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UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

BEFORE THE HONORABLE MARILYN HALL PATEL, JUDGE

E.I. DU PONT DE NEMOURS & CO.,)

PLAINTIFF,)

VS.)

NO. C 89-2860 MHP)

CETUS CORPORATION, A DELAWARE)
CORPORATION,)

DEFENDANT.)

SAN FRANCISCO, CALIFORNIA
TUESDAY, JANUARY 22, 1991

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LEGAL DEPARTMENT
WILMINGTON, DELAWARE 19898

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(APPEARANCES CONTINUED ON NEXT PAGE)

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21

1 TUESDAY, JANUARY 22, 1991

8:15 A.M.

2
3 (OPEN COURT, JURY PRESENT:)

4 THE COURT: GOOD MORNING --

5 MR. FIGG: GOOD MORNING, YOUR HONOR.

6 THE COURT: -- COUNSEL.

7 GOOD MORNING, MR. PASAHOW.

8 MR. PASAHOW: GOOD MORNING, YOUR HONOR.

9 THE COURT: GOOD MORNING, LADIES AND GENTLEMEN.

10 AT LAST, WE ARE TOGETHER AGAIN. I'M GOING TO KEEP THIS
11 GROUP TOGETHER, NO MATTER WHAT, FOR THE REST OF THIS WEEK,
12 BECAUSE -- AS SCHEDULED, ALBEIT THAT THERE'S NOT MUCH LEFT OF
13 THE WEEK BECAUSE OF YESTERDAY BEING A HOLIDAY.

14 SO I DON'T KNOW WHAT YOU'VE WORKED OUT. IF WE HAVE A
15 PROBLEM TODAY, I'LL LET YOU KNOW. BUT WE'RE GOING TO EITHER GET
16 INTO THIS BUILDING OR SOMEWHERE ELSE, SO WE CAN COMPLETE THE
17 CASE.

18 OKAY. YOU MAY PROCEED.

19 MR. FIGG: THANK YOU, YOUR HONOR.

20 YOUR HONOR, WE CALL DR. RUTH KLEPPE.

21 THE CLERK: PLEASE RAISE YOUR RIGHT HAND.

22 RUTH KLEPPE AATVAAG, PLAINTIFF'S WITNESS, SWORN

23 THE CLERK: PLEASE TAKE THE STAND.

24 PLEASE STATE YOUR FULL NAME AND SPELL YOUR LAST NAME
25 FOR THE COURT.

KLEPPE-DIRECT/FIGG

1 THE WITNESS: MY NAME IS RUTH KISSEL KLEPPE AATVAAG.

2 AND TO SPELL THE LAST NAMES, THAT IS TWO WORDS, KLEPPE,
3 K-L-E-P-P-E SPACE --

4 THE CLERK: COULD YOU PLEASE --

5 THE WITNESS: -- A-A-T-V-A-A-G.

DIRECT EXAMINATION

6
7 BY MR. FIGG:

8 Q. GOOD MORNING.

9 A. GOOD MORNING, YOUR HONOR.

10 THE COURT: GOOD MORNING.

11 Q. (BY MR. FIGG) YOU JUST USED THE NAME KLEPPE AATVAAG, I
12 BELIEVE. DO YOU USE A DIFFERENT NAME PROFESSIONALLY?

13 A. YES. I JUST RECENTLY REMARRIED TO MR. TORVIL (PHONETIC)
14 AATVAAG AND SINCE ALL MY EXAMS, I USED RUTH KLEPPE, AND SINCE
15 I -- IN ALL MY PROFESSIONAL LIFE, I USED KLEPPE, I DECIDED TO
16 USE THE NAME -- USE THAT NAME PROFESSIONALLY FOR THE REST OF MY
17 LIFE.

18 Q. OKAY. SO I'LL CALL YOU DR. KLEPPE.

19 A. YES, PLEASE DO.

20 Q. OKAY. NOW, WE'VE HEARD A LOT OF REFERENCES DURING THIS CASE
21 TO A KLEPPE PAPER. ARE YOU THE KLEPPE THAT'S REFERRED TO ON THE
22 FIRST -- AS THE FIRST AUTHOR ON THAT PAPER?

23 A. NO. THAT WAS --

24 Q. WHO IS THAT?

25 A. THAT WAS MY LATE HUSBAND, DR. KJELL KLEPPE. I AM THE R.

KLEPPE-DIRECT/FIGG

1 KLEPPE, THE THIRD.

2 Q. THE THIRD AUTHOR.

3 A. YES. I'M NOT THAT IMPORTANT.

4 (LAUGHTER)

5 Q. (BY MR. FIGG) DR. KLEPPE, COULD YOU PLEASE DESCRIBE YOUR
6 EDUCATIONAL BACKGROUND FOR THE JURY.

7 A. YES. I GOT ALL MY FORMAL EDUCATION AT THE UNIVERSITY OF
8 BERGEN. I STARTED WITH SCIENCE, WENT ON TO GRADING (PHONETIC)
9 SCHOOL WHERE I TOOK BIOCHEMISTRY.

10 GRADING (PHONETIC) SCHOOL IN NORWAY TAKES ABOUT THREE
11 TO FIVE YEARS, DEPENDING ON THE SUBJECT, BIOCHEMISTRY BEING ONE
12 OF THE LONGEST, SO I WAS CLOSE TO 12 YEARS.

13 THE SUBJECT OF MY THESIS WAS IN RNA, DNA; THAT IS, I
14 WAS LOOKING INTO WHY VIRUS-INFECTED BACTERIA STOPPED MAKING THE
15 RNA AND STARTING MAKE VIRUS RNA AND THEREBY KILLING THEMSELVES.

16 MY SUPERVISOR OR ADVISOR WAS DR. NYGARD (PHONETIC), AND
17 HE HAD JUST RETURNED FROM THE UNITED STATES WHERE HE HAD DONE
18 HYBRIDIZATION WORK: THAT IS, TO SEE HOW DNA AND RNA COULD STICK
19 TOGETHER IN TRUE HYBRIDS, AND YOU HEARD A CALL TALK ABOUT THE
20 DIFFERENCE BETWEEN A TRUE HYBRID AND THIS.

21 SO I WAS VERY EARLY VERY INTERESTED IN DNA AND RNA.

22 Q. YOU MENTIONED THE UNIVERSITY OF BERGEN. WHERE IS THAT?

23 A. OH, BERGEN IS IN NORWAY. IT'S ON THE WEST COAST OF THE
24 COUNTRY. AND WE HAVE THE SECOND LARGEST UNIVERSITY IN NORWAY,
25 THE UNIVERSITY OF BERGEN, AND THIS YEAR WE HAVE ABOUT 14,000

KLEPPE-DIRECT/FIGG

1 STUDENTS.

2 Q. DID YOU CONTINUE YOUR STUDIES AFTER OBTAINING YOUR GRADUATE
3 DEGREE IN NORWAY?

4 A. YES. I OBTAINED MY DEGREE IN '68, AND I HAD ALREADY APPLIED
5 FOR THE POST-DOC IN DR. KHORANA'S LABORATORY IN MADISON,
6 WISCONSIN, AND I WAS LUCKY ENOUGH TO BE ACCEPTED AS THE POST-DOC
7 STUDENT IN THAT UNIVERSITY.

8 Q. WHY DID YOU APPLY FOR A POSITION IN DR. KHORANA'S
9 LABORATORY?

10 A. AS I TOLD YOU, I ALREADY GOT INTERESTED IN RNA SYNTHESIS,
11 AND AT THAT TIME, DR. KHORANA'S LABORATORY WAS THE MOST FAMOUS
12 PLACE WHEN IT COMES TO NUCLEIC ACIDS.

13 ALSO, MY SUPERVISOR, AS I TOLD YOU, DR. NYGARD, WAS
14 VERY MUCH IMPRESSED WITH KHORANA, AND, IN FACT, HE WAS ONE OF
15 THE PEOPLE WHO PROPOSED HIM FOR HIS NOBEL PRIZE.

16 AND THIRDLY, IN 1967, KHORANA GAVE A TALK IN NORWAY,
17 AND -- ABOUT THE WORK HE HAD DONE THEN, ON THE GENETIC CODE.

18 AND, THIRD (SIC), I MUST ALSO ADMIT THAT MY HUSBAND AT
19 THAT TIME, DR. KJELL KLEPPE, ALSO WORKED AT THE KHORANA LAB. SO
20 I HAD LOTS OF REASONS TO GO THERE.

21 Q. HOW LONG WERE YOU A POST-DOCTORAL FELLOW IN DR. KHORANA'S
22 LAB?

23 A. CLOSE TO THREE YEARS.

24 Q. AND THAT BEGAN IN 19 --

25 A. 1968, IN THE FALL OF '68.

KLEPPE-DIRECT/FIGG

2 1 Q. AND YOU LEFT IN 1970.

2 A. YES.

3 Q. AND YOU RETURNED TO THE UNIVERSITY OF BERGEN IN 1970; IS
4 THAT CORRECT?

5 A. YES. IN 1970, WE BOTH RETURNED TO BERGEN, AND I GOT A
6 POSITION AS AN ASSISTANT PROFESSOR AT THE MEDICAL SCHOOL IN THE
7 DEPARTMENT OF BIOCHEMISTRY.

8 Q. WHAT SUBJECTS DID YOU TEACH AT THE UNIVERSITY OF BERGEN
9 AFTER RETURNING?

10 A. I TAUGHT MOST -- MOSTLY BIOCHEMISTRY, BUT TO THE MEDICAL
11 STUDENTS AND THE STUDENTS OF SCIENCE, AND SO IT WOULD BE A
12 BORDER SUBJECT, PURE BIOCHEMISTRY, IT WOULD BE MORE LIKE
13 MOLECULAR BIOLOGY, CELL BIOLOGY, AND WE ALSO HAVE TO TEACH SOME
14 CHEMISTRY.

15 Q. I UNDERSTAND THAT YOU'VE ALSO BEEN ACTIVE IN CIVIC AND
16 POLITICAL AFFAIRS. CAN YOU JUST VERY BRIEFLY DESCRIBE THOSE
17 ACTIVITIES FOR THE JURY.

18 A. I THINK IT'S HARD TO DO BRIEFLY BECAUSE IT HAS BEEN MORE AND
19 MORE OF MY OCCUPATION.

20 BUT IT STARTED OFF IN THE MID-'70'S WHEN I WAS SELECTED
21 AS A MEMBER OF THE BOARD OF THE MEDICAL SCHOOL. THEN I WAS
22 ELECTED TO REPRESENT THE WHOLE FACULTY IN UNIVERSITY SENATE, A
23 POSITION WHICH I HAD FOR SIX YEARS.

24 AND I WAS APPOINTED BY THE MINISTER OF EDUCATION TO SIT
25 ON DIFFERENT ROYAL COMMISSIONS, WHICH WERE TO LOOK INTO AND MAKE

KLEPPE-DIRECT/FIGG

2 1 POLICY FOR THE NORWEGIAN EDUCATION SYSTEM.

2 AND I WAS ALSO A MEMBER OF A NATIONAL BOARD OF FIVE WHO
3 HAD TO DO WITH ALL THE FINANCING OF THE NORWEGIAN STUDENTS, 11
4 AND UPWARDS.

5 AND FINALLY, I WAS ELECTED TO BE A MEMBER OF THE
6 REGIONAL PARLIAMENT, AND AT THAT TIME I SERVED AT THE COMMITTEE
7 ON THE ENERGY AND INDUSTRY.

8 SO TO SUMMARIZE IT, I GOT MORE AND MORE INTERESTED IN
9 RESEARCH AND EDUCATION AND POLITICS, AND I SHOULD SAY LESS THAN
10 RESEARCH.

11 Q. YOU'VE REFERRED TO -- TO YOUR LATE HUSBAND, DR. KJELL
12 KLEPPE. I UNDERSTAND HE WAS ALSO A SCIENTIST.

13 A. YES. HE WAS AN EMINENT SCIENTIST.

14 Q. WHAT WAS HIS SCIENTIFIC BACKGROUND?

15 A. THAT WAS MOSTLY ENZYMOLOGY AND ENZYMES, AND INSTRUCTOR OF
16 WHICH ENZYMES WHICH HAD TO DO WITH NUCLEIC ACIDS AND ALSO THE
17 STRUCTURES OF NUCLEIC ACIDS.

18 Q. WAS HE FORMALLY TRAINED IN SCIENCE?

19 A. OH, YES, VERY MUCH SO. AFTER BACHELOR OF SCIENCE IN NORWAY,
20 HE GOT AN AMERICAN STIPEND AND WENT TO THE UNIVERSITY OF
21 NEBRASKA WHERE HE DID HIS PH.D. IN BIOCHEMISTRY.

22 AND AFTER THAT, HE WENT AS A POST-DOC TO CAMBRIDGE,
23 ENGLAND, FOR TWO YEARS, THEN RETURNED TO NORWAY, AND FINALLY HE
24 GOT A POSITION AS ASSISTANT PROFESSOR AT THE UNIVERSITY OF
25 BERGEN, SAME DEPARTMENT WHERE I WAS A GRADUATE STUDENT AT. THAT

KLEPPE-DIRECT/FIGG

2 1 WAS IN '66.

2 Q. AND WHEN YOU WENT TO DR. KHORANA'S LABORATORY IN '68, DID
3 DR. KJELL KLEPPE ALSO GO TO DR. KHORANA'S LAB THEN?

4 A. YES, HE DID.

5 Q. UH-HUH. WHAT WAS KJELL KLEPPE'S SCIENTIFIC SPECIALTY?

6 A. I THINK I TOLD YOU THAT WAS ENZYMOLOGY.

7 Q. UH-HUH.

8 A. HE WAS VERY, VERY GOOD IN ENZYMOLOGY.

9 Q. AND HOW LONG DID KJELL KLEPPE WORK IN DR. KHORANA'S
10 LABORATORY?

11 A. THAT FIRST PERIOD WAS THE SAME AS MINE. WE STARTED IN '68
12 AND WE RETURNED BOTH TO NORWAY IN THE LATE SUMMER OF 1970. BUT
13 THEN HE WENT BACK FOR TWO OR THREE MONTHS EACH TIME, BOTH IN '72
14 AND IN '74.

15 Q. DID . . . AFTER THE TWO OF YOU RETURNED TO BERGEN IN 1970,
16 DID KJELL KLEPPE ALSO RESUME A FACULTY POSITION THERE?

17 A. YES. HE STARTED OUT -- WHEN -- WHEN HE CAME TO THE
18 UNIVERSITY IN '66, HE WAS APPOINTED AN ASSISTANT PROFESSOR, AND
19 THEN HE WAS ASSOCIATE, AND THEN LATER ON HE BECAME TRUE
20 PROFESSOR, AND THAT MUST HAVE BEEN IN . . . IN THE BEGINNING OF
21 THE '70'S. I CAN'T EXACTLY REMEMBER WHEN. BUT IT WAS IN THE
22 DEPARTMENT OF BIOCHEMISTRY, IN THE MEDICAL SCHOOL.

23 Q. UH-HUH. I UNDERSTAND THAT DR. KJELL KLEPPE PASSED AWAY A
24 FEW YEARS AGO?

25 A. YES. IN THE SUMMER OF '88, AND . . . YES. DR. KHORANA

KLEPPE-DIRECT/FIGG

2
1 WAS -- AND HIS WIFE WAS -- WAS WITH ME BY THAT TIME.

2 Q. ~~I'D LIKE TO TURN NOW TO THE WAY THE KHORANA LAB WAS SET UP~~
3 ~~WHEN YOU WENT THERE IN 1968.~~

4 CAN YOU ACQUAINT THE JURY WITH HOW THE LABORATORY WAS
5 ORGANIZED AT THAT TIME WHEN YOU JOINED.

6 A. YES, I WOULD LIKE TO.

7 IT WAS MAINLY ORGANIZED -- THE PHYSICAL ORGANIZATION IS
8 NOT IMPORTANT, BUT THE SCIENTIFIC PERSONNEL WAS ORGANIZED IN TWO
9 GROUPS. YOU HAD THE PEOPLE DOING ORGANIC CHEMISTRY, AND THEN
10 YOU HAD THE PEOPLE WHO WERE DOING BIOCHEMISTRY, AND BOTH KJELL
11 AND I JOINED THE BIOCHEMISTRY PART OF THE GROUP.

12 Q. HOW MANY SCIENTISTS WERE WORKING IN THE LABORATORY WHEN YOU
13 AND KJELL KLEPPE JOINED IT?

14 A. YEAH. IT WILL BE LIKE 15 TO 20. IT VARIED, BUT ~~15~~ WOULD BE
15 A GOOD NUMBER.

16 Q. AND DID THAT -- DID THE COMPOSITION OF THE LABORATORY
17 CHANGE, THE PEOPLE WHO WERE WORKING THERE CHANGE, OVER THE TWO
18 YEARS OR SO THAT YOU WERE THERE?

19 A. YES, BECAUSE USUALLY ONE WOULD BE POST-DOC FOR ONE -- NAY,
20 TWO OR THREE YEARS, SO THAT MEANS YOU HAVE A TURNOVER IN THE
21 NUMBER OF THE PEOPLE.

22 AND ALSO THE -- THE COMPOSITION OF THE GROUPS CHANGED
23 BECAUSE, IN THE BEGINNING, THERE WERE MUCH MORE PEOPLE DOING
24 ORGANIC CHEMISTRY; THAT IS, THESE PEOPLE PUT TOGETHER TO MAKE
25 THIS OLIGONUCLEOTIDE. BUT, OF COURSE, AS SOON AS WE HAD MORE,

KLEPPE-DIRECT/FIGG

1 YOU CAN START DOING ENZYMOLOGY WORK AND BIOCHEMISTRY WORK, SO
2 THEN MORE PEOPLE DOING ENZYMOLOGY WOULD START.

3 Q. OVER THIS PERIOD THAT YOU WERE THERE, DO YOU HAVE AN
4 ESTIMATE OF HOW MANY SCIENTISTS WORKED IN THE LABORATORY IN
5 TOTAL?

6 A. YEAH. WE HAD THE PEOPLE WHO ARE POST-DOCS, AND IF YOU HAVE
7 A TURNOVER ABOUT EVERY TWO YEARS, I WOULD GUESS THAT THAT WOULD
8 BE 20 TO 25.

9 THEN THERE ARE ALSO PEOPLE COMING IN FOR SHORTER TIME,
10 FOR A FEW MONTHS, SO THEY WOULD ALSO BE PART OF THE GROUP AT
11 THAT TIME. SO I WOULD GUESS, LIKE, 25 PERSONS WOULD BE WORKING
12 IN THE LAB AT THE TIME I WAS THERE.

13 Q. IN ADDITION TO THESE PEOPLE WHO WERE WORKING IN THE
14 LABORATORY AS POST-DOCS OR REGULARLY WORKING, DID OTHER
15 SCIENTISTS VISIT THE LABORATORY FROM TIME TO TIME?

16 A. YEAH. THAT WAS A FANTASTIC EXPERIENCE FOR ME. I MEAN, EVEN
17 IF BERGEN IS A NICE PLACE, IT IS ABSOLUTELY ON THE OUTSKIRT OF
18 EUROPE, SO IT'S VERY SELDOM YOU GET PEOPLE VISITING US.

19 SO IN THE MIDDLE OF THE UNITED STATES WITH ALL PEOPLE
20 COMING TO, I HAD THE FEELING THAT THE PEOPLE WERE COMING THROUGH
21 ALL THE TIME. ALL THE BIG NAMES WOULD VISIT THE LAB, SO, YEAH.

22 Q. ALL OF THE BIG NAMES, MEANING ALL OF THE BIG NAMES --

23 A. LIKE --

24 Q. -- OF SCIENTISTS.

25 A. -- (UNINTELLIGIBLE) FOR EXAMPLE. I WAS INTRIGUED TO SEE

KLEPPE-DIRECT/FIGG

3
1 HIM. I HAD READ ABOUT HIM, BUT I HADN'T SEEN HIM BEFORE.

2 Q. WHAT WAS THE PURPOSE OF THESE VISITS BY OTHER SCIENTISTS?

3 A. OH, THAT WAS AS IT IS IN ANY ACADEMIC INSTITUTION; THAT IS,
4 TO EXCHANGE INFORMATION. THERE IS A CERTAIN, I WOULD LIKE,
5 ~~BROTHERHOOD AMONG SCIENTISTS~~, LIKE THE GROUPS WHO ARE INTERESTED
6 IN THE SAME TYPE OF PROBLEMS WOULD VISIT EACH OTHER AND EXCHANGE
7 INFORMATION.

8 SO THESE PEOPLE WOULD GIVE SEMINARS SO WE CAN
9 UNDERSTAND WHAT THEY ARE DOING, AND THEN THEY WOULD ATTEND OUR
10 SEMINARS SO THEY COULD UNDERSTAND WHAT WE ARE DOING.

11 SO THIS WAS FANTASTIC. AND LONG BEFORE THINGS WERE
12 PUBLISHED, YOU HAVE -- YOU KNOW WHAT WAS GOING ON, SO . . .

13 Q. WELL, WASN'T DR. KHORANA WORRIED ABOUT REVEALING THE DETAILS
14 ABOUT HIS SCIENTIFIC RESEARCH TO THESE VISITORS?

15 A. OH, NO, NO, NOT AT ALL. ~~IF YOU HAVE BEEN IN A IN A LAB~~
16 ~~DOING BASIC RESEARCH, YOU KNOW, THAT THE MOST IMPORTANT THING IS~~
17 ~~TO TELL OTHER PEOPLE WHAT YOU ARE DOING. AND, OF COURSE, AS~~
18 ~~THIS WAS THE ONLY PLACE IN THE WORLD WE HAD THESE BEAUTIFUL~~
19 ~~MOLECULES, THERE WAS NO WAY ANYBODY COULD COMPETE. SO WE WERE~~
20 SO LUCKY TO TALK ABOUT IT, AND WE WERE VERY, VERY -- AT LEAST, I
21 FELT GOOD BEING THERE.

22 Q. WHEN YOU SAY "THESE BEAUTIFUL MOLECULES," YOU'RE REFERRING
23 TO THE SYNTHETIC --

24 A. OLIGONUCLEOTIDES, OH, YES, YEAH.

25 Q. CAN YOU REMEMBER HOW OFTEN SCIENTISTS VISIT THE

KLEPPE-DIRECT/FIGG

3 1 LABORATORY -- VISITED THE LABORATORY?

2 A. THAT WILL, OF COURSE, VARY A LOT, BUT -- ACCORDING TO IF
3 THERE WAS OTHER THINGS GOING ON. BUT A VERY CONSERVATIVE
4 ESTIMATE WILL BE LIKE . . . 20 TO 25 A YEAR. THAT WILL BE
5 CONSERVATIVE, I WOULD GUESS.

6 Q. UH-HUH.

7 A. BUT YOU MUST REMEMBER SOME OF THESE WOULD VISIT, LIKE, FROM
8 STANFORD, LIKE KORNBERG, AND SOME WERE PEOPLE WORKING AT THE
9 CAMPUS BECAUSE THE CAMPUS, I THINK IT WAS 45,000 STUDENTS, SO
10 THAT MEANT THAT THE FACULTY WAS VERY BIG. SO PEOPLE FROM OTHER
11 PLACES WOULD ALSO COME.

12 Q. NOW, YOU -- IN ONE OF YOUR ANSWERS A FEW MINUTES AGO, YOU
13 REFERRED TO PEOPLE WHO WERE ACTUALLY WORKING IN THE LABORATORY.
14 DID -- DID SOME OF THESE VISITORS ACTUALLY DO EXPERIMENTAL WORK
15 WHILE THEY WERE THERE?

16 A. YES, THEY DID. AND FOR MY FIRST YEAR, I HAD TWO PERSONS I
17 REALLY REMEMBER BECAUSE, UP TO THEN, I WAS THE ONLY GIRL IN THE
18 GROUP, AND THAT IS NOT NICE. YOU . . .

19 AND THEN THERE WAS TWO WOMEN VISITED US, AND ONE FROM
20 JAPAN, EIKO (PHONETIC) OHTSUKA, AND ONE FROM LENINGRAD, NINA
21 SETROVA (PHONETIC), AND I REALLY LOOKED FORWARD TO SEE THEM,
22 SO . . .

23 Q. UH-HUH.

24 A. BUT I KNOW FROM, LIKE -- KJELL TOLD ME IN '72 WHEN HE WAS
25 THERE AT M.I.T., KLENOW WAS THERE -- THAT IS A NAME YOU HAVE

KLEPPE-DIRECT/FIGG

1 HEARD FROM KORNBERG -- AND, YEAH, OTHER PEOPLE WOULD COME.

2 Q. THAT'S HANS ~~KLEPPE~~, THE --

3 A. YES.

4 Q. -- PERSON WHO --

5 A. YEAH.

6 Q. -- THIS ENZYME WE'VE BEEN TALKING ABOUT WAS NAMED FOR.

7 A. YES.

8 (PAUSE IN PROCEEDINGS)

9 Q. (BY MR. FIGG) DR. KLEPPE, LET ME SHOW YOU THE DOCUMENT THAT
10 HAS BEEN MARKED AS EXHIBIT A-18. THAT'S THE ONE WE'VE BEEN
11 CALLING THE KLEPPE ARTICLE.

12 ARE YOU FAMILIAR WITH THAT?

13 A. YES, I AM.

14 Q. AND YOU AND YOUR LATE HUSBAND WERE CO-AUTHORS, AS YOU
15 POINTED OUT.

16 A. YES.

17 Q. THERE ARE FIVE AUTHORS ON THE PAPER, AND I'D LIKE FOR YOU TO
18 GO DOWN THE LIST OF AUTHORS AND DESCRIBE THEIR ROLES.

19 THE FIRST ONE IS -- IS KJELL KLEPPE. WHAT WAS HIS ROLE
20 IN THE WORK THAT'S REPORTED IN THIS PAPER?

21 A. OH, YES. KJELL WAS THE LEADER OF THIS WORK, BECAUSE HE WAS
22 MOST -- MORE SENIOR THAN I, AT LEAST, WAS. AND BEING A VERY
23 GOOD ENZYMOLOGIST, HE WOULD BE ABLE TO DO BEAUTIFUL ENZYMATIC
24 WORK, VERY, VERY SPECIAL. AND SO THE MOLECULES, THE
25 OLIGONUCLEOTIDES, HE WOULD DO MOST OF THE WORK. AND ALSO HE --

KLEPPE-DIRECT/FIGG

4
1 HE WOULD WRITE UP THIS PAPER TOGETHER WITH PROFESSOR KHORANA.

2 EIKO OHTSUKA, THAT WAS THE GIRL I TOLD YOU WHO WAS
3 VISITING FROM -- FROM JAPAN. SHE HAD BEEN A POST-DOC IN
4 KHORANA'S GROUP BEFORE. BUT SHE WAS AN ORGANIC CHEMIST, SO WHEN
5 SHE CAME BACK, SHE WANTED TO DO -- LEARN SOME ENZYMOLOGY, AND IT
6 WAS VERY NATURAL THAT SHE WORK TOGETHER WITH -- WITH KJELL ON
7 THIS THING.

8 I'M THE THIRD AUTHOR, THIS R. KLEPPE, AND I WAS PUT ON
9 A DIFFERENT PROJECT WHEN I STARTED BECAUSE EVERYTHING WHICH WENT
10 ON IN THIS LAB WAS PART OF A LARGE PLAN, ~~THE PLAN BEING TO~~
11 ~~SYNTHESIZE THE VERY FIRST GENE IN THE WORLD.~~ AND FOR THAT, ONE
12 PICKED A LITTLE GENE, A SMALL GENE, LESS THAN 17 PIECES LONG.

13 AND THE PEOPLE DOING ORGANIC CHEMISTRY WOULD SYNTHESIZE
14 THE SMALL PIECES YOU HAVE HEARD ABOUT, AND THEN THE PEOPLE DOING
15 ENZYMOLOGY WOULD STICK THESE TOGETHER IN A VERY SPECIAL WAY.
16 AND, OF COURSE, YOU HAD TO LEARN A LOT ABOUT WHAT TO STICK THESE
17 PIECES TOGETHER WITH, WHAT ENZYMES DO YOU USE, AND SO ON.

18 SO AT THIS STAGE, THE WHOLE GENE WAS NOT FINISHED BUT
19 PIECES OF IT WAS, SO ONE CAN START ENZYMOLOGY WORK.

20 AND THE WHOLE IDEA WAS THAT, WHEN THE WHOLE GENE WAS
21 PUT TOGETHER, ONE HAS TO TRY TO SEE, DID IT WORK? AND THIS
22 PARTICULAR GENE HAS TO BE COMBINED WITH AN RNA; THAT IS, THE
23 SAME LENGTH OF INFORMATION BUT TRANSFERRED TO ANOTHER TYPE OF
24 MOLECULE, THE R MOLECULE.

25 AND SINCE I HAD BEEN WORKING WITH RNA-POLYMERASE, I WAS

KLEPPE-DIRECT/FIGG

1 LOOKING TO SEE, IS IT POSSIBLE TO MAKE RNA FROM THIS GENE?

2 SO -- BUT THAT MEANT, OF COURSE, THAT I USED ALSO

3 DOUBLE-STRANDED DNA, AND WE USED LOTS OF THE SAME DOUBLE END

4 TYPE OF ENZYMES, AND WE USED THE SAME LABEL -- THAT IS,

5 RADIOACTIVE COMPONENTS -- TO MONITOR WHAT WAS GOING ON.

6 SO MY PART OF THIS WORK WAS THAT I MADE SOME OF THIS
7 DOUBLE-SIDED DNA, BECAUSE I USED THAT FOR MY OWN WORK. AND ALSO
8 I PREPARED SOME OF THE ENZYMES, ESPECIALLY THE . . . I USED LOTS
9 OF TIME TO PREPARE THE INFECTED CELLS.

10 AND I THINK IF YOU WANT ME TO ELABORATE ON THAT . . .

11 Q. YES, JUST BRIEFLY. HOW DID YOU --

12 A. YEAH.

13 Q. HOW DID YOU MAKE THE ENZYMES?

14 A. BECAUSE I THINK ONE HAS TO GO BACK IN TIME TO UNDERSTAND THE
15 DIFFERENCE BETWEEN THEN AND NOW.

16 BECAUSE TODAY, YOU JUST PICK UP THE PHONE AND YOU ORDER
17 A BEAUTIFUL PURE ENZYME. WE COULDN'T DO THAT. WHAT WE HAD TO
18 DO WAS TO PAINSTAKINGLY ISOLATE THESE ENZYMES.

19 AND THESE PARTICULAR ENZYMES WHICH ARE NECESSARY IN
20 THIS TYPE OF WORK HAS TO BE -- SOME OF THEM HAS TO BE
21 VIRUS-INFECTED CELLS. THAT MEANS THAT YOU HAVE YOURSELF TO GROW
22 UP VIRUSES AND INFECT THE CELLS AND HARVEST THE CELLS, AND FROM
23 THIS CELL BASE, YOU HAVE TO ISOLATE THE ENZYMES.

24 AND AT THAT TIME, WE USED LOTS OF THOSE ENZYMES, AND
25 SINCE I WAS THE ONLY ONE WHO HAD EVER WORKED THE VIRUS, THIS WAS

KLEPPE-DIRECT/FIGG

1 MY JOB. I DIDN'T ALWAYS LOVE IT, BUT IT HAD TO BE DONE.

2 AND DR. KORNBERG, HE TOLD US THAT HE HAD 200 POLES OF
3 CELL PASTE. I HAD TO WORK FOR MONTHS TO GET 100 GRAMS, AND
4 THAT'S ABOUT HALF A CUP, SO . . . SO, YEAH.

5 BUT THE BRAIN BEHIND THIS WAS KHORANA AND DR. KLEPPE.
6 I WILL SAY THAT THE REST OF US WAS JUST DOING THINGS.

7 Q. WHAT -- THE FOURTH AUTHOR IS DR. MOLINEUX. WHAT WAS HIS
8 ROLE?

9 A. YEAH. SINCE HE IS COMING, HE'S GOING TO TESTIFY, I THINK
10 IT'S MUCH BETTER THAT HE TELLS HIS OWN STORY ABOUT THAT.

11 Q. OKAY.

12 THE COURT: I THINK SHE JUST OBJECTED TO YOUR QUESTION.

13 MR. FIGG: I THINK YOU'RE RIGHT, YOUR HONOR.

14 (LAUGHTER)

15 MR. FIGG: I WITHDRAW THE QUESTION.

16 Q. AND WHAT WAS -- WHAT WAS DR. KHORANA'S ROLE, THE LAST
17 AUTHOR?

18 A. OH, YOU MUST -- DR. KHORANA WAS -- I MEAN, HE WAS THE LEADER
19 OF THE WHOLE GROUP. EVERYTHING WHICH WENT ON IN THIS LAB WAS A
20 PART OF A -- HIS TOTAL IDEA THAT, FROM ORGANIC MOLECULES, YOU
21 CAN MAKE A GENE, AND YOU THEN CAN SEE IF THIS GENE WORKS. IT
22 WAS A FANTASTIC IDEA.

23 AND ALSO HE WAS -- SO EVERYTHING WHICH WENT ON, OF
24 COURSE, WAS DISCUSSED WITH HIM. AND HE AND KJELL CAME UP WITH
25 THIS TOGETHER, WHICH IS ALSO IMPORTANT.

KLEPPE-DIRECT/FIGG

5 1 HE WAS, OF COURSE, THE ONE WHO HAD ALL THE GRANTS, SO
2 HE PAID FOR EVERYTHING, YES. HE PAID FOR IT.

3 Q. CERTAINLY AN IMPORTANT ROLE.

4 YOU MENTIONED THAT DR. OHTSUKA WAS INVOLVED IN THE --
5 IN SYNTHESIZING SOME OF THE DNA, I BELIEVE; IS THAT RIGHT?

6 A. THE OLIGONUCLEOTIDES.

7 Q. YES.

8 A. UH-HUH.

9 Q. WERE YOU FAMILIAR WITH THE EFFORT THAT WAS REQUIRED BY THE
10 CHEMISTS IN KHORANA'S LAB TO SYNTHESIZE THE DNA?

11 A. YES. WE WERE REALLY AWARE OF THAT, BECAUSE . . . AND THEN
12 AGAIN IT'S VERY IMPORTANT TO GO BACK AND UNDERSTAND HOW SCIENCE
13 STARTS.

14 WE KNOW THAT IT COULD TAKE FROM HALF A YEAR TO TWO
15 YEARS TO MAKE ONE MOLECULE, AND THESE MOLECULES WERE SO SCARCE
16 THAT WHEN WE BIOCHEMISTS USED THEM, THEY WERE NAMED AFTER THE
17 PERSON WHO MADE THEM. SO I REMEMBER WE REALLY FELT SORT OF VERY
18 PRIVILEGED TO BE ABLE TO TAKE THE MOLECULE WHICH HAD TAKEN A MAN
19 TWO YEARS TO PREPARE, AND I WAS ALLOWED TO -- TO PLAY WITH THIS
20 MOLECULE. IT WAS FANTASTIC.

21 SO THE MOLECULES ARE NAMED. AND I THINK IT IS VERY
22 PROPER THAT, IN THIS PAPER, UNDER THE MATERIAL AND METHODS,
23 EVERY SINGLE OLIGONUCLEOTIDE IS REFERRED TO TO THE PERSON WHO
24 MADE IT.

25 TODAY, OF COURSE, YOU WOULD GUESS THAT WE TOOK THIS AND

KLEPPE-DIRECT/FIGG

5 1 THAT. BUT WHEN TWO YEARS OF EFFORTS GOES INTO MAKING ONE
2 MOLECULE, YOU FEEL DIFFERENT ABOUT IT.

3 Q. UH-HUH. DR. KLEPPE, WERE YOU FAMILIAR WITH THE PROCEDURES
4 THAT WERE USED IN THE KHORANA LAB FOR RECORDING THE EXPERIMENTAL
5 WORK THAT WAS DONE?

6 A. OH, YES. EVERYONE HAS TO KEEP A LAB -- LABORATORY NOTEBOOK,
7 WHICH WE DO IN EVERY RESEARCH LAB.

8 Q. CAN YOU JUST BRIEFLY EXPLAIN TO THE JURY WHAT A LABORATORY
9 NOTEBOOK IS.

10 A. YEAH. THAT IS A PROTOCOL IN WHICH YOU CAREFULLY WRITE DOWN
11 WHATEVER YOU DO AND ALL YOUR RESULTS. AND IN THE -- DR.
12 KHORANA'S LABORATORY, IT WAS CUSTOMARY FOR PEOPLE TO -- TO HAVE
13 COPIES, AND I THINK I COULD EXPLAIN LIKE THE WAY KJELL DID HIS
14 NOTEBOOKS, BECAUSE HE WAS A VERY, VERY GOOD SCIENTIST, AND MY
15 TEACHER, IN A WAY.

16 WE WOULD USE A SPIRAL BINDER WITH NUMBERED PAGES, AND
17 THAT WOULD BE TWO PAGES FOR THE SAME NUMBER. AND THE IDEA WAS
18 THAT YOU THEN -- AND THE FIRST WAS WHITE AND THE SECOND WAS
19 YELLOW. SO YOU STUCK A CARBON PAPER IN BETWEEN AND YOU WROTE ON
20 THE WHITE ONE AND THEN YOU HAD A COPY ON THE YELLOW.

21 SO AFTER THE BOOK WAS FINISHED, YOU TORE OUT THE YELLOW
22 ONES, BECAUSE THEY HAD A PERFORATION. SO YOU CAN TEAR OUT THE
23 YELLOW ONES AND USE THEM, AND THE IDEA WAS THAT THE WHITE ONE,
24 WHICH WAS THE ORIGINALS, WOULD STAY WITH DR. KHORANA.

25 Q. AND YOU MENTIONED DR. KJELL KLEPPE USED THIS PROCEDURE FOR

KLEPPE-DIRECT/FIGG

5 1 RECORDING HIS OWN WORK?

2 A. YES. YES, HE DID.

3 Q. DID YOU ALSO KEEP LABORATORY NOTEBOOKS?

4 A. YES, I DID, BUT I DIDN'T -- I FOUND THOSE SPIRAL BINDERS
5 VERY DIFFICULT, SO WHAT I USED, I USED AN ORDINARY PAD, WHITE
6 PAD LIKE THE ONE THE JURY HAS, AND I WOULD PUT THE CARBON PAPER
7 IN BETWEEN AND WRITE AND HAVE COPIES IN THAT WAY.

8 Q. UH-HUH. HAVE YOU HAD AN OPPORTUNITY TO LOOK FOR ANY OF THE
9 ORIGINAL NOTEBOOKS THAT WERE KEPT WHILE YOU AND DR. KJELL KLEPPE
10 WERE IN KHORANA'S LAB?

11 A. YES. I LOOKED FOR MY OWN COPIES AT HOME IN MY OFFICE IN
12 BERGEN, BUT I DID NOT FIND THEM. BUT THEN I MOVED OFFICE MANY
13 TIMES, AND . . .

14 SO -- BUT THEN I WENT TO DR. KHORANA'S LABORATORY IN
15 FEBRUARY, LAST -- NEARLY A YEAR AGO, AND LOOKED IF I COULD FIND
16 MY OWN ORIGINALS IN HIS -- IN HIS CUPBOARD. HE HAS A BIG
17 CUPBOARD IN HIS OFFICE WHERE HE KEEPS THESE THINGS.

18 BUT I COULD NOT FIND MY OWN ORIGINALS OR EITHER KJELL'S
19 OR -- AND I ALSO LOOKED FOR IAN MOLINEUX'S SINCE I KNEW THIS WAS
20 COMING UP, BUT I DIDN'T FIND THOSE.

21 BUT THEN HE HAS HUNDREDS OF POST-DOCS, AND I SUPPOSE
22 THERE'S A LIMIT TO WHAT YOU CAN KEEP.

23 Q. HAVE YOU BEEN ABLE TO FIND THE CARBON COPIES OF ANY OF THE
24 NOTEBOOKS?

25 A. YES. I FOUND CARBON COPIES OF KJELL'S NOTEBOOKS. AND I

KLEPPE-DIRECT/FIGG

1 ALSO FOUND SOME NOTES I MADE MYSELF FROM SEMINARS AND SO ON.

2 BUT I DID NOT FIND MY OWN COPIES FROM MY LABORATORY NOTEBOOKS.

3 Q. OKAY. WHERE HAVE THE -- I'D LIKE TO FOCUS ON THE NOTEBOOKS
4 OF KJELL KLEPPE'S WHICH YOU DID FIND:

5 WHERE HAVE THEY BEEN SINCE 1970, I GUESS, WHEN YOU LEFT
6 THE KHORANA LAB?

7 A. YEAH, YEAH. THEY HAVE BEEN IN KJELL'S AND MY POSSESSION
8 EVER SINCE.

9 Q. I'D LIKE TO HAND YOU COPIES OF THREE EXHIBITS THAT WE HAVE
10 MARKED AS A-70, A-71 AND A-72.

11 CAN YOU -- CAN YOU IDENTIFY THESE DOCUMENTS.

12 A. YES. OBVIOUSLY, THIS IS -- THE FRONT PAGE, OBVIOUSLY, IS A
13 COPY OF THE -- A BLUE BINDER WHICH THEY USED TO SIT THINGS INTO,
14 AND WHICH I FOUND.

15 AND WHEN YOU LOOKED IN -- INSIDE THIS IS A COPY
16 OF . . . OF HIS LABORATORY NOTEBOOKS, AND I CAN'T QUITE SEE THE
17 DATE BECAUSE IT'S STUCK TOGETHER. BUT DEFINITELY THIS ONE IS
18 KJELL'S.

19 THE SAME FOR THIS ONE. THIS IS HIS LABORATORY
20 NOTEBOOKS, COPIES OF THEM. YES.

21 AND THE PAGES ARE NUMBERED, I SEE.

22 AND THIS ONE IS FOR ANOTHER, YES.

23 HERE, I CAN READ THE DATE. THIS IS '69, AND I COULD
24 SEE THE YEAR ON THIS ONE BUT NOT THE DATE.

25 Q. SO THESE ARE COPIES OF EXCERPTS FROM DR. KLEPPE'S

KLEPPE-DIRECT/FIGG

6 1 NOTEBOOKS --

2 A. YES.

3 Q. -- OF 1969?

4 A. YES, THEY ARE.

5 Q. AND YOU -- YOU'RE FAMILIAR WITH THE HANDWRITING OF YOUR LATE
6 HUSBAND, KJELL KLEPPE.

7 A. OH, YES.

8 Q. AND DO YOU RECOGNIZE THE HANDWRITING ON THESE --

9 A. YES.

10 Q. -- EXHIBITS AS HIS HANDWRITING?

11 A. YES, IT IS.

12 (PAUSE IN PROCEEDINGS)

13 Q. (BY MR. FIGG) IS IT YOUR UNDERSTANDING THAT ALL OF THESE
14 NOTEBOOKS WERE PREPARED IN THE 1969-1970 TIME FRAME?

15 A. OH, YES.

16 (PAUSE IN PROCEEDINGS)

17 Q. (BY MR. FIGG) NOW, I UNDERSTAND THAT YOU WANT TO KEEP THESE
18 NOTEBOOKS BECAUSE THEY HAVE SOME SENTIMENTAL VALUE FOR YOU, BUT
19 ARE THESE THE ORIGINAL NOTEBOOKS FROM WHICH THESE COPIES WERE
20 MADE?

21 A. YES. THIS IS -- THIS IS SOME OF THESE NOTEBOOKS OF HIS,
22 YES.

23 (WITNESS EXAMINES NOTEBOOK.)

24 YES, IT IS.

25 Q. OKAY. THANK YOU.

KLEPPE-DIRECT/FIGG
(PAUSE IN PROCEEDINGS)

1
2 Q. (BY MR. FIGG) DR. KLEPPE, WERE THERE ANY PROCEDURES IN THE
3 KHORANA LAB FOR -- FOR SCIENTISTS TO KEEP EACH OTHER ABREAST OF
4 WHAT THEY WERE DOING?

5 A. OH, OF COURSE. WE WERE ALL WORK -- AS I TOLD YOU, WORKING
6 VERY CLOSE TOGETHER USING THE SAME ENZYME AND EXCHANGING
7 COMPONENTS ALL THE TIME. SO INFORMALLY, WE WOULD DISCUSS THIS
8 INFORMALLY ON A DAILY BASIS BECAUSE WE WERE VERY CLOSE, JUST
9 LIKE A FAMILY. AND WE SPENT ALL OUR TIME IN THE LAB, SO WE'RE
10 TALKING CONSTANTLY.

11 BUT THEN WE HAD A VERY FORMAL ORGANIZED SEMINAR EVERY
12 MONDAY MORNING, A RESEARCH SEMINAR, WHICH WE HAD TO PRESENT WHAT
13 YOU HAD DONE SINCE YOU LAST GAVE A SEMINAR. AND USUALLY THAT
14 WILL BE EVERY SECOND MONTH AND SO ON.

15 Q. EVERY SECOND MONTH, YOU WOULD REPORT ON THE WORK YOU HAD
16 DONE?

17 A. YEAH. IT WOULD VARY, BECAUSE USUALLY IT WOULD BE ONE OR TWO
18 PERSONS PRESENTING THEIR WORK ON EACH MONDAY MORNING'S SEMINAR.

19 Q. WHO ATTENDED THESE SEMINARS?

20 A. OH, EVERYONE. IT WAS EXPECTED THAT YOU SHOULD BE IN THE
21 SEMINAR.

22 Q. AND WHO SPOKE AT THE SEMINARS? DID EVERYBODY --

23 A. YES.

24 Q. -- GET A CHANCE TO SPEAK?

25 A. IT WOULD BE ON A ROTATIONAL BASIS. EVERYONE WOULD TALK IN

KLEPPE-DIRECT/FIGG

6
1 THE SEMINAR.

2 AND PERHAPS I SHOULD EXPLAIN HOW IT WAS DONE: IT WAS
3 LITERALLY BEING ON A HOT SEAT, LIKE HERE, BECAUSE, I MEAN, YOU
4 HAD TO -- TO SHOW TO THE REST OF THE GROUP YOUR RESULTS, OR YOUR
5 FAILURES, BECAUSE NOT EVERYTHING WORKS AS YOU THOUGHT IT SHOULD.

6 WHAT YOU WOULD DO IS THAT YOU WOULD TAKE YOUR GRAPHS OR
7 YOUR RESULTS AND STICK THEM ON THE BLACKBOARD, AND THEN YOU
8 WOULD EXPLAIN THE EXPERIMENTS. AND THEN THE REST OF THE GROUP
9 WOULD ASK YOU, WHY DID YOU DO THAT, WHY DID YOU TRY THAT, AND
10 WHY WOULD DO TRY THAT, AND SO ON.

11 BUT IT WOULD BE -- YOU HAD REALLY TO PRESENT YOUR NOTES
12 AND WHAT YOU HAVE DONE.

13 AND THEN THERE WILL BE DISCUSSION, WHAT SHOULD THE NEXT
14 STEP BE, WHAT WOULD BE A GOOD APPROACH TO GO FURTHER ON.

15 Q. DID -- DID THESE VISITORS WHO CAME THROUGH THE LAB FROM TIME
16 TO TIME ATTEND THE SEMINARS?

17 A. YES. IF THEY WERE THERE ON MONDAY MORNING, THEY WERE FREE
18 TO ATTEND THE SEMINARS, YEAH.

19 Q. DID YOU KEEP ANY RECORDS OF THE SEMINARS YOURSELF?

20 A. YES. I USUALLY TOOK NOTES FROM THE SEMINAR, BECAUSE THIS
21 WAS A PLACE TO REALLY LEARN WHAT WAS HAPPENING. AND SINCE I WAS
22 FAIRLY NEW, I THOUGHT IT WAS VERY GOOD FOR ME TO KEEP NOTES OF
23 THE SEMINAR. IT WAS LIKE GOING TO A LECTURE.

24 AND I MUST ADMIT, WHEN PEOPLE FROM THE ORGANIC GROUP
25 SPOKE, I REALLY HAD TO KEEP . . . KEEP MY HEAD STRAIGHT TO

KLEPPE-DIRECT/FIGG

7
1 UNDERSTAND WHAT THEY WERE TALKING ABOUT.

2 Q. OKAY. WE'VE MARKED AS EXHIBIT A-67 SOME HANDWRITTEN PAGES.
3 COULD YOU IDENTIFY --

4 A. YEAH.

5 Q. -- THAT EXHIBIT FOR THE JURY, PLEASE.

6 A. YEAH. YES, THIS IS A COPY OF ONE OF MY SEMINAR NOTES FROM
7 MARCH 24, '69.

8 Q. AND WHO -- WHO GAVE THE SEMINAR THAT IS NOTED THERE?

9 A. THAT PARTICULAR MONDAY MORNING, IT WAS KJELL WHO GAVE THE
10 SEMINAR, BECAUSE HIS NAME IS ON THE TOP THERE.

11 Q. KJELL KLEPPE.

12 A. KLEPPE. YEAH, KJELL KLEPPE.

13 Q. WE'VE MADE A BLOWUP OF THAT EXHIBIT.

14 MR. PASAHOW: EXCUSE ME. YOUR HONOR, I DON'T THINK
15 THIS EXHIBIT IS PROPERLY ADMISSIBLE INTO EVIDENCE, AND I'D LIKE
16 TO ADDRESS THAT BEFORE IT'S DISPLAYED TO THE JURY.

17 I SUPPOSE IF MR. FIGG WANTED, HE COULD MAKE A CASE THAT
18 IT WAS PAST RECOLLECTION RECORDED, BUT EVEN IF HE DID, OF
19 COURSE, THE RULE IS THAT PAST RECOLLECTION RECORDED IS NOT
20 ADMISSIBLE BUT MAY ONLY BE READ BY THE WITNESS TO THE JURY, AND
21 THE DOCUMENT ITSELF CAN ONLY BE OFFERED BY THE OPPONENT OF THE
22 PERSON PUTTING THE WITNESS ON.

23 SO WE -- WE WOULD OPPOSE EITHER THE ADMISSION OF THE
24 EXHIBIT OR ITS BEING DISPLAYED TO THE JURY.

25 THE COURT: WELL, THE RULE IS CORRECTLY STATED. IS

KLEPPE-DIRECT/FIGG

1 THERE SOME OTHER RULE THAT --

2 MR. FIGG: WELL, I GUESS I'M A LITTLE SURPRISED BY
3 THIS, BECAUSE WE DISCUSSED THIS LAST WEEK, AND WE DISCUSSED THE
4 FACT THAT WE WERE GOING TO BE PRESENTING DR. KLEPPE'S OWN
5 SEMINAR NOTES AS -- AS EXHIBITS, SO I THINK THE OBJECTION COMES
6 A LITTLE -- A LITTLE LATE.

7 AND INsofar AS THE --

8 THE COURT: WELL, DID YOU WORK OUT WHETHER YOU WERE
9 GOING TO HAVE --

10 MR. FIGG: -- HEARSAY OBJECTION, THIS DOCUMENT IS MORE
11 THAN 20 YEARS OLD. IT FALLS UNDER THE ~~ANCIENT DOCUMENT~~
12 ~~EXCEPTION~~, IF FOR NO OTHER REASON.

13 (PAUSE IN PROCEEDINGS)

14 THE COURT: ANY REASON WHY IT SHOULDN'T COME IN UNDER
15 THAT BASIS?

16 MR. PASAHOW: YES, YOUR HONOR. THE ANCIENT DOCUMENTS
17 EXCEPTION TAKES CARE OF THE THINGS LIKE STATEMENTS OF PERSONAL
18 HISTORY AND SUCH. IT DOES NOT TAKE CARE OF THE HEARSAY
19 STATEMENT IN THE DOCUMENT ITSELF.

20 THE NOTES THAT GO WITH THE RULES THEMSELVES ARE VERY
21 CLEAR THAT THE ANCIENT DOCUMENT EXCEPTION IS NOT MEANT TO
22 INCLUDE THE HEARSAY WHICH IS CONTAINED IN THE DOCUMENT. IT
23 PROVIDES NO EXCEPTION FOR THAT.

24 THE COURT: WHY ISN'T THAT A FORM OF A BUSINESS RECORD,
25 GIVEN THE NATURE OF THE BUSINESS, THE NATURE OF THE WAY NOTES

KLEPPE-DIRECT/FIGG

1 WERE MAINTAINED?

2 MR. PASAHOW: THESE NOTES WERE NEVER SHOWN TO ANYONE
3 ELSE, YOUR HONOR. THEY WERE MADE FOR THE WITNESS' PERSONAL
4 BENEFIT, NOT FOR THE BENEFIT OF ANY BUSINESS ENTITY.

5 MR. FIGG: BUT --

6 THE COURT: YES?

7 MR. FIGG: BUT SHE HAS STATED THAT HER -- IT WAS HER
8 REGULAR ACTIVITY TO KEEP NOTES OF THESE SEMINARS. THEY WERE
9 GIVEN REGULARLY.

10 AND I DISAGREE WITH MR. PASAHOW'S CHARACTERIZATION OF
11 THE ANCIENT DOCUMENTS EXCEPTION. IT IS A CLEAR EXCEPTION TO THE
12 HEARSAY RULE.

13 (PAUSE IN PROCEEDINGS)

14 THE COURT: WELL, I THINK --

15 MR. FIGG: THERE CAN CERTAINLY BE NO QUESTION ABOUT THE
16 TRUSTWORTHINESS OF THESE MADE OVER 20 YEARS AGO.

17 THE COURT: WELL, YOU'RE ANTICIPATING WHAT I'M GOING TO
18 RULE, AND THAT IS ESSENTIALLY UNDER THE CATCH-ALL PROVISION OF
19 803, THAT GIVEN HER TESTIMONY, ABOUT HOW NOTES WERE MAINTAINED
20 OR TAKEN, THE FACT THAT SHE'S HERE AND SUBJECT TO
21 CROSS-EXAMINATION, AND ALL OF THE OTHER INDICIA THAT SURROUND
22 THEM, THEY WOULD COME IN AS PAST RECOLLECTION RECORDED, ANYWAY.

23 I THINK, GIVEN THE TECHNICAL NATURE OF THIS MATERIAL,
24 IT IS FAR MORE HELPFUL TO THE JURY AND CERTAINLY NO THREAT TO
25 THE INTEGRITY OF THE PROCEEDINGS BY ALLOWING THEM TO BE SEEN BY

KLEPPE-DIRECT/FIGG

1 THE JURY AS WELL AS READ BY THE WITNESS.

2 SO THE OBJECTION IS OVERRULED.

3 MR. FIGG: THANK YOU, YOUR HONOR.

4 Q. DR. KLEPPE, I'VE PREPARED A CHART, BLOWUP, OF THAT EXHIBIT,
5 WHICH I'VE PLACED ON THE EASEL HERE. I DON'T KNOW IF YOU CAN
6 SEE THAT FROM THAT DISTANCE. YOU MAY WANT TO COME DOWN, IF HER
7 HONOR --

8 THE COURT: YES.

9 Q. (BY MR. FIGG) -- AGREES.

10 A. YES.

11 (PAUSE IN PROCEEDINGS)

12 THE WITNESS: I THINK I HAVE TO --

13 THE REPORTER: I'M SORRY. I CAN'T HEAR HER.

14 THE COURT: HOLD ON JUST ONE MOMENT. THE REPORTER IS
15 GOING TO HAVE TO BE ABLE TO HEAR YOU, SO . . .

16 (CLERK HANDS MICROPHONE TO WITNESS)

17 THE COURT: THERE WE GO.

18 Q. (BY MR. FIGG) IF YOU CAN JUST HOLD THAT, PLEASE.

19 A. YES.

20 Q. CAN YOU DESCRIBE THIS, DOCTOR.

21 A. YES. WHAT I SAID WAS, I HAVE TO APOLOGIZE FOR MY CRUMMY
22 WRITING, BUT THEN I DIDN'T KNOW ANYONE WAS GOING TO SEE THEM.

23 WHAT THIS IS IS A COPY OF TWO PAGES FROM MY SEMINAR
24 NOTES, FROM THE RESEARCH SEMINARS. AND AS YOU CAN SEE, THE TOP
25 IS "KJELL." THAT WAS MY LATE HUSBAND, DR. KLEPPE.

KLEPPE-DIRECT/FIGG

1 THE DAY IS MONDAY, THE 24TH OF MARCH -- THAT'S THE WAY
2 THAT THE NORWEGIANS USE -- AND IT IS '69, SO THAT WOULD BE IN
3 THE EARLY SPRING '69.

4 OF COURSE, THESE ARE ONLY SHORT NOTES. BUT WHAT THE
5 SEMINAR IS ABOUT IS TWO SUBJECTS, WHICH AT THAT TIME WAS VERY
6 IMPORTANT WORK WHICH KJELL WAS DOING. AND THAT WAS TO SEE --
7 AND YOU ARE SEEING ENOUGH OF THESE DRAWINGS TO KNOW THAT THESE
8 TWO SLANTS REPRESENT TWO OLIGONUCLEOTIDES.

9 AND HIS -- HIS -- THE SUBJECT OF THIS SEMINAR WAS TO
10 SEE IF WE HAVE DUPLEXES WHICH IS NOT PERFECTLY PARALLEL, THAT
11 LACKS PIECES, WITH THE DNA POLYMERASE. IN THIS CASE, IT WAS THE
12 KORNBERG ENZYME. WILL THAT ENZYME COMPLETELY FILL OUT SO WE END
13 UP WITH A PERFECT DUPLEX?

14 AND IN THIS CASE, AND IN THIS CASE, WE ONLY HAD THE
15 MIDDLE PART OF THE GENE, SO THIS WOULD BE ABOUT 30 NUCLEOTIDES
16 LONG FROM THE MIDDLE PART OF THIS LLG. THAT IS WHAT THE FIRST
17 PART IS ABOUT.

18 SO WHAT THIS PART SHOWS IS THAT THEY ARE COMPLETELY
19 FILLED IN AND THE EVIDENCE IS DONE HERE (INDICATING). SO
20 THERE'S THE NUMBERS HE'S GOT AND IT HAS THIS.

21 SO THIS PART JUST GOES TO SHOW THAT WHATEVER TYPE OF
22 DUPLEX YOU START WITH, UNDER THE CONDITION HE WORKED WITH,
23 BECAUSE IT CHANGED THOSE, YOU GOT A PERFECT DUPLEX. THAT WOULD
24 BE THE FIRST PART OF IT.

25 BUT FOR THIS CASE, I UNDERSTAND THAT THE MOST

KLEPPE-DIRECT/FIGG

8
1 INTERESTING PART IS THE LAST PART OF THE SEMINAR AND HAS MY
2 CRUMMY NOTES HERE.

3 AND HERE'S A DRAWING, AND AGAIN YOU SEE THESE TWO
4 PARALLEL SLANTS. AND ON EACH END OF THIS IS A LITTLE PIECE
5 STUCK TO IT, A LITTLE OLIGONUCLEOTIDE, WHICH YOU HAVE SEEN MANY
6 TIMES NOW.

7 AND IT SAYS DUPLEX II. AND DUPLEX II IS THIS ONE, IS
8 DRAWN UP HERE, AND THIS IS 29 NUCLEOTIDES LONG AND IT LACKS ONE,
9 ONE . . . BIT OF IT.

10 AND I HAVE TO READ IT TO YOU, AND I -- IT'S MY OWN
11 SHORTHAND.

12 "DUPLEX II - HEATED TWO MINUTES AT 100
13 DEGREES IN THE PRESENCE OF 10-FOLD EXCESS OF NONA AND
14 DECA. HOMOLOGOUS TO THE ENDS."

15 AND NONA AND DECA ARE TWO OLIGONUCLEOTIDES BASED ON 9
16 AND 10, AND THEY ARE THE ONES WHO ARE DRAWN HERE.

17 AND THEN THERE IS A CURVE SHOWING THIS. THAT IS HOW
18 THIS REACTION WAS DONE. THE TIME WOULD BE ON THIS AXIS
19 (INDICATING) AND HOW COMPLETE REACTION WAS GOING WAS ON THIS
20 AXIS (INDICATING).

21 AND WHAT THIS MONITORED IS THE REPAIR REACTION. THAT
22 IS, TO FILL IN THIS WAY, AND FROM THAT PRIMER FILL IN THAT WAY.
23 THAT WAS WHAT WE IN THE LAB AT THAT TIME CALLED REPAIR
24 REPLICATION, WHAT YOU ALSO HAVE KNOWN AS PRIMER EXTENSION.

25 AND IF YOU LOOK AT THIS DRAWING OF THE CURVE, YOU SEE

KLEPPE-DIRECT/FIGG

8 1 THAT IT STARTS VERY RAPIDLY AND THEN IT PLATEAUS. AND THE LEVEL
2 OF THE PLATEAU, ON THIS AXIS, 85 PERCENT OF COMPLETION. SO THAT
3 MEANS THAT THIS FIRST REACTION WENT 85 PERCENT OF WHAT YOU
4 THEORETICALLY EXPECTED.

5 AND THEN IT SAYS HERE, "HEAT AGAIN AND ADD NEW ENZYME."
6 ADD NEW ENZYME. AND THEN THE REACTION CONTINUES AS IT DID
7 BEFORE: IT GOES UP AND THEN PLATEAUS. BUT OBVIOUSLY THIS TIME
8 IT DOESN'T GO SO FAR AS THE FIRST TIME. SO A ROUGH ESTIMATE
9 WOULD BE LIKE 40 PERCENT.

10 AND THEN DOWN HERE IS THREE PARALLEL CURVES WHICH ARE
11 PARALLEL TO THIS TIGHT AXIS. THAT MEANS IT DOESN'T -- IT HASN'T
12 HAPPENED VERY MUCH IN THOSE REACTIONS. THEY ARE CONTROLS.

13 AND THERE ARE THREE TYPES OF CONTROLS, THE ONE THAT'S
14 MINUS DNA MOLECULES; THAT IS, YOU DO THE SAME REACTION BUT DON'T
15 ADD ANY DNA, AND OF COURSE YOU WON'T ADD ANYTHING -- EXPECT
16 ANYTHING TO HAPPEN IN THOSE CIRCUMSTANCES.

17 AND THEN THE SECOND ONE IS MINUS PRIMER; THAT IS, IF
18 YOU DO THIS TYPE OF EXPERIMENT AND DON'T ADD ANY PRIMERS. THE
19 POLYMERASE CANNOT DO ANYTHING BECAUSE THERE'S NOTHING TO START
20 ON, SO NOTHING HAPPENS.

21 AND THE THIRD IS MINUS HEATING. IT SAYS HEATING THERE.
22 AND THAT MEANS THAT IF YOU DON'T HEAT, THESE TWO PRIMERS DOESN'T
23 GO -- IT DOESN'T LEAVE EACH OTHER, SO YOU CAN'T START.

24 SO THEN YOU HAVE THESE TIGHT MOLECULES WITH THE -- THAT
25 THE POLYMERASE CANNOT FIND ANYTHING TO START ON, BECAUSE THE

KLEPPE-DIRECT/FIGG

1 PRIMERS CANNOT GET INTO THE MOLECULE ITSELF IT'S SO TIGHT.

2 SO THAT IS WHAT THIS SAYS.

3 Q. OKAY. THANK YOU, DR. KLEPPE.

4 A. (WITNESS RESUMES WITNESS STAND.)

5 Q. DR. KLEPPE, IS -- IS WHAT YOU WROTE ON THE BOTTOM OF THIS
6 PAGE, IS IT YOUR UNDERSTANDING THAT YOU RECORDED EVERYTHING THAT
7 YOUR HUSBAND PRESENTED ABOUT THIS REACTION AT THAT SEMINAR?

8 A. NO, NO. WHEN YOU TAKE NOTES, YOU ONLY TAKE WHAT YOU SEE TO
9 BE THE MOST, BECAUSE IN A SEMINAR, WHICH GOES ON FOR -- IN THIS
10 CASE, IT WOULD BE LIKE ONE HOUR, PERHAPS MORE, LOTS OF STUFF --
11 INFORMATION WOULD BE PRESENTED WHICH YOU COULD NOT WRITE DOWN,
12 SO THIS IS WHAT'S DESTINED TO HAVE A LITTLE REMINDER OF WHAT WAS
13 GOING ON.

14 AND THESE ARE VERY USEFUL BECAUSE THE NEXT TIME THIS
15 COMES AROUND YOU CAN LOOK BACK AND SEE WHAT HAPPENED. SO THIS
16 WOULD BE JUST MY SHORT -- SHORT NOTE OF WHAT WAS PRESENTED.

17 Q. WAS -- DID THE SCIENTISTS PRESENTING SEMINARS BRING THEIR
18 LABORATORY NOTEBOOKS WITH THEM TO THE SEMINARS?

19 A. OH, YES, BECAUSE THAT WAS ALL THE WORK. AND USUALLY YOU --
20 AND ALL THE RESULTS WOULD BE, LIKE IN THIS -- IN THIS TYPE OF
21 EXPERIMENT, YOU WOULD RECORD YOUR NOTE -- YOUR NUMBERS AND THEN
22 YOU WOULD MAKE A DRAWING, A GRAPH. ON THIS, OF COURSE, YOU ONLY
23 HAD ONE COPY AND THAT WAS STUCK IN YOUR NOTEBOOK.

24 AND, AS I SAID, YOU WOULD TAKE THIS GRAPH AND PUT IT ON
25 THE BLACKBOARD. YOU USED TAPE. AND THAT ALSO MADE THE PAPER

KLEPPE-DIRECT/FIGG

9
1 STICKY AFTERWARDS. BUT YOU TAPED THEM ON THE BLACKBOARD AND YOU
2 SAT -- YOU HAD THAT WHEN YOU PRESENTED YOUR RESULTS.

3 Q. WERE THESE WEEKLY SEMINARS AT THE TIME THIS ONE WAS GIVEN,
4 WERE -- WERE THEY WELL ATTENDED BY SCIENTISTS IN THE LABORATORY?

5 A. NOT ONLY WELL, BUT EVERYONE WAS EXPECTED TO BE THERE. AND
6 NO ONE WOULD MISS IT, BECAUSE THIS WAS WHAT THE REACTIONS WERE,
7 SO IT'S VERY IMPORTANT.

8 MR. FIGG: WELL, THANK YOU, DR. KLEPPE, VERY MUCH.
9 THAT CONCLUDES OUR DIRECT EXAMINATION, YOUR HONOR.

10 THE COURT: THANK YOU.

11 MR. PASAHOW: YOUR HONOR, AT THE PRETRIAL CONFERENCE,
12 WE'D AGREED THAT A JURY INSTRUCTION WOULD BE GIVEN AT THIS TIME,
13 AND THERE WERE TWO VERSIONS OF IT SUBMITTED TO YOUR HONOR. ONE
14 HAS BEEN MARKED D-145 AND THE OTHER P-143. THEY DISAGREE
15 SLIGHTLY.

16 THE COURT: WOULD YOU HAND THOSE UP, PLEASE, SINCE YOU
17 HAVE THEM RIGHT THERE?

18 (PAUSE IN PROCEEDINGS)

19 THE COURT: OKAY. WELL, A MODIFIED VERSION OF BOTH, AS
20 IT WERE:

21 YOU MAY RECALL AT THE OUTSET OF THE TRIAL, I TOLD YOU
22 THAT -- ABOUT EVIDENCE, AND SOME EVIDENCE COMES IN FOR
23 CONSIDERATION IN ALL RESPECTS; SOME TESTIMONY OR EVIDENCE COMES
24 IN FOR A LIMITED PURPOSE. IN OTHER WORDS, TO EXPLAIN WHY
25 SOMEBODY DID SOMETHING THEY DID, OR WHATEVER, BUT NOT FOR THE

9
1 ACTUAL TRUTH OF THE STATEMENTS THEMSELVES.

2 BECAUSE, FOR EXAMPLE, SOMETHING THAT IS SUBMITTED FOR
3 THE TRUTH OF THE MATTER MAY, IN FACT, BE HEARSAY IF IT IS
4 SOMETHING THAT IS OTHER THAN WHAT THAT PARTICULAR WITNESS WHO
5 WAS TESTIFYING SAW OR SAID OR DID; IN OTHER WORDS, ANY KIND OF
6 OUT-OF-COURT STATEMENT TO WHICH THERE ARE THEN, AS LAWYERS ARE
7 WANT TO DO, TREMENDOUS NUMBER OF EXCEPTIONS DEVELOP OR EVOLVE.

8 BUT ANY OUT-OF-COURT STATEMENT OFFERED FOR THE TRUTH OF
9 THE MATTER CONTAINED IN THE STATEMENT; IN OTHER WORDS, WHAT THE
10 STATEMENT ITSELF SAYS FOR THE TRUTH OF THAT STATEMENT IS
11 CONSIDERED HEARSAY.

12 THERE ARE, AS I SAID, EXCEPTIONS TO THAT.

13 AND, IN ADDITION, THOSE STATEMENTS MAY BE ADMITTED TO
14 SHOW SOMEBODY'S STATE OF MIND OR TO SHOW, FOR EXAMPLE, THAT
15 SOMEBODY DID WHAT THEY HAD SAID THEY WOULD DO, THAT KIND OF
16 THING, TO DEMONSTRATE INTENT OR THAT IT HAPPENED IMMEDIATELY,
17 AND THERE MAY BE AN EXCEPTION ALSO BECAUSE YOU HEARD US TALKING
18 ABOUT VARIOUS EXCEPTIONS HERE, WHETHER IT WAS SOME TYPE OF
19 RECORD OR AN ANCIENT DOCUMENT.

20 I DON'T KNOW HOW IT FEELS TO HAVE SOMETHING YOU'VE MADE
21 NOTES ON A NUMBER OF YEARS AGO CALLED AN ANCIENT DOCUMENT,
22 BUT -- THAT SORT OF GIVES YOU AN UNEASY FEELING; DOESN'T IT?

23 THE WITNESS: NO. BEING 52 YEARS, I FEEL AGELESS,
24 SO . . .

25 (LAUGHTER)

9
1 THE COURT: WELL, YOU SURELY ARE NOT, BUT I'M SURE IT'S
2 JUST A NUANCE IN AMERICAN LAW, AND I SUSPECT BECAUSE WE'RE SUCH
3 A NEW COUNTRY. PROBABLY IN NORWAY THE NOTES WOULD HAVE TO BE
4 MUCH OLDER BEFORE THEY QUALIFIED AS AN ANCIENT DOCUMENT BUT, IN
5 ANY EVENT, THAT'S WHAT THEY'RE REFERRED TO.

6 WELL, IN THIS CASE, YOU'VE HEARD TESTIMONY FROM THIS
7 DR. KLEPPE REGARDING HER LATE HUSBAND AND DR. KHORANA AND THINGS
8 THAT HAPPENED IN DR. KHORANA'S LAB.

9 NOW, OF COURSE, SHE MAY TESTIFY AS TO WHAT SHE SAW OR
10 WHAT SHE DID OR WHAT SHE OBSERVED SOMEONE ELSE DO, BUT, OF
11 COURSE, IF SHE TESTIFIES ABOUT WHAT SOMEONE TOLD HER, THAT IS,
12 IN FACT, HEARSAY UNLESS THERE IS -- THERE IS A BASIS FOR IT.

13 WHAT YOU'VE HEARD HER TESTIFY TO ABOUT WHAT OCCURRED IN
14 THESE SEMINARS, FOR EXAMPLE, IN DR. KHORANA'S LABS, AND IN
15 HER -- THAT OCCUR NOW IN HER NOTES FROM THOSE SEMINARS, ARE
16 ADMITTED INTO EVIDENCE ONLY FOR A LIMITED PURPOSE, AND YOU MAY
17 CONSIDER THAT EVIDENCE ONLY FOR THE LIMITED PURPOSE FOR WHICH IT
18 IS ADMITTED.

19 YOU MAY CONSIDER IT ONLY FOR THE PURPOSE OF DECIDING
20 WHAT WAS SAID AND HEARD DURING THE SEMINARS. YOU MUST CONSIDER
21 IT FOR THE PURPOSE OF DECIDING WHAT WORK WAS ACTUALLY PERFORMED
22 UNLESS IT IS WORK THAT SHE OBSERVED HERSELF AS OPPOSED TO
23 HEARING ABOUT IT IN A -- IN A SEMINAR AND HEARING SOMEONE ELSE
24 DESCRIBE IT, BECAUSE IT WOULD BE -- IT WOULD BE HEARSAY.

25 IN OTHER WORDS, YOU MAY CONSIDER IT ONLY FOR THE

KLEPPE-CROSS/PASAHOW

10 1 PURPOSE OF DECIDING WHAT WAS SAID AND HEARD DURING THE SEMINARS
2 BUT NOT FOR THE PURPOSE OF DECIDING THE ACCURACY OR INACCURACY
3 OR THE TRUTH OF THOSE STATEMENTS.

4 NOW, HAVE I SUFFICIENTLY MUDDIED IT THAT IT'S UNCLEAR?

5 DO YOU UNDERSTAND?

6 THE JURORS: (NODDING HEAD.)

7 THE COURT: IT'S A FINE LINE.

8 OKAY. ARE YOU READY TO PROCEED, MR. PASAHOW?

9 MR. PASAHOW: YES, YOUR HONOR.

10 THE COURT: THANK YOU.

11 CROSS-EXAMINATION

12 BY MR. PASAHOW:

13 Q. GOOD MORNING, DR. KLEPPE.

14 DR. KLEPPE, YOU'VE BEEN RETAINED AS A CONSULTANT FOR DU
15 PONT FOR PURPOSES OF THIS CASE?

16 A. YES, I HAVE.

17 Q. AND YOU'RE RECEIVING \$2,000 PER DAY AS A FEE AS A
18 CONSULTANT?

19 A. YES. AND EVEN AFTER 62 PERCENT OF PERSONAL TAX, THAT IS
20 REALLY GOOD.

21 Q. NOW, BACK WHEN YOU WERE DOING THE WORK YOU DESCRIBED IN THE
22 KHORANA LABORATORY, DID DU PONT HAVE ANY INVOLVEMENT IN THAT
23 WORK?

24 A. IN THE KHORANA LABORATORY? YOU MEAN, IF -- IF DU PONT HAD
25 ANYTHING TO DO WITH THE WORK IN KHORANA'S LABORATORY?

KLEPPE-CROSS/PASAHOW

10

1 Q. YES.

2 A. NEIN. NO, NO, NO. THIS WAS A ~~PURELY ACADEMIC PLACE~~, I
3 MEAN.

4 Q. SO THERE WERE NO DU PONT SCIENTISTS THERE, FOR EXAMPLE.

5 A. NOT TO MY KNOWLEDGE.

6 Q. NOW, YOU MENTIONED THAT DR. KLENOW WAS IN THE LABORATORY.

7 A. NO. I SAID THAT I HEARD MY LATE HUSBAND, WHEN HE WAS A
8 POST-DOC IN '72 AT M.I.T., THAT KLENOW WAS ALSO VISITING. BUT
9 THAT WAS AT M.I.T. AND I WAS NOT AT M.I.T. IN '72.

10 Q. I MISUNDERSTOOD.

11 SO YOU WERE NOT THERE AT THE SAME TIME AS DR. KLENOW.

12 A. NO, NO. I SAID THAT MY HUSBAND HAD MENTIONED THAT.

13 Q. WHEN YOU WERE AT THE LABORATORY, IN DR. KHORANA'S
14 LABORATORY, DID YOU KNOW ABOUT DR. KLENOW'S WORK ON THE LARGE
15 FRAGMENT OF THE ENZYME?

16 A. IN '69? NO, I DON'T THINK SO.

17 Q. IN 1970, DID YOU KNOW ABOUT THAT WORK?

18 A. NO. I CANNOT RECALL WHEN I LEARNED ABOUT IT, BECAUSE I WAS,
19 AS I TOLD YOU, INTERESTED IN RNA POLYMERASE. THAT WAS MY
20 PRIMARY INTEREST, SO I DID THE RNA POLYMERASE WORK.

21 Q. FROM TIME TO TIME, YOU PREPARED THE DNA POLYMERASE THAT WAS
22 USED IN THESE EXTENSION REACTIONS?

23 A. THE FIRST TASK, I WAS SUPPOSED TO PURIFY DNA POLYMERASE 1
24 ACCORDING TO THE METHOD OF DR. KORNBERG, BECAUSE IT'S AN
25 EXTREMELY GOOD EXERCISE TO LEARN HOW TO PREPARE ENZYMES.

KLEPPE-CROSS/PASAHOW

10 1 Q. UH-HUH.

2 A. BUT THAT WAS A METHOD WHICH DR. KORNBERG HAD PUBLISHED WITH
3 SOME OTHER PERSONS.

4 Q. DO YOU KNOW IF, AT THE TIME YOU WERE PREPARING THE ENZYME,
5 WHETHER YOU KNEW THAT IT CAME APART INTO THESE -- THESE TWO
6 PIECES WITH DIFFERING PROPERTIES?

7 A. NO. I REMEMBER THAT IT WAS VERY IMPORTANT NOT TO LET IT
8 STAND AROUND, BECAUSE THEN IT COULD DEGRADE. BUT WE WERE
9 LOOKING FOR THE WHOLE ENZYME, THE 106,000-NUCLEOTIDE, OR
10 SOMETHING.

11 Q. SO YOU CAN'T RECALL IF, AT THE TIME WHEN YOU WERE DOING THIS
12 WORK, WHETHER -- WHETHER YOU KNEW THAT YOU COULD GET THE KLENOW
13 PIECE SEPARATE.

14 A. NO, NO.

15 Q. NOW, WHEN YOU WOULD PURIFY ENZYMES BACK AT THIS TIME, IN
16 1969 AND 1970, IS IT TRUE THAT THE ENZYME WOULD BE -- HAVE
17 WITHIN IT SOME SMALL PIECES OF DNA AS WELL AS THE PROTEIN?

18 A. YOU MUST REMEMBER THAT THE PURIFICATION METHODS AT THAT TIME
19 WAS NOT AS GOOD AS THEY ARE NOW, SO, OF COURSE, HOW COULD YOU
20 KNOW?

21 WE DIDN'T DETECT IT, BUT IF YOU CANNOT DETECT A THING,
22 THAT DOESN'T MEAN THAT IT ISN'T THERE. SO THIS IS AN IMPOSSIBLE
23 THING TO ANSWER.

24 Q. WELL, DR. KORNBERG, YOU'LL RECALL -- YOU WERE HERE FOR DR.
25 KORNBERG'S TESTIMONY?

KLEPPE-CROSS/PASAHOW

10

1 A. YES.

2 Q. DR. KORNBERG TESTIFIED THAT HE HAD A CASE WHERE HE WAS
3 WORKING WITH A ROUND PIECE OF DNA --

4 A. UH-HUH.

5 Q. -- AND HE THOUGHT THAT PERHAPS HE WAS GETTING SOME PRIMER
6 SYNTHESIS STARTED WITHOUT PUTTING A PRIMER IN.

7 A. YEAH.

8 Q. AND HE LATER FOUND OUT IT WAS BECAUSE THERE WERE SMALL
9 PIECES OF DNA CONTAMINATING THE SOLUTION.

10 DO YOU THINK THAT THOSE SMALL PIECES WERE ALSO IN THE
11 ENZYME YOU WERE USING?

12 A. NO. I CANNOT SAY ANYTHING ABOUT THAT, BUT WHAT I CAN SAY IS
13 THAT THE UNIQUE TYPE OF WORK WE WERE DOING WAS THAT WE HAD SMALL
14 DOUBLE-STRANDED DNA MOLECULES WITH A VERY SPECIFIC SEQUENCE.

15 Q. UH-HUH.

16 A. AND THE ESSAY WAS THAT IF YOU DID NOT -- LIKE THE SEMINAR:
17 IF YOU DID NOT PUT IN ANY PRIMER, YOU DIDN'T GET ANY SYNTHESIS.
18 SO IF YOU HAD LOTS OF JUNK, PRIMERS, AS YOU ARE IMPLYING THAT WE
19 HAD, IT WOULD -- IT WOULDN'T -- THE CONTROL WOULDN'T WORK. SO
20 OBVIOUSLY THIS COULD NOT BE SO.

21 Q. WELL, WHAT --

22 MR. FIGG: YOUR HONOR, I DIDN'T WANT TO INTERRUPT DR.
23 KLEPPE'S ANSWER, BUT I OBJECT TO MR. PASAHOW'S CHARACTERIZATION
24 OF DR. KORNBERG'S TESTIMONY. HE DID NOT TESTIFY THAT HIS
25 ENZYMES WERE CONTAMINATED WITH DNA.

KLEPPE-CROSS/PASAHOW

10
11
1 THE COURT: THAT'S ONE OF THOSE AREAS WHERE I'M GOING
2 TO ALLOW THE JURY TO MAKE ITS OWN DETERMINATION AS TO THE -- THE
3 SUM TOTAL OF DR. KORNBERG'S TESTIMONY.

4 Q. (BY MR. PASAHOW) DOCTOR --

5 THE COURT: SO THE ANSWER -- THE QUESTION AND THE
6 ANSWER WILL REMAIN.

7 MR. PASAHOW: THANK YOU, YOUR HONOR.

8 Q. DR. KLEPPE, IN THIS EXPERIMENT YOU POINTED OUT WITH THE
9 CONTROLS DOWN HERE, DO YOU KNOW HOW LONG THIS TIME PERIOD IS
10 FROM THE BEGINNING TO THE END?

11 A. OH, IT WOULD BE A -- I DIDN'T RECORD IT, AND IF I KNEW YOU
12 WERE GOING TO ASK, I WOULD HAVE, I CAN ASSURE YOU.

13 (LAUGHTER)

14 THE WITNESS: BUT MY GUESS WOULD BE A COUPLE OF HOURS
15 TO THE PLATEAU, THE FIRST PLATEAU. IT WOULD BE AN ORDINARY
16 PROCEDURE, BUT I CANNOT SAY MORE.

17 Q. (BY MR. PASAHOW) NOW, ON THE -- ON THE QUESTION OF THIS
18 ARTICLE WE'VE BEEN TALKING ABOUT, DID I UNDERSTAND THAT THAT
19 ARTICLE WAS PUBLISHED AFTER YOU AND DR. KJELL KLEPPE HAD
20 RETURNED TO NORWAY?

21 A. IT WAS PUBLISHED, YES, BUT IT WAS SUBMITTED FOR PUBLICATION
22 BEFORE WE LEFT. AND THE IMPORT OF ANY PUBLICATION IS THE DATE
23 IT IS SUBMITTED BECAUSE THEN THE JOURNAL GETS IT. AND THAT, I
24 THINK, WAS -- YEAH, WE WERE WORKING VERY HARD, SO THAT WAS
25 BEFORE WE LEFT, YEAH.

KLEPPE-CROSS/PASAHOW

11 1 Q. WHAT IS THE DATE OF SUBMISSION ON THAT ARTICLE? IT'S THERE
2 IN FRONT OF YOU.

3 A. JULY, I THINK.

4 LET'S SEE.

5 (PAUSE IN PROCEEDINGS)

6 THE WITNESS: RECEIVED, 20TH JULY, YES, SO THAT MEANS
7 THAT KHORANA HAD SENT IT. SO THAT MEANS THAT IT HAD BEEN . . .
8 WHATEVER HIS INVOLVEMENT IN IT HAD BEEN FINISHED BECAUSE THAT
9 MUST BE ABOUT THE TIME WE WERE LEAVING.

10 Q. (BY MR. PASAHOW) SO IT WAS SUBMITTED AFTER YOU WERE BACK IN
11 NORWAY BUT WRITTEN BEFORE YOU LEFT?

12 A. WE DID NOT -- WE WERE NOT BACK IN NORWAY ON JULY 20TH.

13 Q. OH, I'M SORRY. I THOUGHT YOU HAD SAID YOU HAD LEFT EARLIER.

14 SO IT WAS SUBMITTED WHILE YOU WERE -- WHILE YOU WERE
15 STILL IN DR. KHORANA'S LABORATORY.

16 A. WE LEFT IN THE END OF THE SUMMER, BUT WE DID NOT GO STRAIGHT
17 TO NORWAY. WE WENT TO PLACES. WE WENT TO NEW YORK AND HAD TO
18 SEE A LITTLE OF THE STATES BEFORE WE WENT ON THE BOAT.

19 Q. I SEE.

20 A. SO . . .

21 (PAUSE IN PROCEEDINGS)

22 Q. (BY MR. PASAHOW) DR. KLEPPE, LET ME SHOW YOU WHAT WE'VE
23 MARKED AS EXHIBIT B-194.

24 A. (WITNESS EXAMINES DOCUMENT.)

25 UH-HUH. IT LOOKS LIKE ONE OF -- ONE OR MORE OF MY

KLEPPE-CROSS/PASAHOW

11

1 CRUMMY NOTES.

2 Q. AND THESE ARE --

3 A. THIS IS ALSO A MONDAY MORNING SEMINAR. IT'S DATED SEPTEMBER
4 13, AND IT IS AGAIN KJELL WHO GIVES THE SEMINAR.

5 Q. AND THIS WOULD BE IN 1969 AGAIN?

6 A. YES, IT HAD TO BE IN '69, BECAUSE IN '70 AT THAT TIME WE
7 WERE NOT THERE. THE LAB WAS NOT THERE, EITHER, BECAUSE IT HAD
8 MOVED.9 Q. SO TO SUMMARIZE, THESE ARE NOTES OF ANOTHER OF THESE MONDAY
10 MORNING SEMINARS, AND THIS PARTICULAR ONE WAS GIVEN BY DR. KJELL
11 KLEPPE.

12 A. UH-HUH. YES, AS I SAID.

13 (PAUSE IN PROCEEDINGS)

14 Q. (BY MR. PASAHOW) NOW, THESE PARTICULAR NOTES HAVE AT THE
15 BOTTOM OF THE FIRST PAGE HERE SOME PECULIAR STRUCTURES DRAWN.

16 A. NO, NO. THEY'RE NOT PECULIAR AT ALL.

17 Q. WELL . . .

18 (LAUGHTER)

19 Q. (BY MR. PASAHOW) THEY HAVE SOME STRUCTURES DRAWN.

20 CAN YOU -- CAN YOU TELL ME, PLEASE, FIRST, WHAT THIS
21 TOP ONE IS HERE THAT HAS THESE LETTERS LOOPING AROUND ON ITSELF.22 A. YES. THIS IS -- IF YOU HAD -- IF YOU TAKE ONE OF THESE
23 STRANDS -- I DON'T KNOW IF THE JURY HAS IT IN FRONT OF THEM, BUT
24 IF YOU TAKE ONE SINGLE STRAND OF THESE DNA PIECES -- AND THIS
25 APPEARS AGAIN TO BE A PIECE OF THE MIDDLE PART OF THIS GENE --

KLEPPE-CROSS/PASAHOW

11

1 THE NATURE OF THIS MOLECULE IS SUCH THAT THE SEQUENCE OF THE
2 BUILDING BLOCK IS SUCH THAT YOU -- THERE IS A POSSIBILITY FOR
3 THEM TO FALL BACK BECAUSE THEY ARE BEST BY THEMSELVES.

4 SO THIS IS WHAT IS CALLED A HAIRPIN STRUCTURE. AND IT
5 LOOKS LIKE A HAIRPIN IF YOU'RE A LITTLE GENEROUS.

6 Q. NOW, THIS IS THE SAME PIECE OF DNA THAT WAS INVOLVED IN THE
7 LECTURE THAT WAS GIVEN SEVERAL MONTHS EARLIER IN THE NOTES THAT
8 MR. FIGG SHOWED YOU?

9 A. NO, THIS IS NOT THE SAME PIECE. IT IS ONE OF THE PIECES.
10 BECAUSE I HAVE ALSO THE OPPOSITE PIECE. THIS IS THE ONE, THIS
11 IS THE OTHER, SO WE HAD BOTH THERE. AND WHEN YOU ANNEAL THEM,
12 THEY GO LIKE THIS (INDICATING).

13 Q. I SEE.

14 A. BUT THERE'S ONE LARGE DIFFERENCE, AND THAT IS, IN THAT CASE,
15 THERE IS 10-FOLD EXCESS OF PRIMER; IN THIS CASE, IT IS THE PIECE
16 BY ITSELF.

17 Q. WELL, THIS IS -- THIS, YOU'RE TELLING US, IS ONE -- ONE HALF
18 OF THE --

19 A. HALF OF THE DUPLEX.

20 Q. BUT THE SAME DUPLEX AS WAS INVOLVED IN THE MARCH NOTES.

21 A. YEAH. THE UPPER HALF OF THAT DUPLEX.

22 Q. AND THOSE ARE NOTES FROM SEPTEMBER OF THAT SAME YEAR.

23 A. UH-HUH.

24 Q. I'M SORRY, DOCTOR?

25 A. YES. YES, IT IS.

KLEPPE-CROSS/PASAHOW

11
12
1 Q. NOW, JUST BELOW THAT, THERE IS A -- ANOTHER STRUCTURE DRAWN,
2 WHICH IS SOMEWHAT DIFFERENT THAN THE --

3 A. UH-HUH.

4 Q. -- TWO PIECES ONE RIGHT NEXT TO EACH OTHER WE'RE USED TO
5 SEEING. CAN YOU TELL ME WHAT THAT IS.

6 A. YES. IT'S -- IF YOU TAKE -- IF YOU -- YOU SORT OF EXPAND
7 THE STRUCTURE ON TOP OF THAT, JUST UNBAND IT SO IT GOES IN ONE
8 LONG PIECE AGAIN, AND YOU STICK TWO THESE TOGETHER, THE NATURE
9 OF THE COMPOSITION OF THE MOLECULE IS STILL SUCH THAT THEY
10 CAN -- THEORETICALLY, IT CAN ALSO DO LIKE THIS (INDICATING).
11 IT'S A MOST INTERESTING MOLECULE, SO . . .

12 Q. I SEE. SO THAT'S THE SAME PIECE OF DNA FLIPPED OVER AND
13 THEN IT STICKS TO ITSELF LIKE THAT?

14 A. YEAH. THIS IS A POSSIBILITY, YOU SEE. YOU HAVE TO EXPLORE
15 ALL POSSIBILITIES THAT THESE MOLECULES CAN MAKE. AND IF YOU
16 HAVE A SINGLE-STRAND, THEORETICALLY, IT CAN DO BOTH OF THESE
17 THINGS.

18 (PAUSE IN PROCEEDINGS)

19 THE WITNESS: BUT I THINK IT'S VERY FAIR TO POINT
20 OUT -- IF YOU CAN SHOW THAT BACK AGAIN, I THINK I HAVE TO --

21 Q. (BY MR. PASAHOW) OF COURSE.

22 A. -- EXPLAIN IT.

23 IF YOU SEE THE WRITING, THE LINE JUST ