME. THERE WAS A CORE OF VERY INTERESTED, CAPABLE PEOPLE THAT WERE EXCITED ABOUT FURTHERING THE FIELD, AND THAT'S ONE OF THE PRODUCTS OF THAT TIME.

Q. IN 1983 ON THE PROPOSED METHOD OF CLASSIFICATION OF BITE MARKS BEFORE THE AMERICAN ACADEMY OF FORENSIC SCIENCES IN OHIO, WAS THIS A -- FURTHER PRELIMINARY WORK

THAT YOU DID WITH REGARD TO YOUR LATER STANDARDS?

A. YES. WE'VE ESSENTIALLY PUT THE ISSUE OF LOOKING AT BITE MARK INJURIES INTO THE SAME CATEGORY THAT AN ORAL PATHOLOGIST, THAT A PHYSICIAN, WOULD CLASSIFY ANY WOUND, SO WE'RE ABLE TO LOOK AT BITE WOUNDS, AND IF WE TALK IN TERMS OF A CLASS 2 BITE OR A BITE WITH ERYTHEMA THAT MEANS SOMETHING TO ANOTHER FORENSIC DENTIST.

Q. WHAT DO YOU MEAN BY WHEN YOU GAVE A SEMINAR ON STATISTICAL EVIDENCE ON THE INDIVIDUALITY OF THE HUMAN DENTITION BEFORE THE AMERICAN ACADEMY OF FORENSIC SCIENCES IN OHIO?

A. THERE WAS AN ASSUMPTION THAT TEETH WERE UNIQUE, THAT THERE WERE NO TWO SETS OF TEETH ALIKE AND THERE ARE CASES THAT GO BACK INTO THE 15, 1600'S WHERE THEY BEGAN TO IDENTIFY PEOPLE BY TEETH, AND THEY JUST ASSUMED THAT THE HUMAN DENTITION IS UNIQUE.

KAISER NIELSEN DID SOME PRELIMINARY STATISTICAL WORK IN SCANDINAVIA, BUT THERE WAS NO REAL BODY OF KNOWLEDGE ON THAT, AND SO I STARTED A NATIONWIDE STUDY WHERE WE SAMPLED THE GENERAL POPULATION, HAD THEM BITE INTO WAX AND THEN ALL OF THOSE BITES WERE ANALYZED, COMPUTER ANALYZED, AND WE ENDED UP WITH A BASE OF STATISTICS THAT COULD TELL US ARE THERE TWO SETS OF DENTITION ALIKE, AND THERE AREN'T. THEY ARE ALL UNIQUE AND IDENTIFIABLE.

WE PURSUED THAT WITH A FURTHER STUDY OF TWINS,

WHERE WE SELECTED IDENTICAL TWIN PAIRS AT U.C.L.A. AND THEN STUDIED THEIR DENTITION VERY CLOSELY WITH A COMPUTER, AND WE WERE ABLE TO DISTINGUISH ALL OF THE TWIN PAIRS FROM EACH OTHER. IN OTHER WORDS, THERE ARE NO TWO SETS OF TEETH THAT ARE EXACTLY ALIKE.

Q. EVEN IN IDENTICAL TWINS?

A. THAT'S CORRECT.

Q. WHAT KIND OF FORENSIC DENTAL IDENTIFICATION DID YOU DO AS PART OF THE GENERAL STAFF AT SUNRISE HOSPITAL IN LAS VEGAS?

A. THAT WAS WHAT YEAR? 1980?

Q. '80.

A. THAT WAS PROBABLY ASSOCIATED WITH MASS DISASTER TYPE OF IDENTIFICATION, AND I CAN'T REMEMBER IF THAT'S JUST BEFORE OR JUST AFTER THE MGM, BUT IT WAS PART OF AN EFFORT TO HAVE A GENERAL BODY OF DENTISTS THAT WERE CAPABLE OF BEING ABLE TO DO IDENTIFICATION WORK.

Q. WHAT TYPE OF SEMINAR IN '79 DID YOU GIVE ON IDENTIFICATION OF BITE MARKS IN CRIMINAL CASES TO THE INTERNATIONAL ASSOCIATION OF CORONERS AND MEDICAL EXAMINERS IN LAS VEGAS?

A. THAT WAS A MEETING OF -- I'M NOT SURE, MAYBE 500 OR MAYBE A THOUSAND MEDICAL EXAMINERS, AND IT WAS A REVIEW OF BEING ABLE TO RECOGNIZE BITE MARK EVIDENCE. THERE ARE MANY KINDS OF WOUNDS THAT, YOU KNOW, INSTRUMENTS THAT CAN

LEAVE A PATTERN ON THE BODY. MEDICAL EXAMINERS ARE USED TO SEEING PATTERNED INJURIES. BUT THEY HADN'T REALLY BEEN TUNED IN TO LOOKING FOR BITE MARKS VERY MUCH. AND SO WAS A -- ABOUT AN HOUR OR TWO SESSION WITH THOSE MEDICAL EXAMINERS, DEMONSTRATING HOW TO RECOGNIZE BITE MARKS.

Q. IF MEDICAL EXAMINERS WERE NOT FAMILIAR WITH IT, HAVE YOU HAD ANY EXPERIENCE IN YOUR VARIOUS PRESENTATIONS, LECTURES, AND TEACHINGS WITH WHETHER THE STUDENTS THAT YOU TAUGHT AT UNIVERSITY, AND SO FORTH, WERE PARTICULARLY USED TO THE IDEA OF BITE MARKS AND THE UNIQUENESS OF THEM?

A. I'VE TAUGHT ADVANCED PHYSICAL ANTHROPOLOGY CLASSES WHERE I HAVE TAKEN STUDENTS THROUGH VARIOUS EXERCISES, AND I THINK THEY HAVE ALL HAD TO BE -- HAD TO BE SHOWN HOW THE TEETH ARE UNIQUE. SOME STARTED WITH A FEELING THAT THEY WERE, AND SOME DIDN'T KNOW, BUT I HAVE TAKEN THEM THROUGH EXAMPLES OF REALLY DETERMINING THAT.

ACTUALLY STARTED WITH A CLASS IN THE NATIONAL SURVEY OF DENTITION. WE STARTED WITH A CLASS ONE YEAR AND HAD THEM SAMPLE EACH OTHER, AND WE DEVELOPED OUR SAMPLING TECHNIQUES WITH THAT CLASS. SO SOME OF THEM WERE INSTRUMENTAL IN THE VERY BEGINNING PHASES OF IT.

Q. IN 1979 YOU GAVE A LECTURE ON TRANSILLUMINATION AND IMAGE INTENSIFICATION OF BITE MARKS AT THE AMERICAN ACADEMY OF FORENSIC SCIENCES AT ST. LOUIS. WHAT DO YOU MEAN BY THAT?

A. ONE OF THE DIFFICULTIES IN DEMONSTRATING BITE MARK EVIDENCE IS TO TRY TO PHOTOGRAPH IT OR RECORD IT IN A WAY THAT OTHER PEOPLE CAN SEE WHEN YOU ACTUALLY LOOK AT IT, AND WE USE STANDARD PHOTOGRAPHY. BUT ANOTHER APPROACH IS TO SHINE LIGHT BEHIND THE TISSUE AND THEN PHOTOGRAPH IT AND THEN IT GIVES -- YOU CAN SEE DIFFERENT DETAILS IN IT THAT YOU OFTEN CAN'T SEE WITH NORMAL PHOTOGRAPHY.

THE IMAGE INTENSIFICATION WAS TO USE A STARLIGHT SCOPE, AND I INJECTED A GLOWING SOLUTION UNDERNEATH THE TISSUE SO THAT THERE WAS A FAINT GLOW TO THE TISSUE AND THEN USED AN IMAGE INTENSIFIER TO PHOTOGRAPH THAT, AND IT WAS STARTLING, IN THE DETAIL THAT IT BROUGHT OUT. THERE WERE SOME DISTORTION PROBLEMS BECAUSE OF THE INACCURACY OF IMAGE INTENSIFIERS, BUT IT -- IT WAS KIND OF A BOLD NEW WAY TO LOOK AT IT, AND WE SAW THINGS THAT WE HAD NEVER SEEN BEFORE.

Q. HAVE YOU USED VARIOUS INSTRUMENTS, EITHER AIDS OR TO OBTAIN THE EVIDENCE, BY WAY OF STILL CAMERAS, MOVIE OR VIDEO CAMERAS, OTHER INSTRUMENTS, CAT SCAN, AND SUCH INSTRUMENTS AS THAT?

A. I HAVE TRIED TO ADAPT TO ANY TECHNOLOGY THAT I WAS FAMILIAR WITH, TO RECORDING THE EVIDENCE ASSOCIATED WITH BITE MARKS.

Q. DOES THAT INCLUDE STILL PHOTOGRAPHY?

A. YES. AND VIDEO PHOTOGRAPHY.

Q. AND HAVE YOU DONE THAT IN THE PAST AND MADE EITHER TEACHING PRESENTATIONS OR TO ASSIST THE COUNTY ATTORNEYS FOR CASE WORKUPS?

A. YES, YES, I HAVE.

Q. WITH REGARD TO PROFESSIONAL MEETINGS AND CONTINUING EDUCATION, JUST IN GENERAL, HAVE YOU KEPT UP IN FORENSIC SCIENCE, ORAL MEDICINE, FORENSIC ODONTOLOGY, RADIOLOGY, BITE MARK TYPE EVIDENCE AND THAT SORT OF THING?

A. WE HAVE A GENERAL REQUIREMENT OF 12 CONTINUING EDUCATION HOURS A YEAR TO MAINTAIN OUR LICENSE, AND I USUALLY SURPASS THAT BY 40 OR 50 HOURS. SO I'M FAIRLY ACTIVE IN CONTINUING EDUCATION PROGRAMS.

Q. DOES THIS CURRICULUM VITAE SHOW ALL OF THE MOST RECENT THINGS? I THINK YOU HAVE US FROM ABOUT 19 -- WELL, 1990, BUT IS IT --

A. IT'S -- I'M IN THE PROCESS OF UPDATING IT RIGHT NOW. I HAVE ADDED A NUMBER OF THINGS THAT I HAVE BEEN INVOLVED IN OR THAT I HAVE ATTENDED. AND -- BUT IT'S REPRESENTATIVE OF THE TYPE OF THINGS THAT I'M STILL INVOLVED IN.

Q. FOR EXAMPLE, MEDICOLEGAL INVESTIGATION OF DEATH, UNIVERSITY OF NEW MEXICO, IN 1976, HAVE YOU KEPT UP YOUR PROFESSIONAL INTEREST AND CREDENTIALS AND THAT SORT OF THING?

A. YES. AND THAT WAS ONE OF THOSE EARLY COURSES TO

TRY TO GAIN AS MUCH KNOWLEDGE AS I COULD FROM AS MANY DIFFERENT SOURCES AS I COULD. CURRENTLY I PROBABLY RESEARCH AND WRITE OR SHARE INFORMATION AS MUCH AS I GATHER FROM OTHER PEOPLE.

Q. I TAKE IT YOU PUBLISH?

A. YES.

Q. AND SOME OF THE PUBLICATIONS, A REVIEW OF BITE MARK EVIDENCE, IN THE J.A.D.A., 1979. DID YOU CONTRIBUTE TO THAT JOURNAL WITH REGARD TO BITE MARK EVIDENCE?

A. THAT'S WHAT THEY REFER TO A PREMIUM OR PREMIERE ISSUE AND THE AMERICAN DENTAL ASSOCIATION ASKED ME TO WRITE THAT ARTICLE.

Q. SO THAT'S THE JOURNAL OF AMERICAN DENTAL ASSOCIATION?

A. YES. SO THE EDITOR SOLICITED ME TO WRITE THAT, AND IT WAS AN ENTIRE VOLUME, AND THIS WAS A REVIEW TO PUT INTO UNDERSTANDABLE TERMS FOR THE AVERAGE DENTIST SO THEY COULD UNDERSTAND THE SCOPE OF BITE MARK ANALYSIS OR BITE MARK TECHNOLOGY.

Q. THE PUBLICATION, THE JOURNAL OF FORENSIC SCIENCES IN 1979, RADIOGRAPHIC INTERPRETATION OF CONTRAST MEDIA, ENHANCED BITE MARKS, HAVE YOU -- HAS ANY OF THAT TYPE RESEARCH AND STUDY SHOWN UP IN YOUR INVESTIGATION OF THIS CASE WITH REGARD TO VICTIM KIM ANCONA AND DEFENDANT RAY KRONE?

A. NO. I DIDN'T USE THE CONTRAST ENHANCEMENT. THAT'S A -- THAT'S A COMPLICATED WAY OF SAYING A MAMMOGRAM. ONLY IT'S A SPECIAL TYPE OF MAMMOGRAPHY THAT WE USE FOR TISSUE, AND IF WE'RE -- IF WE HAVE A PIECE OF FLAT TISSUE AND ARE ABLE TO FLOW AN IODINE SOLUTION OVER IT AND THEN SUBJECT IT TO THE MAMMOGRAPHY OR WHAT WE CALL ZERO RADIOGRAPHY, THEN IT USES AN IMAGE OF THE BITE PATTERN THAT CAN'T REALLY BE RECORDING IT ANY OTHER WAY BECAUSE IT'S RECORDING IT THROUGH THE VARIOUS TISSUES. IT DIDN'T LEND ITSELF TO THIS TISSUE.

Q. BUT IN ANY EVENT, YOU HAVE DONE RESEARCH WITH THE FEMALE BREASTS AND BITE MARKS?

A. YES.

Q. ON THE ARTICLE IN 1984, STATISTICAL EVIDENCE FOR THE INDIVIDUALITY OF THE HUMAN DENTITION, DID YOU DO SOME STATISTICAL RESEARCH?

A. THAT'S THE PUBLICATION OF THE NATIONWIDE STUDY TO GET A POPULATION SAMPLING OF PEOPLE'S TEETH FROM ALL OVER THE COUNTRY AND THEN ANALYZE IT CAREFULLY TO SEE WHAT KINDS OF VARIATION OR WHAT KINDS OF SIMILARITY WE HAD IN THE COUNTRY.

Q. DID YOU PUBLISH AN ARTICLE AT THE AMERICAN ACADEMY OF FORENSIC SCIENCES IN '83 DEALING WITH A METHOD OF CLASSIFYING DISTORTION AND BITE MARKS?

A. YES. I'M JUST TRYING TO SEE IF THAT WAS IN THE

ABSTRACTS. IF THAT WAS --

Q. IT SAYS ABSTRACTS.

A. OKAY. THAT WAS A PRESENTATION, A SLIDE PRESENTATION, THAT I DEMONSTRATED TO THE ACADEMY THAT IS WRITTEN UP IN SHORT.

Q. SO, AGAIN, YOU'RE FAMILIAR WITH DISTORTION IN BITE MARKS?

A. YES.

Q. NOW, DID YOU WRITE THE MORPHOLOGICAL CHARACTERISTICS OF THE HUMAN BREAST IMPORTANT TO BITE MARK INVESTIGATORS, TO THE AMERICAN ACADEMY OF FORENSIC SCIENCES; AGAIN IT'S ABSTRACTS?

A. YES. I COAUTHORED THAT ARTICLE, AND THAT WAS GIVEN AS A PRESENTATION AT THE AMERICAN ACADEMY, BUT IT WAS ALSO PUBLISHED AS A FULL ARTICLE BEHIND THAT, AND THE COAUTHOR WAS ONE OF -- I GUESS MY MENTOR OR TEACHER IN PHYSICAL ANTHROPOLOGY, SO WE STUDIED THIS IN DETAIL SO THAT IT WOULD BE USEFUL NOT ONLY TO FORENSIC DENTISTS BUT THAT IT WOULD BE USEFUL IN THE FIELD OF PHYSICAL ANTHROPOLOGY.

Q. YOU EARLIER MENTIONED DOING A COMPUTERIZED STUDY OF BITE MARK STUDIES IN THE GENERAL POPULATION, AND I TAKE IT IN '79 YOU ACTUALLY WROTE -- AUTHORED A STUDY ON THAT?

A. YES.

Q. FOR THE AMERICAN ACADEMY OF FORENSIC SCIENCES?

A. YES.

Q. AND --

A. THAT WAS BOTH PUBLISHED, AND IT'S BEEN PRESENTED TO THE GENERAL BODY OF THE ACADEMY.

Q. AND WHAT DID YOU FIND OUT AS TO THE UNIQUENESS OR INDIVIDUALITY OF EACH HUMAN DENTITION?

A. WELL, THE HUMAN DENTITION IS UNIQUE IN THAT YOU SIMPLY NEED TO LOOK AT ENOUGH TEETH CLOSELY ENOUGH TO BE ABLE TO DISTINGUISH BETWEEN ANY TWO SETS OF TEETH.

Q. AND DID YOU AUTHOR AN ARTICLE WITH REGARD TO ANALYSIS OF PHOTOGRAPHIC DISTORTION IN BITE MARKS, AND ARE YOU -- IN 1986, FOR THE JOURNAL OF FORENSIC SCIENCES. ARE YOU FAMILIAR WITH PHOTOGRAPHIC DISTORTION AND BITE MARKS?

A. YES. I WORKED EXTENSIVELY WITH IT AND BOTH ON THE BITE MARK GUIDELINES COMMITTEE AND THE RESEARCH COMMITTEE THAT WAS INSTALLED BEFORE THAT, AND I HAVE WORKED ON IT SINCE.

Q. YOU AUTHORED SOMETHING WITH REGARD TO GUIDELINES FOR BITE MARK ANALYSIS IN FORENSIC INVESTIGATION. YOU EARLIER MENTIONED ESTABLISHING GUIDELINES; IS THAT CORRECT?

A. YES. THIS IS AN ARTICLE THAT CAME OUT IN THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION, SO IT GOES TO THE GENERAL MEMBERSHIP OF DENTISTS IN THE COUNTRY, MAYBE ONE HUNDRED FIFTY OR SIXTY THOUSAND. IT WAS A COAUTHORED ARTICLE WITH THE OTHER MEMBERS OF THE BITE MARK GUIDELINES COMMITTEE. AND SO IT'S DR. VALE, DR. HERSCHAFT, DR.

SPERBER, AND MYSELF.

Q. ARE YOU CURRENTLY AUTHORING A TEXTBOOK ON BITE MARK EVIDENCE, ITS LEGAL AND SCIENTIFIC FOUNDATION?

A. YES.

Q. BUT IT'S NOT COMPLETE?

A. NO.

Q. WHERE ARE YOU LICENSED TO PRACTICE DENTISTRY?

A. I HAVE A NATIONAL BOARD -- WHAT DO THEY CALL IT? I GUESS IT'S A CERTIFICATE FROM THE NATIONAL BOARD. I'M LICENSED IN CALIFORNIA AND LICENSED IN NEVADA.

Q. WHEN WERE YOU LICENSED RESPECTIVELY IN THOSE STATES?

A. IN 1968.

Q. AND ARE YOU A DIPLOMATE IN THE AMERICAN BOARD OF FORENSIC ODONTOLOGY?

A. YES, SIR.

Q. AND HOW ABOUT ORAL MEDICINE?

A. AND THE SAME THING. AND WE'RE REFERRED TO AS BEING FELLOWS OR DIPLOMATES, BEING THE HIGHEST ORDER OF MEMBERSHIP.

Q. WITH REGARD TO YOUR PROFESSORSHIPS OR ADJUNCT PROFESSORSHIPS IN EITHER DENTISTRY OR BIOLOGY OR ORAL BIOLOGY, ARE YOU ACTIVE IN TEACHING THOSE COURSES?

A. YES. I ALSO AM AN ADJUNCT PROFESSOR, FULL PROFESSOR, AT THE UNIVERSITY OF NEVADA, SCHOOL OF MEDICINE,

IN THE DEPARTMENT OF PATHOLOGY AND FAMILY MEDICINE. AND I TEACH PATHOLOGY, SOME PATHOLOGY SUBJECTS ASSOCIATED WITH DENTISTRY AND FORENSIC DENTISTRY TO THE MEDICAL STUDENTS.

Q. HAVE YOU DONE A GOOD DEAL OF WORK IN HOMICIDE CASES WITH REGARD TO IDENTIFICATIONS FROM -- IN VARIOUS YEARS -- THROUGH THE VARIOUS YEARS?

A. I'VE DONE HUNDREDS OF IDENTIFICATIONS, AND I DON'T HAVE ALL OF THOSE IN MY V.C.

Q. ARE SOME OF THESE REFLECTED IN THIS CURRICULUM VITAE?

A. YES, THAT'S JUST REPRESENTATIVE, AND MANY OF THOSE HAD BEEN HOMICIDES. SOME WILL BE SUICIDES. SOME ARE ACCIDENTAL DEATHS.

Q. HAVE YOU GIVEN COURT TESTIMONY IN VARIOUS CRIMINAL CASES?

A. YES, I HAVE.

Q. WITH REGARD TO BITE MARK CASES, HAVE YOU ACTED AS AN EXPERT IN VARIOUS BITE MARK CASES, FOR EXAMPLE, IN MARCH OF 1980, IN THE STATE OF NEVADA VERSUS AGUILAR?

A. YES.

Q. HOW ABOUT IN '81, NEVADA VERSUS PATTON?

A. YES. THAT'S WRITTEN PATTON, BUT THEY PRONOUNCED HIS NAME PATTON. BUT IT LOOKS LIKE PATTON.

Q. SO THERE ARE VARIOUS CASES, AND YOU PARTICULARIZE THEM LATER ON IN THE CURRICULUM VITAE; IS THAT CORRECT?

A. YES.

Q. YOU HAVE DEALT WITH BITE MARK CASES IN NUMEROUS STATES?

A. YES.

Q. DOES THAT INCLUDE ARIZONA?

A. YES.

Q. COCONINO COUNTY?

A. YES.

Q. WAS THAT IN ARIZONA VERSUS ABNEY?

A. I THINK THAT'S COCONINO COUNTY.

Q. YES.

A. FLAGSTAFF.

Q. AND DID YOU GIVE, AMONG OTHER PLACES, TESTIMONY AS AN EXPERT?

A. YES.

Q. FOR EXAMPLE, ON BITE MARK CASES STILL PENDING. DOES THAT INCLUDE A HOMICIDE -- HOMICIDE BITE MARK ON THE HAND IN LAS VEGAS, AND A BITE -- MALE BITE ON THE TIP OF A NOSE IN LAS VEGAS?

A. YES, THEY'RE STILL OPEN CASES. THERE'S ONE CASE I HAD ON THERE, CODDINGTON. IT'S A YOUNG GIRL. YEAH, THAT CASE HE HAS NOW BEEN CONVICTED OF A DIFFERENT CASE. SAME CASE, IN CALIFORNIA.

Q. SO HAVE YOU DONE HUNDREDS OF BITE MARK CASES? THOUSANDS?

A. I HAVE EXAMINED THOUSANDS OF BITE MARKS, AND I HAVE GIVEN OPINIONS ON HUNDREDS. I'M SURE THAT I HAVEN'T REACHED A HUNDRED THAT HAVE BEEN IN THE COURT, THAT I HAVE ACTUALLY GIVEN TESTIMONY ON.

Q. NOW, SOME OF THE COURT TESTIMONY, HAVE SOME REACHED THE APPELLATE OPINION SUCH AS STATE VS. --

A. STINSON, IS IT?

Q. STINSON IN 1986, AND STATE VS. KENDRICK -- WHICH IS A WISCONSIN CASE -- AND STATE VS. KENDRICK IN '87, WHICH IS A WASHINGTON CASE?

A. YES. AND THERE IS ALSO DEUTSCHER IN NEVADA, D-E-U-T-S-C-H-E-R.

Q. AND THEN WERE YOU AN EXPERT IN THAT CASE?

A. YES.

Q. WAS THAT A HOMICIDE CASE?

A. YES, IT WAS.

Q. DID IT INVOLVE A DEATH PENALTY?

A. YES, IT DID.

Q. AND WAS IT ABOUT A BITE MARK?

A. YES.

Q. WITH REGARD TO JUST A FEW SELECT BITE MARK CASES, I HAVE LISTED A FEW -- I MEAN I HAVE HIGHLIGHTED A FEW. CODDINGTON, ARIZONA V. ABNEY, NEVADA V. RAMIREZ, AND OTHERS, IN VARIOUS YEARS AS NOTED ON YOUR CURRICULUM VITAE. ARE ANY OF THOSE HOMICIDE CASES?

A. ALMOST ALL OF THE BITE MARK CASES ARE HOMICIDE. THEY'RE -- I HAVE NUMEROUS CHILD ABUSE CASES, BUT MANY OF THOSE, IF THERE'S A SURVIVING CHILD, WILL BE HANDLED THROUGH THE JUVENILE COURT, AND THEY'RE HANDLED A LITTLE BIT DIFFERENTLY, SO YOU DON'T SEE THEM ON A TYPICAL COURT DOCKET. I THINK MOST OF THOSE THAT YOU'VE MENTIONED ARE, TO MY RECOLLECTION, ARE HOMICIDE CASES.

Q. ANY SEXUAL ASSAULT?

A. YOU CAN'T SAY ALWAYS IN SCIENCE, BUT THERE'S ALMOST ALWAYS A SEXUAL ASSAULT ASSOCIATED WITH A BITE MARK.

Q. SEXUAL ASSAULT AND HOMICIDE?

A. YES.

Q. WHICH ONE?

A. WELL, WHENEVER YOU SEE A HOMICIDE WITH A BITE MARK, THERE'S USUALLY A SEXUAL ASSAULT.

Q. WOULD YOU CLASSIFY THE ABNEY CASE IN FLAGSTAFF, COCONINO COUNTY, THAT YOU TESTIFIED AT IN '87, AS THAT TYPE OF CASE?

A. YEAH. I'M NOT SURE WHAT WAS RECOVERED TO DEMONSTRATE THE SEXUAL ASSAULT.

Q. WHAT WAS IT, A BREAST BITE?

A. YES. A BREAST BITE.

Q. AND WAS IT A DEAD WOMAN?

A. YES.

Q. AND WAS THE DEFENDANT MALE?

A. YES.

Q. OKAY. SO YOU HAVE PARTICIPATED AS -- YOU HAVE QUALIFIED AS AN EXPERT IN VARIOUS COURTS; IS THAT CORRECT?

A. YES.

Q. FEDERAL COURTS?

A. I DON'T THINK SO.

Q. SUPERIOR COURTS IN VARIOUS COUNTIES AND VARIOUS STATES, SUCH AS THIS TYPE OF COURT?

A. YES.

Q. OF COURSE --

A. I HAVE REVIEWED -- FOR THE U.S. ATTORNEY, I HAVE REVIEWED CASES, BUT I DON'T THINK ANY OF THOSE HAVE -- I DON'T THINK I HAVE ACTUALLY BEEN ON THE WITNESS STAND ON THOSE. I HAVE GIVEN REPORTS.

BUT I HAVE BEEN ON THE WITNESS STAND IN NUMEROUS STATE COURTS, SUPERIOR COURTS.

Q. DID SOME OF THOSE CASES WORK -- DID THEY GO ALL THE WAY TO BEING DECIDED UPON BY THE JURY?

A. YES.

Q. HOW LONG HAVE YOU SPENT IN BITE MARK IDENTIFICATION, BITE MARK CASES IN YOUR CAREER?

A. AT LEAST 15 YEARS.

Q. AND IS THAT A PART OF YOUR WORK IN FORENSIC ODONTOLOGY?

A. YES.

(Whereupon the following proceedings were held in open court.)

THE COURT: Morning everyone. The record will show the presence of all of our jurors, the defendant and counsel, with the witness still on the stand.

Go ahead, Mr. Levy.

MR. LEVY: Thank you, Your Honor.

DIRECT EXAMINATION (Continued.)

BY MR. LEVY:

Q. Dr. Rawson, I show you these items that were admitted in evidence through Dr. Piakis, being photos 118 through 122 and 126 through 132, and teeth impression 125, and teeth casts 124 and 123.

The question to you is: Have you seen these before? Were they provided to you in order for you to make your analysis?

A. Okay. There are two items here that I haven't seen before. They're item 121 and item 120. They're overlays that have been made.

Q. Okay. I'll take them.

A. And as I remember, Exhibit 122 has some teeth that are lettered on that that I haven't seen that before. So they have either been added after or I

haven't seen them.

Q. Okay.

A. The photograph I'm sure that I've seen, but there was not numbering on it.

Q. So excluding the numbering on 122, you believe that you received this photograph?

A. Yes.

Q. Okay. Now if you look -- okay.

A. Okay. The rest of this I believe I've seen. It was delivered to me on the 11th of March.

Q. Now what about the teeth casts and the impression, have you looked at those?

A. Yes.

Q. So did you have all of those items with you up in your laboratory in Las Vegas to analyze preparatory to you making a determination?

A. Yes.

Q. I show you Exhibit 109 for identification and ask if you recognize this as a video that you made of your findings?

A. Yes, it is.

MR. LEVY: I move Exhibit 109.

THE COURT: 109 is admitted subject to the earlier discussion.

MR. LEVY: Thank you.

Q. BY MR. LEVY: Dr. Rawson, have you reached an opinion with regard to the teeth impressions on [redacted] breast, whether they came from the teeth of Ray Krone via the medium of his teeth casts and teeth impressions on the foam and the exhibits before you?

A. Yes, I have.

Q. And what is your opinion?

A. My opinion is that the teeth that are represented to me as being Ray Krone's teeth did cause the injury patterns that we call bite marks.

Q. And how certain are you of your opinion?

A. I'm certain. It's a very good match.

Q. Now, do you have a basis for your opinion?

A. Yes, I do.

Q. Can you demonstrate that basis through this videotape?

A. Yes, I can.

MR. LEVY: With the Court's permission, could the witness step from the box in order to help the jury?

THE COURT: Yes. Go right ahead, sir.

MR. LEVY: I'll talk out loud to Dr. Rawson before I get going.

Dr. Rawson, this is the VCR control. I'll turn it toward you. This is play, fast forward, rewind,

stop.

THE WITNESS: Okay.

THE COURT: Go ahead, sir.

THE WITNESS: Let's fast forward through the -- okay.

This is simply a title slide indicating that this is bite mark evidence that's been collected, put together so that it can all be seen in one place.

Q. BY MR. LEVY: Could you speak up, Dr. Rawson?

A. Yes.

This videotaping started on the 14th of March and went on from that point. I was still doing some taping a week ago on new specimens that had been sent to me.

Now this is footage that was represented to me as being taken by Dr. Piakis, or at least I received it from that source. And there is a basic comparison taking place here that appears to be an appropriate comparison.

It's rare that we have the body still there when a suspect is found in a bite mark case. So we typically don't have an opportunity to actually go to the body with casts, with models.

Now I put this in simply to illustrate the

evidence that was given to me. And it does give an orientation for one of the bites.

There appears to be no sound track on this. I was not able to discover any. And so I'm not aware of any of the conversation that took place during this filming.

MR. JONES: Excuse me, Your Honor. Could we have a question-and-answer format?

MR. LEVY: That's fine, Your Honor. I'm prepared.

Q. BY MR. LEVY: Is this still Dr. Piakis' tape of the putting on of Mr. Krone's teeth against the actual body and the left breast?

A. Yes, it is.

Q. And what is it that you see from your expertise, Dr. Rawson, with regard to the match?

A. Well, it appears to be a very close match. The tissue is pliable. And as the models touch the tissue there you can reproduce some of the dynamics of the bite. And it's a very good match on that tooth number 8 and 9, the two central incisors.

Now this is a photograph that is laid out that I will do the -- some of the comparisons with. It's placed here so that we can look at some of the characteristics of the bite.

Q. Excuse me, Dr. Rawson. Is this photograph -- are we through with footage from Dr. Piakis' tape?

A. Yes, we are.

Q. And is this one of the photographs you received and utilized for your demonstration?

A. Yes, it is.

Q. What is the purpose of this photograph?

A. This photograph really gives a very good view of the entire -- the entire areola area with the bite mark injuries.

Q. You mean the upper and lower --

A. Yes.

Q. And does the ruler -- is that there for purposes of -- to indicate nondistortion?

A. Yes. The ruler is there so that we can do proper measuring. And we can make a proper relationship with anything we compare to this.

The bite does demonstrate -- if I may go back to that for just a moment. This bite demonstrates an overall injury pattern with the upper arch in what we would call a 12:00 o'clock position. There's also a lower arch form opposite that in what we might refer to as 6:00 o'clock.

There's another bite pattern that we might

refer to as the 10:00 o'clock position where the two central incisors are reflected there. And then the opposing arch which might be considered a 5:00 o'clock position.

And there are other injuries that are seen on the breast here.

There is a slight mark from the 12:00 o'clock bite where there is kind of a second impression and even a third indentation from that bite. There's also some indication that there is a bite in the 2:00 o'clock.

Q. Could you try putting that on some kind of a hold, Dr. Rawson? I'm not sure that -- I'm not sure that it will maintain the quality when it's on hold. Well, that's not bad.

Let me ask you a couple of questions. That's the left breast of [redacted]?

A. Yes.

Q. Now, would -- those are the wounds that you can visually see; is that correct?

A. That's correct.

Q. Are there anything -- will teeth touching the flesh always necessarily leave a wound pattern like that?

A. No. We know that it takes a certain amount

of biting pressure, that a tooth has to be in contact with the tissue with a certain amount of force to create an injury pattern.

And I -- you know, like I can bite the side of my finger about as hard as I can stand and it won't produce a bruise pattern like this. It will produce an indentation that in a half hour will look red and within a few hours will be gone.

Q. One other preliminary question I'd like to ask with regard to the 10:00 o'clock position. There are two marks and one which sort of angles out. Were you able to closely analyze that particular marking?

A. Yes, I've looked closely at that. There's actually an indentation or an impression of the two central incisors, and then there's a scratch that runs across what would be the impression from tooth number 9.

Q. How did you determine that was a scratch as distinguished from a tooth impression?

A. Well, in looking at it under the microscope there's an indentation with a coloration, and then there's a kind of a parting of the tissue. It's actually froed up as far as like you'd see in a plowed field. The tissue is just froed up, and it comes across and swings into the bite -- the bite pattern.

Q. So that is observable under microscopic

magnification?

A. Yes.

Q. I think that was all the particular questions I had at this point, Dr. Rawson, on that.

A. Okay. Now this is a photograph that's represented to me as being of Ray Krone. And there are things that we look at in any of the photographs to see if there's deviation, to see if there's a certain narrowness or broadness to the face, to the biting areas.

And I've taken each of these slides that were presented to me and placed them on the videotape. You can see with the lip slightly apart that there is one tooth that appears to be long in front. It turns out to be tooth number 9.

This is a right lateral view. It shows the sharpness of the canine, tooth number 6. And it shows the relative shortness of tooth number 7. It's well out of the plane of occlusion and wouldn't be expected to mark unless there was an avulsive type of mark where the tissue was excised or actually bitten into.

It shows also a point on the lower right canine, which would be tooth number 27. The left lateral demonstrates the same shortness with that lateral incisor.

And we're able to see some of the lower anterior teeth, that there is a tooth that is projecting higher towards the mid line. That's tooth number 24. And the left canine is tooth number 22. And it is not as sharp as the right canine.

Looking straight on, this is what we would refer to as a restricted arch. The prominent teeth are certainly the left central incisor, number 9. And the right canine -- the left canine also on the lower arch of the mid line is off. It appears to be a bridge. And again tooth number 24 is long. 26 is relatively longer than 25.

And then 27 is the longest and sharpest tooth on that arch. That's porcelain work. The tooth above tooth number 9 is also a porcelain crown. And it is left considerably longer than the central incisor next to it. Look at the incisor ledge or the biting ledge. We can see on the tooth number 8 that there is an unusual wear pattern. There's probably been some chipping. And there is an actual chip out of the lip surface of that biting edge.

Then we can see a certain curvature to the porcelain work on tooth number 9. There's a triangular area that's not shown fully from this view on tooth number 6.

Again, if we look more close up at the anterior teeth, we see an irregular pattern of teeth. This is not a typical reconstruction. And we could only speculate as to why a porcelain crown was left long like that. They do wear at a different rate than normal teeth, and it may well be that it's been in for some time.

Q. Could you go back to the last teeth, Dr. Rawson?

A. Yes.

Q. And now can you put it on pause?

A. Yes. I'll try and get a little further. Okay.

Q. Now based upon your prior research and work, including with computers, on the uniqueness of human dentition, could you share through this particular view the uniqueness of human dentition, and whether this set of teeth of Kay Krone's is unique? And thirdly, in your opinion, are there any two sets of teeth or dentition the same between the same -- between two different human beings?

A. There's really two aspects to the human dentition. The first, and what is used most by forensic dentists, is the positioning of teeth.

And to talk about that in simple terms, any

one tooth, if we were to look at the teeth as being in, say, the lower arch, and if we looked at two teeth in relationship to each other, one tooth may be forward from the tooth next to it, or it may be back, or it may be to the side, or it may be to the other side, or it may be rotated to what we would refer to as the mesial, or what's referred to as rotated to the distal.

So there's six basic positions that a tooth can be in. And the early work really concentrated on those basic six positions. And if you then are looking at two teeth and the number of positions that they may be in, it would be six times six, or 36 possible positions that these teeth could be in. Each position would be distinguishable from the other positions.

Q. Would that also include the variation of lengths, widths, and those sorts of dimensions?

A. No. It doesn't take into account any differences in the height of one tooth versus another. It doesn't take into account any of the wear patterns, any of the shape of the teeth, simply the positions of the teeth. And most of the early bite marks were used -- the determinations were really made based on those six positions.

Now the study that I went into tried to identify more precisely how many positions can a tooth

actually be in. And it turns out that on average a tooth can be in about 150 different positions, each one of which is easily recognizable. And if you are looking at a tooth in that kind of detail, then you can see that very quickly. Just having two teeth, the possibilities of two teeth being in the same position, it would be 150 times 150, whatever that is. Maybe 1200 or something like that.

So in other words, there are many more positions that a tooth can be in than we had previously realized. And now granting that, I still take a fairly conservative view on the way that I'll look at those positions. And then we can start to deal with the terms of how high is the tooth, or how short is the tooth, or what's the basic shape, is it really a small tooth or is it a wide tooth? And we can get a lot more specific.

It's safe for us to say at this point that there are no two sets of dentition alike, that there are distinct differences in all sets of teeth. We've done this examination on kids that are adults who as kids have gone through orthodontic therapy so all of their teeth were lined up as pretty as they were lined up, and still we find that we can distinguish those people, that they're identifiable by tooth pattern.

So there are no two -- and of course we

went to the twin study to try and demonstrate whether or not there would be a mirror image in twins. And I can reverse one of the images and compare, and it gives us the closest comparison. But they're still easily distinguishable. Even in identical twins the human dentition is unique.

So when we go back now and look at this view of the teeth, there are so many factors that we can look at in relationship to what is the overall arch form in the upper teeth, and what position is each tooth in in that arch, and what's the rotation of each tooth in that arch, and what's the length or the shortness of each tooth in that arch? And without ever getting to the specific characteristics we can determine the match simply on the basis of those things that I've talked about.

Now if we can find particular characteristics about a tooth also reflected in the bite mark, that's -- in a scientific sense that's a gift. It's just more proof of the pudding, so to speak.

Q. Dr. Rawson, another preliminary question: In your review of the utilization of bite mark evidence in cases, in courts of law, have you noted about how far back the utilization of bite mark evidence goes?

A. The first case -- I have the reference in

my notes. But I believe it's an Ohio case in 1870. There were actually some bite marks presented in some of the Salem witch trials, but we feel there was no science behind that at the time, that it was simply people that had no dental knowledge looking at bite marks and saying that they matched.

But by 1870 the first dean of the Michigan School of Dentistry testified extensively on a bite mark case. And it was -- he laid down the pattern of how we should really look at a bite mark case very, very close to the way the American Board of Forensic Odontology now suggests that we do it. In fact, we had presented our guidelines, and someone in doing historical research for something else, found this case and went back and read it and found that it parallels what the American Board is advocating now very closely.

Q. So bite mark evidence is not new in American jurisprudence?

A. No.

We have another case before 1900. There's a key case in 1927 where a policeman was bitten on the arm. We have a great explosion in the number of cases in the 1950s and sixties. We have maybe -- oh, in 1968 I knew of 190 cases that had been through the appellate level. I'm not sure how many cases have been through

the appellate levels now. There have been thousands of bite mark cases tried in this country. As far as I know, to my knowledge they have been accepted in every jurisdiction. It has been allowed in every case.

Q. Thank you, Dr. Rawson.

A. This goes back again now to the evidence photograph that shows the --

MR. JONES: Excuse me, Doctor.

Could we have the question and answer format?

Q. BY MR. LEVY: The next photo appears to be the left breast of [redacted]?

A. Yes. And this shows the wound pattern.

Q. What are you about to show the jury at this point? What is that?

A. This is one of the styrofoam bites.

Q. Of Ray Krone's teeth?

A. That's correct.

I have to look at it for just a minute to see where we are. Okay.

What this starts off with is a -- the evidence photograph of the left breast of [redacted]. And it shows the bite wound pattern, in essence. It shows the scale running along beside and underneath this.

And then the next view is of one of the styrofoam bites. It also has a scale in it. And we see the bite pattern.

Q. What is it that you're about to show the jury?

A. What I'm trying to demonstrate here is that we're in the same scale. That the scale on the bite mark photograph matches the scale on the bite --

Q. So it's the same --

A. -- on the styrofoam bite.

Q. So it's the same size to size?

A. That's correct.

As that superimposes, then I can hold that frame and verify the scale. This is simply a technique that's done to demonstrate -- demonstrate the scale. And so we have the centimeter lines over each other. I have mark for mark matching on those scales.

And then it's a matter of moving these bites around so that we can see the relationship. And then we'll see that the tooth pattern is consistent with the injury pattern. The tooth pattern in the styrofoam then is the same as the tooth pattern in the tissue.

Q. Is this one of many ways you're going to show the jury?

A. Yes.

Q. Demonstrate to the jury?

A. Yes.

Q. If you could hold that for a moment, please.

A. Okay.

Q. That appears to look like at first -- the photographic thrust of it is as though it is raised up. Is that raised up or indented in?

A. Well, any type of exhibit that we produce is simply trying to illustrate what it is we can see. In other words, I will study a bite mark and arrive at an opinion, and then face the difficult task of trying to be able to show other people what it is that I can see.

Q. Now here's my point --

A. But as we look at this you'll see shadows on it.

Q. Okay. I want -- when I first saw it, I'm not sure the jury -- it may seem like this is raised up. Is it indented in as the bite mark on the foam?

A. This particular view shows that as indented. But it forms an optical illusion for some people. When some people look at an image like that, that will look like this is raised up. And for other people it will looked like it's depressed in. And there

isn't any way to predict which way people will see it.

But in either case, this is a pattern that is what we would refer to as a third-dimensional pattern, there's depth to it.

Q. Where is the number 9 tooth?

A. Tooth number 9 is right in that area. And tooth number 8 right below. And then this would be tooth number 6.

Q. And is some of the way that you can see it better or not due to shadows?

A. Yes. We try to side light a little bit so that it's not white on white. You just can't see it. If there's a little bit of side lighting then it creates that third dimensional aspect. There isn't any photo enhancement of this. There isn't any computer-generated image. We can make it look like a mountain or make it look like a hole with the computer. But I've used none of those kinds of devices.

Q. Thank you.

A. Okay. You can see the wear patterns in teeth. You can see the triangle that's kind of created as the biting tip is worn off of a tooth. We have a triangle there. There's a dimension to the tooth as it's worn. And I'm simply overlaying the styrofoam bite over the tissue.

Q. What is this blue light effect?

A. Now this blue is simply switched the camera to negative. So it's a color camera. We're getting the negative now of that white, which shows as blue. And you do it simply for contrast.

Now to me that still looks like an indentation. Now to some people that will look like it's positive, like it's a mountain or a hill. By going to the different colors you simply are able to see the bite pattern in contrast to the tissue.

Q. What are you doing now?

A. I'm wiping from side to side simply showing that the mark in the styrofoam is equivalent to that mark in the tissue. And the same thing on tooth number 8, that the mark in the styrofoam is the same as that mark in the tissue.

And then I'll end up by looking at tooth number 6, where you can see that the little triangular space that was created in the styrofoam is duplicated also in the tissue in a bruising pattern.

Q. Is that quite -- is all of that quite unique?

A. Oh, this is -- it's a very good match. It's unique, yes.

Q. Is it clear?

A. It's clear. This is about as far as a lot of people would go in determining a bite mark. I mean, it simply shows.

Q. You mean as far as different techniques?

A. Yes.

Q. But you've done additional --

A. Yes. I've looked at this from many different directions. This is fading in and out, simply to show the same thing. And now I have to let this go into it for a moment again.

This is still the left breast of Kim Ancona.

And this now is a set of --

Q. Could you put it on pause until you explain this to the jury?

A. Yes.

Q. How did you develop the image of the teeth to make the overlay?

A. Okay. The models and a scale are placed on the clear glass of a copy machine.

Q. Let me -- just a moment, Dr. Rawson.

A. Yes.

Q. I'm going to bring these exhibits over here. And from time to time as you deem it appropriate I would ask that you would share with the jury the

actual models of the foam bite and any photographs that you -- still photographs you feel might be of any benefit for the jury's knowledge.

A. Okay. Well, the model -- there are a number of ways that we can record the biting surfaces. One of those ways is to bite into styrofoam and then compare the styrofoam to the tissue injury.

Another way is to place a piece of transparent plastic over the teeth and then trace the edges of the teeth. But that allows for human error to creep into the process.

And so one of the techniques that's been advocated for a number of years is to do an acetate overlay by placing these models right on the flat glass screen of a copy machine and then placing a scale by it, which we see on the right side of the monitor, so that we have a scaling. We can make sure that we're one to one, or a true three one, or whatever size we're looking at. And then closing the cover and simply making a copy of that.

And if the copy looks like the teeth, and we verify it by measurements, then we can run that. Instead of on paper we can run it on a clear acetate sheet so that it's transparent, you can look through it. That's what is represented here, a clear acetate image

of the biting edges of the teeth.

And the teeth as we look at them in this direction, tooth number 9 is on the left side as we look at it. Tooth number 9 is the long central incisor. And it would be on the left side of the arch. But if you turn it over and look at it this way -- now I've shown it to you that way. The way I'm looking at that now is the way that would come down on the tissue. That long tooth, tooth number 9, will to be the left side.

Q. In that regard, Dr. Rawson, and your superimposition, one over the other, this is the photo of [redacted] left breast, and you superimposed the teeth. How would it show on the screen?

A. If we look at it this way -- and let me demonstrate. And I'll hold it just a little bit off the bite mark so you can see the basic relationship.

And that's now looking at it as if you were above the teeth looking down on the injury pattern. But the way we photocopied that, it's as if we're looking at this surface of it. Not looking down on it, but looking at this surface. So we turn that overlay over.

In other words, the overlay is a reverse of what really shows here. So we simply look at it from the other side and it overlays exactly. That's a complicated way of saying a very simple thing. And I

show that in another place on the videotape to try to make that a little bit more clear.

Q. Thank you.

A. That acetate image then can be verified scalewise, and then simply placed in relationship to the injury. And this is real time simply moving it to show how it fits into that injury pattern.

Q. These would be the upper teeth to the top of the -- upper teeth of Ray Krone and the top of the left breast of [redacted]?

A. That's correct.

Now, I'm just showing some relationship here to the way we do this process. And this will be a studying process, that for hours sometimes you'll look from different directions just seeing what really matches, what doesn't match, what's consistent.

Q. And do you do this for purposes of accuracy and precision?

A. That's correct.

Then by looking at simply a close-up view of that Xerox image and comparing that to the injury pattern on the tissue, we can --

Q. Is this the number 9 tooth?

A. That's correct, it's tooth number 9.

-- we can follow some particular

characteristics around that tooth.

Now there's an overall shape to that that is mimicked in the tissue or it is duplicated in the tissue. And we see some different gradations of bruising. And that's one of the characteristics of tissue, it simply will show darker bruising in some areas than others.

Q. Now what are you doing now?

A. This is a comparison of the scale -- of the styrofoam bite to the scale of the Xerox copy of the incisal edges of the teeth.

Q. Are you now superimposing the foam bite mark and the teeth?

A. That's correct.

Now we know that those teeth made the bite mark in the foam. And this is simply demonstrating the comparison procedure of how those teeth fit into the foam.

Q. That's a verification process?

A. That's correct.

Now this is basic information that's put down on a CAT scan of these same models. And this information is simply technical information that tells the date that it was -- the CAT scanning was done. It tells the basic settings of the instrument.

And a CAT scanner is designed -- in the human body we may take an X-ray say of something in the middle of the body, and you see everything in front of that object and everything in back of that object that's in the body. So everything's superimposed over. And radiologists have long been worried about trying to get rid of everything they didn't want to see and just looking at, say if it was the gallbladder, they just want to see the gallbladder.

And tomography is a very complicated X-ray process of being able to just visualize one thin slice through the individual. So we can take a slice through my body. Everything in front of that you wouldn't see, everything behind that you wouldn't see. And it's simply an image of a certain corridor within the body.

A CAT scanner is a computerized process that will show you any level of the body that you want to see. In other words, they record everything that is seen through the body, and then they can set it for whatever depth -- they can look at whatever depth they want to.

And I've developed a little jig that holds these models in a CAT scanner headrest. The CAT scanner can take an image just before the tooth, and then it can take an image just to the biting edge of the teeth, and

then take an image a millimeter and half deeper than the biting edge.

And this is simply the information sheet setting the stage for the CAT scan images that we'll see.

Q. Is the CAT scan image quite accurate?

A. Yes, it is.

Q. And is this another way of further confirming the precision -- by way of a precision instrument, whether Ray Krone's teeth made the impressions in [redacted] breast?

A. That's correct.

And when we look at the Xerox copies, there's a lot of superfluous things around. It's dark. It's hard to see there. It's hard to make a comparison.

Q. What are these pictures on the screen?

A. This is a side view of the model holder that is in a headrest.

Now put this in perspective. The headrest is down this way. That's simply setting in this complicated device that can take the various X-ray views. And if a person were in here, it would be as if a person were laying down looking at the ceiling. Their head would be in this headrest.

This model then shows that this is a scout

film. And it shows the various levels that we're going to look at. And there's a series of very close lines that are close, that they're difficult to see on the T.V. But it's just saying one level here, one level next to it, one level next to it, one level next to it. Each one is a millimeter and a half deeper down the edge of the teeth.

And so this is -- is simply reference for us to look at that describes how the CAT scanning was done. It can show it in a negative image or a positive image. And some radiologists like to have it one way or another just for ease of reading.

Now this would be the first -- the first image. And all we see are three very tiny dark spots that would represent three of the lower teeth. In other words, they're the highest teeth and they're just barely marking.

The next one superimposes into that. Now we can see more teeth that would be touching the tissue. And above we can see tooth number 9 and tooth number 5 and 6 that would be touching the tissue. Everything else is shorter than that.

Then this will fade into the next millimeter and a half in depth so that we'll see more teeth show up. And as more teeth show, we're also going

down the surface of the teeth and so they tend to look bigger with each successive step.

Now this is just a millimeter and a half further from the biting edge and we see more teeth showing now. Tooth number 5, 6, 8, 9, 11 and 12. On the lower we see almost the full arch.

Another millimeter and a half we see the full arch on the lower. We still don't see all of the full arch on the upper. Tooth number 7 still is so high above the biting line that you can't -- still can't see it.

And I think I superimposed one more. We just begin to see the mark from tooth number 7.

And so if the teeth very lightly came in contact with the tissue, you would expect none -- maybe none of the upper to leave a mark, maybe two or three of the lower. If the bite's a little harder you'd expect to see more teeth that would show a mark. Harder, more teeth that would show a mark. And if there was tissue that was actually bitten out, you'd expect to see all of those teeth then leave some kind of a mark.

You can look at the size of tooth number 9, that's clear down by the gum line, and it's a fat tooth by the time you get down to the gum line.

This backs out or demonstrates that same

thing in a bigger scale. And you can see tooth number 9, tooth number 6. As it is superimposes then we can now see 5, 6, 8 and 9.

Q. Does this explain any gaps that you've implied -- any gaps in the wounds shown on the left breast of [redacted]?

A. Yes. It's very pertinent to that.

This also shows -- at this point we'll stop that and you can see that we're really seeing the -- in the darkest color, the darkest black is the biting edge of the tooth.

And then a millimeter and a half further from the biting edge the tooth gets bigger. So this tooth number 6 is a pointed tooth. And the point then would be expected to leave some kind of an impression like that. If it was bitten further into the tissue you'd expect to see that bruising on the tissue to expand out.

Q. Dr. Rawson, I notice there's -- in this CAT scan, tooth 9, there's a little curve here. Is that correct? Would that be a point of application?

A. The curvature certainly is part of that. And we can see since this tooth number 9 is so long, it demonstrates very -- the first demonstration of it it's already -- it would be well into the tissue. But we can

see part of that curvature here. And as the tooth goes deeper it gets bigger. So it may leave a complicated image that goes into the tissue.

It's hard to explain some of these things. But we've come to understand them well.

There is another area we need to look at. And I can stop it right there. You see in this section that tooth number 8, there's a different depth to this incisal edge or to the biting edge. And we can't see the full width of that tooth because part of it is shorter than the rest of it.

Now the rest of this process is -- you know, it's unremarkable. It's simply showing -- simply showing the superimposition of deeper and deeper layers. And so you can see the teeth or the bruising patterns that they would produce get deeper and deeper.

And this is getting to a level now where it's beyond what the teeth actually went into the tissue. In other words, the teeth did not leave marks this big.

And it just goes to the next layer where we would start to see this tooth number 7.

And then the same thing is demonstrated just backing out of it, reversing the color.

Q. Could you put pause?

A. You bet.

Q. Stop there.

I'm looking at this tooth. It's tooth number what?

A. Tooth number 8.

Q. Can you go forward? Okay, stop.

This little place here, I don't know whether you've mentioned it before. I think -- yes, you did. Is that a chip?

A. Yes.

When we were looking at the actual slide of the teeth in the mouth, there is a certain wear on this tooth. But there's a chip on it that's a chip on what we would refer to as the labial or buccal incisal edge. It just means it's the cheek or lip side on the biting edge. There's a little chip out of the tooth and it's demonstrated there.

Q. Thank you.

A. We also see kind of the triangular effect of this tooth number 6. And kind of the differential pattern that's created by this tooth number 9.

This is backing down along the length of the tooth now to where we have just tooth number 9, 6 and 5 showing.

And then that's the last -- the last view

where it shows any of the teeth.

On the lower arch, same thing, we can see 20, 22, 27, 28, 29.

Q. Is this still the CAT scan, Dr. Rawson?

A. Yes, this is still the CAT scan. And this is shown light image on dark field.

As we go to the next view, and that's an important view to look at. The widest areas would be the first areas that would come in contact with the tissue. The gray areas are the next level that would come in contact with the tissue. And so it's common to get double images because of the shape of the teeth. And you might be able to see an overall bruise pattern with a more clearly delineated bruise in the center or to the edge of it. You might see that same thing under tooth 22.

The anterior teeth are not as long as either one of the eye teeth, and so they would tend not to mark as well. You see one tooth that's particularly shorter, would show the least well. And there is a distinctive pattern that's a unique dentition, a unique arch.

This simply goes to the next level which is beyond the level that there was any biting into this tissue. And then it will back out.

Q. Is this the actual teeth of Ray Krone being shown now with the superimposition of the CAT scan?

A. Yes.

Now if I can -- we can get that to stop without fluttering. This is a model of Ray Krone's teeth that are set up with the scale so that we can demonstrate the measurement. And this is the way they would look if we were looking at them. It's not the way they would look if they were coming down on the tissue. And so it's just the reverse view. There's nothing that's been done to this. We're simply looking at biting edges the way you would look at them.

And I do a superimposition with the CAT scan, which has the scale imprinted upon the film so that we know what the scale is. And it's a simple superimposition to demonstrate the match between the CAT scan and the teeth. In other words, it's an accurate representation of the biting edges of the teeth.

Q. One scale to another, CAT scan to actual teeth?

A. That's correct. And the scale is demonstrated right across there.

Q. Is this what you call a wiping demonstration?

A. Yes. Instead of superimposing now this is

wiping. And you can see as it stops on the incisal edge that to one side is the CAT scan view, the other side is the model view of the teeth. And you can see that there's a high correlation. They match. The little triangular area on tooth number 6 is -- every tooth around the arch that is shown on the CAT scan matches well the model that they were made from.

And we use both of these techniques, both superimposition and the wiping motion just as ways of being able to see what's going on.

Q. Have you developed these techniques through the years, Doctor, for purposes of precision and accuracy?

A. Yes, that's correct.

Now this demonstrates the way we would be looking at the teeth and the way we would be looking at the photograph. Tooth number 9 would be on the opposite side. And so for purposes of comparison, you have to turn that model and then place it over the photograph. And that shows the relationship then of turning the CAT scan film so that you can see the proper orientation.

Q. So you're looking down from the top of the teeth onto the wound just as though they would actually have contacted it then?

A. Yes, that's correct.

Now I don't do this for any comparison purposes, simply to illustrate the technique that we use in placing the teeth on the tissue. We can then do that with the CAT scan image over a photograph of the left breast of [redacted].

Q. So far, Dr. Rawson, the orientation has been on the 12:00 o'clock wound?

A. Yes. And this is that same view showing the scale. And then superimposing over that the CAT scan view with the scale so that we can verify that they're both in the same -- the same size.

Q. Superimposing the CAT scan and the teeth to the wounds of [redacted]?

A. That's correct.

Now this is a bite where there's some bruise left by 5, a definite by 6, by 8, by 9. And tooth number 11 -- 7, 10, 11, 12, 13, those teeth are not contacting the tissue.

Q. And is this depth of the CAT scan overlay about the same depth as the wound for purposes of matching?

A. Yes. And that's a very good match. I mean, that is an illustration of what I can actually see as I'm working in my laboratory. And it just illustrates to other people what I can see.

Now it's simply putting the color photograph of the breast into the negative color or the blue color so that we can contrast the two. And here the bite injuries look white. Any of the bruise patterns look white. There's a superimposition. That's as nice a match as we -- as we really ever see in a bite mark case.

Q. By "nice" do you mean accurate?

A. Yes. That was a nonscientific term. This is really an excellent match, and would be held in high regard by forensic odontologists.

Now there's a wiping action just to show the same thing. Again, high correlation. I mean, that is -- that tooth caused that injury.

And as we go to tooth number 8, same thing, that tooth caused that injury.

And finally to tooth number 6, although that's more of a diffused bruise, that tooth caused that bruising.

Q. By extrapolation then, did those teeth cause those bruises on [redacted] left breast?

A. That's correct.

The arch form is just well illustrated there.

Q. Further, is this a superimposition of a CAT

scan on [redacted] wounds?

A. That's simply going back to the natural colors and demonstrating that it's the same match. And for someone that's color-blind, they may have a very difficult time seeing this. We know that a certain percentage of the population won't see colors the way we see them. And I may have some peculiarities about my color seeing that's not recognized. And so everybody sees this in a different color.

But shapes, the patterns are the important aspect of this. And they simply match. Whether we're doing it in blue and white or color and gray, whatever the colors are.

Now we can -- there's no reason to spend more time than necessary on that. That is just an excellent match.

Q. Is this going to show the lower dentition on the lower part of the wound of [redacted]?

A. Yes.

Now this is showing a bite. There's actually a number of bites on this tissue, and we've been concentrating on one of those. This is another one of those bites. And this would be in that 10:00 o'clock, 5:00 o'clock position.

Q. So you're rotating the bottom between the

12:00 and the 10:00 o'clock?

A. Yes. And this is looking at the lower arch. And then there's just an excellent matching there.

Now I've made some exhibits that demonstrate that statically. It's more dynamic to be able to look at it on the videotape. But you can place these into a static exhibit so that you can look at them.

Q. Which you have done, Dr. Rawson?

A. Yes.

Okay. This is essentially the same thing. I'll slow it down to demonstrate the 12:00 o'clock bite and the opposing arch. And then as we turn that you'll be able to see the 10:00 o'clock bite.

Q. Dr. Rawson, in the acetate between the lower and upper arch there's quite a space. Is that for demonstrative purposes as distinguished from the actual shape?

A. That's correct.

Now I believe that's the end of that tape.

Q. Are you through with the tape then?

A. Yes.

Q. Okay. I'll return these exhibits to the witness chair.

Now you indicated you had some static exhibits.

For purposes of timing, if we could approach?

THE COURT: Yes.

(Discussion was held off the record between the Court and counsel.)

Q. BY MR. LEVY: I show you, Dr. Rawson, what's marked as Exhibits 145 for identification, 144 for identification, and 146 for identification. Do you -- did you prepare these and do you recognize them as having provided them to me to be marked today?

A. Yes, I do.

Q. And do they purport to represent the views of Kay Krone's teeth and overlays onto the wound of [redacted] left breast?

A. Yes. The first two that you mentioned have both the model -- the CAT scan model of the teeth superimposing that over the breast tissue. The third one is photomicrographs. They're photographs taken through a microscope of the tissue.

Q. 146?

A. That's correct.

Q. And to your understanding were they provided to you as slides made by Dr. Shaw, the medical

examiner, a month or so ago and sent up to you?

A. Yes, that's correct.

MR. LEVY: I move 144, 145, 146.

MR. JONES: Subject to prior objection, Your Honor. Nothing further to add.

THE COURT: 144, 145 and 146 are admitted.

Q. BY MR. LEVY: Dr. Rawson, with the Court's permission, could you step down and show these exhibits to the jury?

A. This first Exhibit No. 144 is an exhibit that shows the one segment of the CAT scan film. It's actually film that's very large and has each of the views on it. And then we can look at any one of those views and have this grid system placed on it. It's all -- all of this is seen on a video screen when we have them lined in the order that they should be. Then that imprints on film, which is developed.

And this is a blow up now of one piece of that -- that CAT scanning document. And it has the basic information on it. It was taken on the 18th of March 1992 by a GE 9800 CAT scanning unit. And it's unit number 2, which is a particular unit at this facility. And these images now have been traced onto clear acetate sheets and placed to demonstrate the basic positioning of the -- of two of the bites that we can

see.

As we talk about the number of bites here, there's really one bite that came in in a 12:00 o'clock position, and then the teeth have moved down across the tissue. So they leave more than one image.

The most definite image is the first image that went into the tissue. But there is some ancillary image that's produced coming in a sliding motion away. And the bite opposite that then also demonstrates some drag mark. But it's particularly hard to see. And I could -- I could see it on the microscope at low power looking at the tissue. But it's -- it doesn't record well on these in either the black and white or the color film. If we were to look at this first 12:00 o'clock position, then we'd see the overlay with the basic positions of these teeth.

Now when I'm working with the video equipment and I have that CAT scanning overlay I can move it around and I can get a sense of the dynamics of this. As we put a static overlay down you're just kind of stuck seeing the one place. That's the only place that it goes. And you don't get an appreciation for the full dynamics as that bit into the tissue. But it illustrates the -- what's been seen on the videotape.

As we look at the 11:00 o'clock -- yes, the

11:00 o'clock or 10:00 o'clock bite, it just has a different axis to it. And the basic alignment is set up, and the lower arch form is set. The different parts of the bite can be used for different measurements. We see good measurements in various areas. And we use different parts of it different ways.

I can demonstrate a good match between tooth number 6, tooth number 8, tooth number 9, and then tooth number 22, 23, 24, 25, 26, 27 and 28. And tooth number 24 being diminutive slightly, very slightly marking.

That, in essence, then in a static display, it shows what can be seen on the videotape.

Q. Was that scale to make the ratio between the CAT scan teeth and the wounds the same?

A. Yes. And that scale is marked on the overlays. The CAT scanning contributed lines two centimeters apart, or 20 millimeters between lines. And if those lines are laid up over the scale on this, it again lines up to be 20 millimeters or two centimeters.

Q. Thank you. Could you go to Exhibit 145?

A. Okay. Now this is Exhibit 145. And this also is set up with an imprint or an image of the CAT scanning film that is blown up to the same scale that we see on the color copy of the photograph of the breast.

And this just puts them into -- you can see that this overlay was made off that CAT scanning document, and that that simply lays down and produces that pattern on the -- for the lower teeth. Same thing with tooth number 9, 8 and 6. That can be flipped up so that the relationship can be seen then with tooth number 6, 8 and 9.

It just demonstrates in a verifiable way that the scales are the same, that this overlay was made from that photograph or CAT scan of the teeth. And that this one was made from that part of the CAT scan of the teeth.

Q. Does it also scale the same ratio?

A. Yes, the scale is the same. And again, that's verified on both and can be measured.

Q. One additional question with regard to this Exhibit 145. This line here that goes sort of outward -- outwards and up.

A. Yes.

Q. Could you explain that to the jury?

A. Yes. That is a scratch or cut. I refer to it as a scratch, but it doesn't go deeply into the tissue. But it can be seen much as if I just took the -- took a straight pin and just run it across my finger just enough to break the surface.

Q. And you saw that under the microscope?

A. Yes.

Q. And you noted that it had a pattern of a scratch not a bite?

A. Yes. And it is at a different level as the bite impressions.

In other words, the bite impressions were made first, and then that scratch is seen going across the top of the bite.

Q. Across the top of the bite as though made after the bite?

A. Yes.

Q. Did you have any further information from Exhibit 145?

A. I think just looking at this on this color copy it shows particularly well the pattern of the lower teeth. And it can be demonstrated that that lower arch fit in -- I can actually measure the embrasure spaces. I can follow the individual placement of the teeth around that arch. And then as it bites in there is a dragging in a direction towards the nipple. And that leaves what looks like a bruised area that just kind of moves towards the nipple.

Tremendous amount of information carried in these photographs.

Q. To make the -- you mentioned earlier on that one can bite one's finger like this. And I take it one can see sort of an imprint of the teeth?

A. Yes.

Q. And yet I don't see any bruising. You mentioned something along that line.

A. Yes.

Q. Well, first of all, you've indicated that you've done research with regard to the female breast tissue, et cetera, in relation to bite marks.

A. Yes.

Q. Now perhaps it's a different kind of tissue, and perhaps you could explain that. But the question is this: To leave the bite marks we see on the left breast of [redacted] on Exhibit 145, what kind of pressure is exerted to leave those kind of marks or bruising or however you wish to describe it?

A. Well, it's significant pressure. And I guess the best way to describe that is that as hard as I can bite, just enough that it's about as much as I can stand painwise to bite, I leave a nice indentation. But within five minutes there's just a little pinkness there. There is no bruising caused from that.

I've demonstrated in classes and I've had maybe 4,000 people bite the palm of their hand just as

hard as they can in the fleshy part. And in that we've seen two people that have been able to raise any kind of a bruise at all with as hard as they can bite. So for persons on a blood coagulant, blood thinner, or if they were taking a dozen aspirin a day for more than a month, they might be able to produce a bruise with that kind of pressure.

When we see this kind of a mark, we know that the average individual would not willingly accept it. In other words, that's painful. And unless someone is really involved in some kind of a pain ritual or painful sexual experience, they wouldn't -- they would try to pull away, I guess is what I'm saying, if they were conscious. That would be a painful bite.

Q. So did you say initially then that that -- those wounds, those marks were left by significant pressure of the jaws shutting on the left breast of [redacted]?

A. That's correct.

Q. Did you have any further information for the jury on Exhibit 145?

A. No.

Q. Could you go to 146, please? What is this -- could you orient the jury what this is?

First of all, you identified it as being

made from slides provided to you by Dr. Shaw, the medical examiner here, from tissue samples -- you understood tissue samples of the bites?

A. Yes.

Q. Of [redacted] left breast?

A. Yes. Dr. Shaw sent to me slides, microscopic slides and an orientation photograph. And the various bruise patterns on the tissue were demonstrated with letters of the alphabet, A through G -- or H. And he then took a scalpel and cut a section of that tissue through each one of those marks and went through a process of mounting those on microscope slides. And it's those microscope slides that he sent to me.

I then viewed each of those microscope slides, searched every detail of the slides -- of the tissue that was on the slides.

Q. What was the purpose of this exercise, Dr. Rawson?

A. It was looking for tissue changes caused by the bite in an effort to try to time the bite in relationship to death.

Q. The time the bite wound was inflicted in relation to the death of [redacted]

A. Yes.

Q. What did you find?

A. Well, I can demonstrate very quickly that on the lowest power, this is a 40 times magnification, the outer layer of skin shown here, with a little bit of disruption of the skin, this represents where the teeth would have contacted that area. It caused a weakening or a loss of the epidermis or the very outer layers of the skin.

The nerves that come into this tissue go into the very bottom part of this dark epidermis that was lost. When that much tissue is lost, that would be equivalent to a scrape, or you would feel that, in other words. And we can see the connective tissue that comes away from that is compressed in that area. So that's where the tooth actually imprinted on the tissue.

As we go down through this connective tissue layer, then we can see some glands. These are sweat glands and some fat tissue, adipose tissue. And there's a little area that's a little brighter, it's a little redder, associated between that fat tissue and the sweat gland. That represents red blood cells that have been pushed out into the tissue. It's bleeding, in other words.

Q. Before you go on, Dr. Rawson, you've got the letter D above these.

A. Yes.

Q. Perhaps I just didn't listen intently. But is this -- are these photographs enlargements of what you saw on the slides in relation to one of those bite marks, the tissue taken from one of the bite marks?

A. Yes, that's correct.

Q. Would you point to the jury which one?

A. That's number D. Now if we were to orient again the 12:00 o'clock bite, it's up here. Directly below that is the opposing arch. And then the 10:00 o'clock bite is in this plane. This would be tooth number 27 that contacted the tissue in this area.

But there's also another bite that comes across in this direction that doesn't leave a very distinct pattern. And this is kind of a double imprint in this area from tooth number 6.

Q. As in -- so actually you can discern these three bites, one faint and two plain?

A. Yes. I can see five different positions of the teeth in this. And I really localize it down to two main bites.

Q. Now why did you choose the tissue with the letter D by it?

A. Well, I've demonstrated that because that's the only one of these that showed any hemorrhage at all.

Q. At all?

A. At all.

Q. The rest showed no hemorrhage at all?

A. That's right.

And as -- the significance of that is that with this depth of pressure and this type of a wound pattern that's left following death, we know that there was significant biting pressure but no significant blood pressure at the time of the bite. The fact that there's some blood that's been pushed out into this tissue is indicative that there was some type of blood pressure, but that it was not very high.

Q. Could you complete then your discussion to the jury?

A. Okay. As I looked at this slide -- and this represents just a small part of the slide. It's the area that shows the hemorrhage -- I could follow the vessels. And I could see the vessel walls ruptured and red blood cells coming out of the arteries. But there wasn't very much blood out in the tissue. And again, that just indicates that there was not very much blood pressure at that point.

Q. Some blood pressure?

A. Some. But not very much.

And so, you know, it's the type of thing

where if there had been a heart attack and the heart had stopped, then you'd see the blood pressure going down to zero. And it was somewhere in that point. If a person was bleeding to where they were losing fluid volume, it would be somewhere in that process where they -- and that's as close as we can come to saying whether or not this person was alive or dead. We can say that -- I used the term perimortem, simply meaning around the time of death.

Q. There's a term postmortem.

A. Postmortem would be after death, and premortem or ante mortem would be before a person died. And I would use the term perimortem because there's good evidence that there was some blood pressure but not very much.

Q. Where the letter D is indicated for that particular bite?

A. Okay. Now D on the orientation photograph is here, and then each of these is a successive blow up of that same tissue. At 100 X we can see now that area of hemorrhage is basically taking half of the volume of that photograph.

And as we go to 400 X, then this is demonstrating a piece about two square inches, something like that, out of the heart of the 100 X. And in this

we can see vessels. There's a small artery that has a few blood vessels inside, but most of the blood vessels are outside of the artery. These red blood cells are scattered throughout the tissue, pushed down even into and around some of the fat cells. They simply went the path of least resistance through the tissue.

And the reason that we would look at that is we want to see, was there any inflammatory reaction. As I bit my hand, I've got a little redness there, which is an inflammatory reaction. The vessels dilate and try to get protective cells that come to that area to protect the body. And we refer to that term as margination. If white blood cells line the lining of that vessel, we know that the body is trying to speed these white cells there to protect the body.

We see no white cells in these views. There is no margination, in other words. And about as close as we can come, we can say this hasn't been five hours before the time of death. I use the term "five hours." You'll hear some that will say you can't tell more than four hours, or some maybe more than six.

So we shouldn't pin it down as to a specific time as much as simply saying that we know that this bite wasn't created a day before, probably not half a day before. And there's other evidence to suggest it

was probably produced around the time of death.

Q. Now if that was the only bite, number D, that had hemorrhage and the others did not have hemorrhage, what does that signify?

A. Well, again the depth of the biting pressure here, and the fact that we see no hemorrhage, it indicates to me it's more likely that the person was really dead or very close to dead.

Q. As in postmortem?

A. That's right.

Q. Is that your opinion?

A. Yes.

Q. Okay. Was there anything else you wished to share with the jury with regard to the bite mark on [redacted] left breast and -- well, wait a minute. One thing does occur to me.

Do you remember -- did you see any photos with regard to a bite mark of the throat?

A. Yes. I saw both tissue and photographs of the bite mark.

Q. Along that line you were -- you received the tissue from -- that was taken from Kim Ancona's left breast and her throat?

A. Yes.

Q. You examined it?

A. Yes.

Q. What did you find with regard to the bite marks of her throat? Recognizing there were stab wounds there as well.

A. I could still identify the pattern of this same teeth creating all of these bite marks. There was distortion in the tissue of the throat.

The tissue of the breast, there was a ring, a custom plastic ring that was formed around the tissue and then the tissue -- it was attached to the tissue and the tissue was removed. So there's no distortion with that method.

With the skin over the throat, it was simply removed without anything to restrain it or to maintain the position. But I could still identify the pattern.

Q. From the actual tissue?

A. Yes.

Q. And by recognizing the pattern, is it your opinion that it was Ray Krone's teeth?

A. Yes.

Q. All right. Now back to the question that preceded this: Was there anything else you wished to share with the jury?

A. No, I think that covers it.

MR. LEVY: That's all the direct questions I have, Your Honor.

THE COURT: All right. Thank you. We'll break for our lunch at this particular time.

Counsel.

(Discussion was held off the record between the Court and counsel.)

THE COURT: All right. We'll start again at approximately 1:45. Please remember the Court's admonition then and we'll see you at that time. Thank you.

(Lunch recess was taken.)

THE COURT: Let the record show the presence of all of our jurors, the defendant and counsel.

Mr. Jones, did you want to proceed in the fashion we had talked about?

MR. JONES: Yes, Your Honor.

If the Court pleases, there's a witness who appeared today, so that if we could just take him out of order.

THE COURT: We can do that.

We'll interrupt the State's presentation of his case for brief testimony from a defense witness who needs to be elsewhere, I guess.

MR. FREDRICKSON: All right.

THE COURT: Let's bring Dr. Rawson back to the stand.

MR. FREDRICKSON: Your Honor, may I ask you one question?

THE COURT: No, sir. We're --

MR. FREDRICKSON: Why haven't I seen a picture?

THE COURT: Maybe -- I have nothing to say to you, sir, at this time. If you'd like to talk to one of the police officers outside you can do that.

MR. FREDRICKSON: I don't want to talk to them. I got to go back to work.

THE COURT: Counsel, will you please approach the bench?

(Discussion was held off the record between the Court and counsel.)

THE COURT: Cross-examination.

MR. JONES: Thank you, Your Honor.

CROSS-EXAMINATION

BY MR. JONES:

Q. Dr. Rawson, I know you've got a plane to catch. I'm going to try to be relatively brief with you. And thank you for allowing the witness to come and

testify first. Let's see if we can move quickly and establish any common ground, and then I'll ask you some questions from there.

First of all, would you agree with me that forensic odontologists are people like anybody else and they can make mistakes?

A. Certainly.

Q. Okay. Would you further agree with me that tissue, human tissue by its very nature can be a very difficult medium to try and obtain these impressions with and attempt to make a match?

A. Yes. In fact, that statement comes from a textbook I think Ervin Sulfer (ph) wrote a number of years ago. There's been a lot of exception taken to that now. And the profession generally feels that the tissue, although you wouldn't use tissue to make an impression of a tooth to make a bridge or a crown, that it fairly accurately records trauma.

Q. Records trauma?

A. Trauma.

Q. So when you talk about tissue, the problems with tissue are what, that it stretches, that it is soft? Could you explain to the jury what the problems are with tissue?

A. Well, the statement was originally brought

up when Dr. Sulfer stated in a textbook that tissue is a very poor impression material. And that's the context he was using it in.

If I wanted to make a denture for someone, I wouldn't take an impression with skin. In that sense it is a poor impression material. But we have a number of studies and a lot of reports that have been given on a national level now that show the real meaning to what was behind that statement.

Q. Well, do you agree or disagree that tissue by its nature can be a very difficult medium to work with to analyze and to interpret?

A. Yes, it can be.

Q. All right. And your difficult task is made even more difficult if you don't have a full set of teeth -- which obviously makes it a very simple thing -- if you don't have a full set of teeth marks showing all the teeth?

A. Yes.

Q. By way of comparison, if you had a piece of styrofoam like the one that's in evidence here, if you have a full set that's an easy job for you, isn't it, with your expertise?

A. Well, understand that this process of comparison is the same regardless of the number of

impressions. And that in many ways the more teeth you add, the more area there is to observe and to fit into the pattern. It actually complicates the amount of time that you have to deal with it.

Q. In other words, if you have a lot of teeth to look at, then you have a lot of different variables and factors to consider?

A. No. You have to give the same careful attention to every tooth mark. And so the more marks you have, the longer it takes to do a complete examination.

Q. You've indicated, based on the evidence that you were given by the prosecutor and Detective Gregory of the Phoenix Police Department, that your opinion that there's a match and that Ray's dentition -- am I saying it right, dentition? -- is one and the same as the bite mark that you examined?

A. That's correct.

Q. Okay. With regard to the injury on the neck, let's see if we can get some further agreement. That one, if you only had that particular bite mark, the one that appeared on the neck, and nothing else, you'd have a very, very difficult time making a match, wouldn't you?

A. No. Actually the relationship was still

clearly visible on the bite mark on the neck. There were distortions. There were conditions that had to be dealt with.

It was easier to work with the bite mark on the breast, I guess, if that's your question. Yes, it was easier.

Q. My question was: If that was the only one you had, you wouldn't have been able to make a match, would you?

A. No, I think it was sufficient to make the match from the neck wounds.

Q. Wasn't that the tissue that was put in the mason jar that we saw in Las Vegas when we went for the interview?

A. That's correct. It was actually a plastic maybe half gallon size jar.

Q. And it was dropped into the formula?

A. Yes.

Q. That's, what, 37 percent solution of formaldehyde?

A. That's a fixing solution that anything over ten percent fixes the tissue.

Q. Well, aren't there specific problems with that type of procedure in terms of distortion?

A. In the early days of bite marks that's the

way they saved all the tissue. All the early analysis was done that way. And I think following the Patterson case where the entire breast tissue was saved that way, there was a recognition that it would be nice to stop some of the distortion because it would be easier to work out the case. We've done that. And it simplifies and places the whole procedure in a more scientific basis. But that doesn't mean we still can't analyze bite marks the way we used to.

Q. Well, aren't effects of the formula twofold, shrinkage and hardening?

A. Yes. You simplify them, but in effect we get a fixing or a preserving of the tissue. And in that process, not particularly because of the formula, but because the tissue is removed from all the underpinnings, the underlying support, the tissue will tend to shrink. And it shrinks as much as 30 percent.

Q. And that in addition to the fact that it was also tissue that had been cut presumably with a knife?

A. Yes.

Q. That would create additional problems also?

A. Yes. Each one of those creates distortions that you have to deal with.

Q. Let me make sure I understand. Is it your

testimony then that if you only have that mark you would still be able to make an identification?

A. Yes.

Q. Okay. Let's move on to another area then. As far as the videotape that you show of -- I wonder if we could go through a portion of that and I could ask you some questions about that. Could we set that up again?

I think we're basically ready to go. Do you have the remote there, Doctor?

A. Would you like me to approach the --

Q. You can if you like. I think they've turned the bottom toward you. Maybe it would be easier for you to see.

A. I would see it better if I was over here where I was.

Q. All right. We'll do that for you.

Now if you would, if we could fast forward to a point where I can ask you some questions.

All right. Would you stop it there, please?

Look, Doctor, if you would, at the 12:00 o'clock bite. Do you know which one I mean by that?

A. Yes.

Q. I think you made reference to it. You just

pointed with your pointer.

A. Yes.

Q. You previously testified that -- I believe we've got the orientation of that bite with what you presumed to be the number 8 and number 9 teeth?

A. Number 8 there and number 9 there.

Q. And did you measure how much space there was between those two teeth marks that were found on the victim?

A. The measurements were made by direct overlay comparison. In other words, I was able to use a model of the teeth to actually do measurements.

Q. And can you give us that measurement, Doctor?

A. No, I don't have those recorded. It seems to me that it was 8 something millimeters wide. But I don't have it recorded.

Q. You've got your ruler there. Would it be possible to give us an estimate based on the ruler?

A. I wouldn't do that off of the T.V. screen. If you want to go to some hard copies. Because this is jumping and we couldn't do an accurate measurement off of this, no.

Q. What was the number that you recalled before?

A. Well, it was 8 something millimeters is just what comes to mind. But I've recorded a lot of numbers. I've done a lot of angles. I've done measurements as far as the arch form in the process of this. It's just that I don't have any of those things --

Q. Excuse me, Doctor. Let me get one of your other exhibits. Just keep that on for me.

Let me show you Exhibit 144. It also has your ruler on it, does it not?

A. That's correct.

Q. If we pull back the acetates, would you be able then to tell us?

A. You wanted me to measure which tooth?

Q. The space there between 8 and 9, how much distance would that be?

And I see you've also got your own ruler out now.

A. Yes.

Now from the end of the mark that I can see on tooth number 8, it's about a millimeter and a half.

Q. Millimeter and a half?

A. And the reason I say about a millimeter and a half, I'm using a flat ruler and having to convert from to three to one back to one to one. It's about a

millimeter and a half.

Q. Thank you, Doctor. Let me take that out of your way.

And could you go back to the fast forward mode?

A. Okay.

Q. Would you hold it there, Doctor?

A. Okay.

Q. Are tooth 8 and 9 depicted in this photo?

A. Yes, they are.

Q. How much space -- you need to stop it, please.

A. I'm sorry.

Q. Is that a close up of 8 and 9 there?

A. Yes, it is.

Q. How much space does there appear to be between tooth 8 and 9?

A. Between the biting edges of these teeth there is a space. Now I can't measure that because again it's on a jumping screen. But if we either have the models or if you have a photograph such as this I can measure that one to one.

But as you see, the way I'm holding the ruler, there is an upturn on the mesial or the middle edge of the biting surface of tooth number 8 that leaves

a space in there that's simply not marking on the tissue.

Q. And you don't know from your notes or your memory in terms of how much space there was there?

A. That looks like about a millimeter and a half.

Q. It looks like a millimeter and a half there?

A. Look at the biting surface of this tooth. Draw a line straight across. And that leaves a wedge shape in there that would not touch the tissue.

Q. You're talking about that part?

A. That's correct.

Q. But as far as the tooth coming straight down, they appear to touch, don't they?

A. They do touch, or they appear to touch.

Q. And the little area you're talking about, is that your opinion as to why when we look on the other exhibit where there is some space between the two marks you've identified as being tooth 8 and 9?

A. I believe that becomes obvious to anyone looking at this that this part of the tooth didn't touch the tissue. It's this part of the tooth that touches the tissue, and that there is a space between the teeth and that part.

Q. And that -- it's your opinion that this particular space that's depicted where these teeth touch created the distance apart between 8 and 9; is that right?

A. It's a well-known principle in forensic dentistry that every part of a tooth will not leave an impression in the skin. An area has to be able to touch the skin, it has to be able to put the same kind of pressure. We have --

Q. I think you answered my question. He can ask you those other questions on redirect.

A. Okay.

Q. Let's go forward to the next tape. And could you hold it there for just a moment?

A. Yes.

Q. Go back to the last one.

A. There?

Q. There. Thank you.

Is this particular photo -- is this particular photo an example of what we call photographic distortion, where it appears 8 and 9 are the same length and we know they're not?

A. It's really a factor of photographing a three-dimensional object in two dimensions. So you could not use this photograph to indicate the length of

the teeth.

Q. So the photographs, depending on the angle that they have -- the angle that the camera has, can create some distortion, this might be an example?

A. Yes, that's an example.

Q. And fast forward, please.

All right. Hold it there, please.

Now what we're looking at right now would be the styrofoam of Ray Krone's teeth?

A. That's correct.

Q. At least that was the information given to you. And we don't have any reason to doubt that.

On this particular styrofoam, the tooth that produced the most prominent wound on the victim is barely discernible there; is that right? It doesn't stand out? Maybe it does to you as a scientist, but as an ordinary person looks at it you can barely see it.

A. Are you talking about tooth number 9, do you mean?

Q. Yes.

A. That's noticeable to me. It's not the most noticeable, but it's observable.

Q. Fast forward, please.

A. Okay.

Q. All right. Could you hold it there,

please?

A. I'm sorry, I have to -- it won't always stop it where I want it to stop.

Q. I know. That's close enough. We can go from there.

A. Okay.

Q. Now this is your attempt to line up with the Xerox of the teeth that you created and to attempt to make them line up to the marks; is that right?

A. No. This was an attempt to demonstrate technique overlaying -- I didn't intend to use this as final -- the final proof or final demonstration, but to demonstrate how the overlays can be -- can be moved and brought in to demonstrate some of the dynamics of the bite.

Q. Is it fair to say, Doctor, that the way you have it aligned right at this point where we see it -- it looks like just below the number 9 tooth?

A. Yes.

Q. The number 9 tooth appears to be going upward and to the right of the screen. And the number 9 tooth is instead round and would not normally make that impression.

A. And again, I say this is a moment in time of moving that around on the photograph, and it happens

to show the overlay of the teeth at about, I don't know, 15 degrees, some angulation different.

Q. Fast forward, please.

A. Okay.

Q. Now, could you hold that, please?

A. Yes.

Q. Now I believe you indicated on direct in response to the prosecutor's questions that what we have now is an overlay, a video overlay, if you will, and the larger object appearing in the screen is the number 9 tooth?

A. Yes. The large object here is the overlay on acetate of the photocopy machine image of the teeth. And it is tooth number 9.

Q. And that's at some kind of magnification; right?

A. Yes. I can't recall what it is. I think it's nine times. It is in the same scale.

Q. And the injury that was noted in the 12:00 o'clock position is the darker injury underneath; is that right?

A. Yes.

I have this set slightly above. And you can see the line in the injury somewhere like that. And you lose it in the darkness coming down on the lingual

or the tongue side.

Q. Doesn't this appear to show the left edge of the injury where the darker portion is? That's the significant injury, is it not?

A. Let's go back --

Q. Go back to the other one where it's clear. All right.

Isn't that the injury right there depicted?

A. That is the injury.

Q. And then this is the overlay?

A. That's correct.

Q. So will you at least agree with me that that particular tooth appears to be twice as large as the injury?

A. No, it doesn't look twice as large to me. The image on the acetate does appear to be larger. I can follow a line through that area, then there's a darker line here. We have a tongue side that cuts around this side. The difference there might be 20 percent or something like that.

Q. Well, you made reference to this area over here. Are you saying that this may be part of that one tooth injury?

A. We have a double impression in this --

Q. Well, if you could just answer yes or no.

A. Your question again?

Q. My question is: This area to the left of this brown spot, are you saying that this could be part of the injury or is an injury?

A. Okay. To answer your question then as directly as I can, this part is a double impression. It's also tooth number 11. Which is basically creating a bruise in that size. And tooth number 8 is lost as we get into the double bruise. The 10:00 o'clock bite, tooth number 6, has caused some of this bruising here.

Q. So if I can find out -- if I understand what you're saying, you're saying then it's your opinion that there was another bite, a third or fourth bite, that a different tooth came down there?

A. The second bite that we've described, the 10:00 o'clock.

Q. The 10:00 o'clock bite?

A. The eye tooth also presses in this area.

Q. Doesn't this particular wound have something of a crescent moon shape in the magnification?

A. I don't know how you want to describe that. I see a line that follows -- makes a nice general buccal surface. The lingual surface is lost, however. There is some of the concavity on the tongue side. But that is obscured by another bruise here that's caused by

tooth number 6. So the detail of this is lost in the double bite.

Q. Well, would you at least agree with me that the dark portion appears to form something of a crescent going upwards?

A. Yes, I can see a dark portion there that has a dip in it or however -- a crescent.

Q. And I assume from what we've talked about before, what these dark portions are showing is significant injuries; right? When we say a dark portion on this screen --

A. Yes.

Q. -- we're to assume that's a significant injury?

A. Yes.

Q. Fast forward, please.

And hold there, please. That's fine.

Now as you testified this morning, what we have now is a CT scan, and you're taking layers. The longest portions of the teeth are showing up first on these layers; is that right?

A. Yes, that's correct.

Q. And what we see is that number -- what number tooth that at 12:00 o'clock?

A. That's tooth number 9.

Q. Number 9 showing up first along with --

A. Tooth number 6 and tooth number 5.

Q. And because of the length of the teeth then, isn't it likely that those three teeth showing up first would produce the most significant injuries?

A. It's likely that if we're -- if you see a bite where all of these teeth were in touch with the tissue you would see the more significant injuries with those teeth.

Q. But didn't -- did you in this case?

A. Of course we did. The most significant injury is the tooth that is hitting the hardest.

Q. That's number 9; right?

A. That's 9. Tooth number 6 leaves a noticeable and significant injury. And there is some bruising from tooth number 5.

You know, we have 32 teeth in our mouth, and only some teeth will come in contact with the tissue.

Q. Isn't it fair, Doctor, that the injuries you determined were there were nowhere near as significant as the one you observed with number 9?

A. No, I wouldn't say that at all. I think we have a very specific injury with number 9. But there is still a very noticeable injury with tooth number 6. And

if you look at the relative proportion of these on the CAT scan, tooth number 6 is barely contacting the tissue at this point. And I would expect to find a relationship very similar to that.

Q. All right. Thank you, Doctor. That's all I have. You can have a seat.

Your Honor, should I move these?

THE COURT: Yes, please, if you would.

Q. BY MR. JONES: Now, Doctor, you would agree with me that the injury produced by tooth number 6 is nowhere near as severe as number 9, would you not?

A. No, I wouldn't agree with you. I think it's -- it demonstrates a significant biting pressure. If you're saying is it as well outlined, no.

Q. Maybe that's what -- I didn't say it very well.

A. Okay.

Q. It's not as well outlined.

Now, in your analysis in this particular kind of case, don't you have to also add and account for distortion that might have been caused by the sucking of the breast as well as the biting?

A. You know, whenever we do an examination of this type we are concerned about distortion or any possible distortion anywhere along the way. I don't see

any significant evidence of sucking on this. That doesn't disprove the fact that there may have been some. But I don't see any evidence of sucking.

Q. What type of evidence would you be looking for?

A. Petechial hemorrhages. And again, if that sucking took place postmortem, you may or may not see that. But we see definite bruises in the center of a bite when there's been a significant sucking action. A hickey, in other words. And I just don't see anything like that.

Q. And wouldn't -- in other words, to be able to see those bruises, wouldn't sucking have to go on for a period of time?

A. No, not particularly. We can experimentally produce that type of suction in a second. It doesn't --

Q. Is it strong enough?

A. With strong sucking action you can very quickly produce a hickey.

Q. My question, Doctor, is: That particular physical act can cause distortion on the breast, can do it. Do you agree or not?

A. There are many things that can and that's one of them.

Q. It can.

Another area that could cause distortion would be the type of tissue we're dealing with, erectile tissue, if you will?

A. Yes. However, none of the bites are on the nipples themselves. And remember, in all of this distortion, if tissue can be drawn out of place, it can return to its normal form. And the tendency for the tissue is always to relax to its normal state. And in fact, there's very little distortion, if any, that's really shown in this bite.

Q. The tissue returns to its normal state, you said?

A. Yeah.

Q. It would return to its normal state after the injury, wouldn't it?

A. Yes.

What I'm saying, if I bring my tissue together like this, there's a significant distortion to that tissue. As soon as I remove my fingers it has a tendency to pull back to its normal form.

Q. By using your example, Doctor, where you bring that up and you create an injury, when you release it and let it go, the bite mark itself spreads out, doesn't it?

A. Yes.

Q. And you have to account for that as part of your analysis?

A. Yes.

And we've analyzed that in some detail, produced many, many experimental bites to study that. And the tissue, in whatever state it is, as the teeth come in contact and then gather the tissue together, the tissue will then go back to the same form it was in as the teeth came in contact. In other words, it may have gone through a significant distortion, but it returns to the normal form that it was in.

Q. To its normal form?

A. Yes.

Q. But just so we're clear, when it's impacted, when the mark is made, it's not in its normal form, is it?

A. Yes. I guess the point I'm trying to make to you is, it's not a factor in this bite.

Q. In this bite you don't believe it to be?

A. That's correct.

Q. And that's your opinion?

A. Yes.

Q. And one additional part about tissue I don't think we've discussed yet, Doctor, is that tissue

also tears and stretches in bite cases, doesn't it?

A. Yes. There is a classification that allows for the extent of the injury. This is an injury that demonstrates no tear or incision or avulsion. It's not a bite of that extent.

Q. And again, in your opinion you didn't see any evidence of tearing or stretching, but you know that does occur in bite mark cases?

A. That's correct.

Q. Now when you go about making one of these evaluations, analysis, and coming to an opinion, I believe you indicated in response to the prosecutor's questions that you spend many hours looking at the tissue, looking at the other exhibits that the State has provided to you?

A. That's correct.

Q. Did you use a scoring system in any sense?

A. I developed a scoring system. And I always, as I evaluate a bite mark, think in terms of the scoring system. But it's not a system that is used systematically now by forensic dentists, and so I don't go through the normal exercise of scoring.

Q. In fact, I asked you in our pretrial interview whether or not you used a scoring system. You told me no, didn't you?

A. That's correct.

Q. And you yourself have developed one that you presented for the other members of your expert community to consider and adopt, did you not?

A. Yes.

Q. And when was that, about '82, '83?

A. I'm not sure. It was early eighties.

Q. But you didn't use that same system in this case to actually score?

A. As I said, I didn't do a formal scoring. But I evaluate every bite mark in terms of the knowledge that went into developing that scoring system.

Q. I understand, Doctor. And you also indicated that -- and I believe you've lectured and written papers on this -- that a computer analysis of the wounds and the dentition are important and should be undertaken; isn't that true?

A. Well, again, this is a field that evolves, like any field. And at the time when we were doing the very first computer analysis of bite marks, that seemed like an important thing to do, because it brought forth far more information than anyone had ever seen before.

The extent of our understanding of bite marks and the way we analyze them has evolved past that point to where I'm using many of the same techniques as

a computer analysis when I evaluate a bite mark today. I still look in terms of the XY coordinates of various marks on the skin. I still think in terms of angulation. It's all of the things that I would put into a computer to analyze. But the system, the technique has evolved.

It finally comes down to this, do we want a machine to make a determination that may hold someone's life in the balance, or do we want to hold that final decision for the wisdom that we have? And it's like, I suppose, landing a computerized airplane. The computer may be very capable. I would rather have the pilot do it.

Q. To clarify, you didn't do a computer analysis in this case, did you?

A. No, sir.

Q. And you admit that you're on record as recommending that in the past?

A. In an early paper in the evolution of the process I advocated computer analysis, yes.

Q. Then just because a computer analysis is done that the computer is doing the work, isn't an expert still looking at the material and evaluating?

A. The early computer programs were directed at a point of giving us a number that would essentially

say it's a match or it's not a match. And that's a decision that I don't know anybody in our field that advocates that today.

Q. So you're talking about the type of program then, we don't want a computer spitting out this is a match and that's the end of the inquiry?

A. I guess it's a dumb machine and it's the way we use it that's important.

Q. Right.

Now you've been involved in studies in the past, haven't you, where blind studies were done and forensic odontologists were unable to determine the identity of a specific individual based on a review of a bite mark and their dentures or casts?

A. Yes.

Q. And when that particular evidence or data was submitted to forensic odontologists around the country, 67 percent were able to come up with a correct match?

A. You know, I don't remember the exact percent. But that's in the neighborhood.

We developed a series of bite marks of known origination. In other words, not through a trial, but through a witnessed biting. We took photographs from those bite marks. And we had some that were

excellent bite marks and some that were very poor bite marks. We had a full continuum of bite marks. And we sent those cases to 100 forensic dentists. And about half of them returned the cases with their evaluation of the bite marks.

Q. So my question then, Doctor, there is room for error in this field, is there not?

A. Well, you know, I think any study has to be looked at, and you have to hold that anything that's done by humans has that potential for error.

This particular study sent a complicated set of four bite marks in all the models to forensic dentists with no payment for their consultation time.

Q. So it was up to them to decide how much time went into it?

A. Sure. And in talking with them, none of them spent --

Q. Excuse me, Doctor, I don't want any hearsay coming in. You did the study?

A. Well, it's my study, and I'm reporting to you what the people that participated in the study said.

Q. It's up to the Court. I'm not requesting hearsay from you.

MR. LEVY: Your Honor, I see --

THE COURT: Is there an objection to what

the witness is basing his testimony on on the hear -- on the study, is that what you're saying?

MR. JONES: I'm just not trying to offer hearsay.

MR. LEVY: No, Your Honor. I'm just interested to hear his answer to the question that he's been asked.

THE COURT: I'll allow you to develop that further on your redirect if you want to.

Q. BY MR. JONES: There wasn't any mention -- I don't think the prosecutor mentioned anything about comparisons to bite marks to fingerprint analysis. And I know you've been on record before as saying that it matches up well and that it should be on the same par as fingerprint analysis; is that true?

A. I don't know that I said that here. I think it's very --

Q. You didn't say it here. I'm talking about you're on record previously.

A. I think both in published literature and in oral presentations I've indicated that it has all the voracity, all of the strength that a fingerprint would have, yes.

Q. And to be fair, Doctor, would it be better to say that it can be -- it can be as strong, depending

on the quality of the mark, how much information you have?

A. You know, I guess I would say that the fingerprints can be as accurate as bite mark identification.

Q. As opposed to the other way around?

A. Yes.

Q. But there are some significant differences between the two. They do have a scoring system in fingerprint analysis, don't they, Doctor?

A. Yes.

Q. A standard scoring system?

A. Yes. Yes, they do. I don't know that it's referred to as a scoring system. But they do have a means of evaluating, yes.

Q. Developed in the 1800s, first used by Scott Lenyard (ph). I think you know all this; is that true?

A. I think the first case is 19 something in this country.

Q. In this country?

A. Yes.

Q. And we also have a central repository for fingerprints so you can actually go and look at the print itself and match it to what you found at a crime scene?

A. That's correct.

Q. And we don't have such a thing with regard to bite marks; is that right?

A. That's correct.

I might indicate in relationship to that that today when we have some type of a disaster and need to identify someone, we have far more access to dentition records than we do fingerprint records. There are more X-rays available on people in this country then there are fingerprints available. And a typical example of like in the Sioux City crash some 90 percent of the people were identified through their X-rays, not through --

Q. Not through fingerprints?

A. Not through fingerprints.

Q. And that's a different area, though, isn't it? I mean, you've got the teeth -- you've got the teeth of the person and you're trying to go back and take the teeth and match them up to the X-rays; isn't that right?

A. Yes.

And if you really want to carry that a little further, that's very much like we're doing here. I'm matching the teeth to marks left by the teeth. Now I can take those teeth and match them to X-rays of the

teeth. It's usually not used in this context, but the technologies are not very dissimilar.

Q. You don't think it's different to take -- you don't think we're talking about a whole different area, Doctor, to take an impression off of a tissue, human tissue with distortion, and try to match that up with someone's styrofoam teeth? You don't think that's different than having the teeth and looking at X-rays and making a one-to-one comparison?

A. If you're asking me are they different techniques that are used in it? Sure they are. Is there any difference?

Q. It's easier, isn't it?

A. Oh, I don't know. I think we have some very difficult times doing identification. The ease or the difficulty of a process doesn't talk about its rightness in a particular situation.

I guess I'm telling you that both are based on the same thing. Teeth are unique. And any work that's done to teeth is unique because it's custom-made. And that is enough to base the identification of a person on. It's also enough to base the identification of a person based on the marks they've left with those teeth.

Q. Now you have analyzed, I think from your

testimony, thousands of bite marks. Is that what you said?

A. No, I don't think that's the way it was said. I have seen thousands -- not thousands. I have one particular study where we've classified over 1,000 bite marks. I've analyzed in some detail those bite marks. I've prepared for court something less than 100. I've given reports on about that many to some proper jurisdiction.

Q. And you've also been involved in some civil cases where this identification issue is involved?

A. Yes.

Q. In the last six months since you became involved with this case I assume you're working on other cases as well?

A. Yes.

Q. Do you know how many?

A. No. Not many. I've given an opinion I think during this same period of time for a case in northern California. There's been some review of a case in Detroit. There have been a few other cases, but not many. Not a dozen.

Q. How many hours do you think you've spent on this case?

A. I would guess 50 hours, formally work on

it. I've spent as many hours informally thinking about it, running things over in my mind.

Q. What's your fee for coming here?

A. I charge, I suppose, similar to what you do. I charge $125 an hour for the formal working time on a case. And $1,000 a day for any day that I have to be out of my office and out of production.

Q. In addition to the other work on other cases, judging by your curriculum vitae, you have lots of other duties that you have to do and were doing in the last six months; is that true?

A. Yes, that's correct.

Q. You've had speaking engagements, seminars?

A. Yes.

Q. You're writing a book?

A. Yes.

Legislative hearings. I've taught classes.

Q. Was the legislature in session up in Nevada?

A. No, it wasn't in session, but I do carry responsibilities beyond session.

Q. And there are hearings that are ongoing even when it's not in session?

A. Yes.

Q. And I believe you're also director of the

Clark County Community College dental hygiene program?

A. Yes.

And during that period of time I was department chair while the department chair was on sabbatical.

Q. So there are duties there that go with that. That takes up quite a bit of your time?

A. Yes. So I've been busy.

Q. Apparently you're on the editorial board of a journal of forensic medicine magazine. Does that require time?

A. No. I'm no longer on that editorial board. And I have been clearing out many of the responsibilities I've carried in the past to try and simplify --

Q. You indicated previously you had 40 to 50 hours of continuing education in the last year?

A. I don't -- I just -- I have to sort that out how many. I've attended some courses, yes.

Q. You list on your CV that you also have a limited private practice in dentistry. Are you seeing patients as well?

A. Yes.

Q. You also indicated you're a full professor of Clark County Community College. Do you teach courses

as well?

A. Yes.

Q. And then I think for your church you're state president. You've got administrative duties there as well?

A. Yes.

Q. Doctor, how do you find the time to give 50 hours to this particular case with all that you're doing?

A. If a case is important enough for me to look at and give an opinion, then that's important enough to spend whatever time is necessary to see that that's an accurate opinion. Now I format my life with days that I devote to forensics and days that I devote to church and days that I devote to the legislature, and there are days that are in practice. And there are hours of those days that are associated with administration and so on.

I suppose it's a matter of organizing similar to the way you would, unless this is the only case that you handle in your life.

Q. It's not.

In addition you're running for reelection?

A. Yes.

Q. I assume there's time required to make

personal appearances and that sort of thing?

A. Yes. However, it's not a hotly contested race. I'm not particularly targeted.

Q. Do you have opposition?

A. I have opposition.

Q. In your party?

A. Yes.

Q. But you say it's not contested?

A. I think I have opposition in two or three parties. I have somebody that's running every possibility that they could.

Q. Now in your analysis and your evaluation and the time that you spent looking at this, would you also agree with me that it would have been important to know if there were any other instruments that may have left marks on the left breast?

A. We like to know as much as we can about every case that we look at. There is an instrument that's left a mark on the breast that I can account for.

Q. The 10:00 o'clock scratch?

A. That's right.

Q. We'll talk about that in just a moment.

Would you agree with me that knives or pieces of wood do leave marks too, and sometimes it's important to eliminate them and get them out of the way

as part of your analysis?

A. Yes. We often see extraneous marks. Bite marks will be created through clothing sometimes, through multiple layers of clothing. So in the pattern analysis of bite marks we try to account for every aspect of it we can.

Q. Isn't it true, Doctor, that you never obtained -- it was never provided to you the knife involved in this particular case so you could make a -- an examination of the injury and compare it to the knife, the edge of the knife?

A. Well, that's true. I never asked for the knife. I didn't see any cut wounds that would have made me do that. If we had analyzed to the full extent this bite mark or two bite marks actually on the neck, I may have wanted to see more of the instrumentation. It was obvious to me that the scratch mark on the -- this 10:00 o'clock bite was not a tooth mark, but it was some kind of a sharp, pointed instrument.

I see marks that are similar as if people are drug across the ground, it can come from small grains of sand. It can come from a needle, it can come from a knife tip. That gets beyond the point of the dentition. And so I have all the information I need there to be able to demonstrate the match with the

dentition. And if they want to have a tool mark examiner look at some of the other things, that's fine.

Q. A tool mark examiner?

A. Sure.

Q. In fact, that's what you are, isn't it? I mean, the teeth are tools, they're teeth and biting tools?

A. Sure it is, in a way. And in effect, once you draw that analogy it -- some of the very early cases were simply handled by tool mark examiners. And bite mark examiners have done tool mark examinations of the skin.

I guess what I'm telling you is, there was a scratch of some unknown cause that overlays one of the bruising patterns of the bite mark. And that's as far as my examination went.

Q. Would you agree that it's possible that if this murderer had wanted to torture [redacted] he could have taken a knife and pressed it down and produced a mark on her left breast?

A. Yeah. But that's not what this mark looked like. This is a scratch mark that really looks very much like a sharp, fine-pointed object, not like a large knife blade, but I mean something like a pin. It could be anything from jewelry to some part of the clothing to

an instrument. And it could have been torture. And that's beyond the area -- you know, I choose not to speculate, because I have no idea what caused the scratch.

Q. My question, Doctor, is that a knife used in that fashion that I described could actually create a mark on the breast. I think I understand it's your opinion that there is no such mark on the breast; is that right?

A. The -- a knife could cause a -- could cause a mark anywhere on the body. And I won't rule out that any instrument has created that mark until I have an opportunity to examine it.

Q. And you didn't have that opportunity here, did you?

A. I didn't have or take that opportunity.

Q. And also in evidence, Doctor, is a piece of wood, a shim that is splintered. Have you had a chance to see that?

A. No, I haven't.

Q. And would you agree with me again that that could also create an injury, and that you'd like the opportunity to examine that?

A. I would think that it could create an injury anywhere on the body. I see nothing in that bite

mark that should suggest any microfragments of wood that's left in that tissue.

Q. You didn't see any microfragments of wood?

A. I've examined that scratch mark in some detail, and I see no extraneous material associated with it, no small slivers, nothing like that. My impression is that it was a small, sharp object, could have been glass, could have been metal. Could be any number of things. But it's superfluous to the bite mark. It's after the bite mark. That's as far as I've pursued that avenue.

Q. And similarly I assume you would also say that as we look at the injury that's depicted on Exhibit 144 at the 12:00 o'clock position, I know you've already testified that's a number 9 tooth of Ray Krone's.

A. Yes.

Q. And I assume that you also would testify that that couldn't have been made by a knife or a splintered stick?

A. That's correct. That tooth was made -- that mark was made by a tooth.

Q. But you haven't even examined either the knife or the stick, have you?

A. No. I have demonstrated to myself that that mark was made by a tooth, part of a complex series

of teeth in an arch form. And that's where it rests.

Q. And that injury which was the starting point of your analysis, that number 9 tooth at 12:00 o'clock, in your opinion that's definitely a bite mark and not made by a knife?

A. That's definitely a bite mark. And the scratch mark that's seen across the other bite mark was distinguishable from the bite mark.

Q. The scratch mark is distinguishable from the bite marks?

A. That's correct.

Q. The State indicated in talking about some of the many things that you've done on the cases you have participated in that you testified in an Arizona case, another Arizona case, State v Abney.

A. Yes.

Q. Are you the same person who testified in 1988 where the jury found George Abney not guilty and found that you -- you had misidentified a bite mark that was really done by a knife?

A. No, that's not correct at all. You're way off on your information.

Q. Did it involve a left breast?

A. Sir, to answer you, that was a bite mark that was listed as an avulsive bite mark. And there was

opposing testimony that experimentally produced a bite mark similar to that by using a knife.

Q. Let me ask you some questions.

MR. LEVY: Excuse me, Your Honor. I would ask that he be allowed to finish his answer.

MR. JONES: The prosecutor can fill that in.

THE COURT: The objection is sustained. Mr. Jones, he was answering your question. Because of the broad nature of your question I'm going to allow him to answer all of his details.

Go ahead, sir.

THE WITNESS: Okay. You have opened up another case where there simply was an opposing expert witness who created an experimental bite with a knife, and used that as a comparison that this couldn't be a bite mark because I've done the same thing with a knife.

The jury never addressed the issue of the voracity or the truth of the scientific evidence that was presented. That was a complex trial that had information from many different sources, including a taped confession. That trial went to a conclusion which the jury decided -- for whatever reason they decided that this man was not guilty of the murder.

That is an issue entirely separate from the

issue of the bite mark evidence that was presented. You would be absolutely wrong to think that any case that I've ever testified in that the verdict is my responsibility.

Q. BY MR. JONES: Well, of course not there. No one's -- your counsel brought it up that you testified in a homicide case involving a left breast in Flagstaff.

A. To answer your --

Q. In State v Abney; right?

A. To answer your question, he was asking the jurisdictions that I've testified in. And he asked, have you testified in Arizona? Yes, I have. Was I qualified as an expert? Yes I was. Is there anything that disqualifies me as an expert? No, there isn't.

Q. Do you recall him asking those questions and asking if you didn't testify in that homicide case?

A. Yes, I do.

Q. And you didn't volunteer, did you, Doctor, that that case had led to an acquittal and there was an expert diametrically opposed to you saying that it wasn't a bite mark, it was, in fact, a knife mark?

A. I didn't give those kinds of statements about any case that I was asked for. And if you want to go through every case on a one-by-one basis, we can do

that.

However, my evidence and my testimony is a piece of a trial proceeding. And it would be absolutely wrong for me to go to an academy meeting and say I've won 97, 98, 99 percent of my cases. Because they're not my cases. I've given a piece of scientific evidence and then those cases are determined on their merit.

It happens to be that the cases that I've testified in have been 99 percent in favor of a -- of the side I was testifying on. That isn't -- that isn't something that would be appropriate for me to talk about, because there is a whole series of people that have contributed to a trial and what makes the verdict of that trial.

Q. And in that case you identified George Abney as being the one who actually put those bite marks on there?

A. The scientific evidence that I presented in that case still will stand on its own. And if you would like to get into trying that case here, I would be happy to present that evidence, because it's very good evidence.

Q. And I take it you would -- you vehemently disagree with Homer Cambell, who was a forensic odontologist who testified in fact that it was a knife

mark and not a bite mark?

A. In terms of ethical behavior, I think I can simply say that Homer Cambell had a different opinion.

MR. JONES: I have no further questions, Your Honor.

THE COURT: Thank you.

Redirect?

REDIRECT EXAMINATION

BY MR. LEVY:

Q. With regard to the questions asked on the cross-examination, Dr. Rawson, on a scoring system, after your interview with defense counsel did you just not informally come up with some number with regard to this particular bite mark?

A. I have informally. I think it's not appropriate to use those numbers because the scoring system is not intended to be used in the courtroom. If you press for or if you want to know that, it scored high in the scoring. And it's an excellent match.

Q. That didn't change your opinion one way or another?

A. No.

Q. You were just sort of wondering about it, were you not?

A. That's simply a paper exercise. And when he asked if I had scored it, I had a picture in my mind of where it was, and it scored out comparably.

Q. Are you aware then in latent print examinations a latent print examiner can go as low as 6, average around 10 or 12 pieces of identification to make a fingerprint examination as positive? Are you aware of that?

A. Yes.

Q. How many points did you come up with in this case?

A. May I explain a little bit some of the differences?

Q. I'm aware there's differences. But the number first, please.

A. Well, I have a dozen points of identification or more. We have numerous bites. I have -- I simply don't use the same kind of terminology. Because we really are dealing with a different situation.

Q. I'm aware of that. But since it was asked in cross-examination I thought I would inquire. Didn't you come up with a number?

A. Yes, I have -- I've got definite numbers that I can point to of 10 or 12 or 14 points of

identification. I clearly have enough points of identification to satisfy me that this is an excellent match.

Q. You did that as you went through this in analyzing it, did you not?

A. Yes.

Q. And that's incorporated into your opinion?

A. That's correct.

Q. Now with regard to the study with the odontologists who received no pay and not all reported back to you, with regard to whether or not these other odontologists, I take it not yourself, were or were not able, I believe the point was, to make an identification.

A. Well, the odontologists that participated in this study that returned their cases each reflected to me they did not put the effort into these cases that they would into an actual court case. None of them went through the 40, the 50 hours necessary to come to a scientific certainty on a bite mark. Each one of them looked at cases, made a snap judgment, returned those cases.

And it served simply as a means for us to illustrate to the community that we needed a common language. We needed to be able to talk about cases in

the same way. And it served that purpose well. And it's accomplished that for us. It was not a scientific study in the sense that 67 percent of expert opinions are correct or wrong. It doesn't get to that issue at all.

Q. Then you were asked about how many hours you spent, and you estimated about 50 hours, which would not include the -- would that include the time from the time you came here yesterday?

A. There would be more time associated with the trial. I always -- when I bill a case I always go back and look over those hours and see how much of that may have been research or furthering some knowledge for myself. I always go back and review those hours to see how much was duplication of effort.

And he asked me how much time I had in the case. I don't know how many of those hours I'll bill, but I've never billed all of those hours.

Q. My point is that you put the hours in to come up with your conclusion here as contrasted with this survey you did?

A. That's correct.

Q. And then he asked you on Exhibit 144 some questions, and on the video. And just to have the final opportunity to redirect, taking the left breast of Kim

Ancona, if I may, Your Honor, and you dwelled on the number 9 tooth mark?

A. Yes.

Q. Do you recall?

A. Yes.

Q. And you said that there was a double impression there?

A. Yes.

Q. And that you could see the image. So now there's a shape to this; is that correct?

A. That's correct.

Q. Now just since you're here and I want to ask you while you still are here, would you share once again with the jury what all that -- that mark and the overlay of the number 9 tooth means?

A. Well, remember that this --

MR. JONES: Excuse me, Doctor.

Objection, Your Honor, this goes beyond the scope of redirect.

THE COURT: Overruled.

You may answer.

A. This overlay represents one area in the depth of the tooth away from the incisal edge. And it shows the central incisor as a certain size. That tooth, if we were to just get the very initial biting

edge, it's about half that thick. As it bites down into the tissue it tends to get thicker and thicker. And at some point in that process it stopped pressing into the tissue.

And I've got this outline to demonstrate the area, the angulation, the basic shape of the tooth -- of tooth number 9 and the impression of tooth number 8.

Q. BY MR. LEVY: And does that impression, in fact, correlate?

A. It's an excellent impression.

Q. Now you were asked about other things, and you've answered them. So let me conclude by asking you this: You were asked a general question about the George Abney case in Flagstaff. That was a homicide?

A. That's correct.

Q. It involved a Navajo woman?

A. Yes.

Q. In the city of Flagstaff?

A. Yes.

Q. And was she found dead with her left breast completely bit off?

A. Yes. The entire areola area, the nipple, was bent away.

Q. I was searching for that word before. The

areola is immediately around the nipple area; is that correct?

A. Yes, the darkened area.

Q. And did you find actual definable edges that matched the teeth of George Abney?

A. Yes, absolutely.

Q. However, when the defense team investigated this case, did they not get an outline of the bite template?

A. That's correct.

Q. And was it your impression -- what was your impression as to what they did with the template with regard to an instrument?

MR. JONES: Objection, calls for speculation, Your Honor. He wasn't on that team.

A. It was related to me --

THE COURT: Hold on, sir.

Mr. Jones, since you opened up, I believe, the area as to the witness' credibility based upon his testimony in the Abney case, I will allow the witness to answer all of these questions.

So go ahead, sir. You may answer.

A. Okay. This was then placed on the tissue with a knife. They then cut the same shape of the bite mark.

Q. BY MR. LEVY: Do you have knowledge as to why, for example, the prosecution just didn't have a butcher come in and slice a piece of tissue off to indicate that it would be a smooth, clean cut?

A. They were demonstrating that this isn't a bite mark, it's simply a knife wound, and that as much as you might core the heart out of a large orange, they simply cut the nipple off and removed it.

Q. Following the template pattern?

A. Following the template pattern. I could create a similar bruise pattern to that as the bruise pattern that's on that breast. If I went from the bite mark on the breast, created a model from that and impressed it deep into tissue, I could produce a similar mark. However, you can't produce exactly the same mark. And we were never allowed any of this material during the course of the trial.

Following the trial I've taken the photographs of those tissue specimens and subjected them to side-by-side comparison. And the difference between the knife wound and the tooth mark wound is obvious, and is corroborated by other forensic dentists.

The fact is that we had a cheap trick that was used in a courtroom to confuse the jury. And it worked.

Q. Was George Abney a white man?

A. Yes, he was.

Q. Was he a teacher?

A. Yes, he was.

Q. Was the victim a Navajo woman?

A. Yes.

Q. And was she found in some ditch dead?

A. Yes, she was.

Q. Was she nude?

A. Yes, she was.

Q. I guess finally, with all of the studies that you've done, whether it be computer analysis, scoring systems, those two come to mind, did you apply all of these -- all of this knowledge, all of this research with regard to analyzing and reaching your conclusion in this case?

A. No. I used the wisdom and experience and knowledge that I've gained through the years of really establishing a good part of the foundation of this field.

Q. If you had used a computer, for example, to come up with some kind of analysis, can a computer be cross-examined?

A. No.

Q. And can a scoring system really be

cross-examined, other than relating where the numbers come from?

A. No.

Q. But you have been cross-examined here today; is that correct?

A. That's correct.

MR. LEVY: Thank you.

THE COURT: All right. Thank you, Doctor. You may step down, sir.

THE WITNESS: Thank you.

THE COURT: Members of the jury, we're going to take our afternoon recess at this time. Please remember the Court's admonition. Let's take about 15 minutes.

(Brief recess taken.)

THE COURT: The record will show the presence of counsel, the defendant and all of our jurors.

Please call your next witness.

MR. LEVY: I would call Dr. Larry Shaw.

THE COURT: Dr. Shaw, please come forward.

LARRY D. SHAW,

called as a witness herein, having been first duly sworn, was examined and testified as follows: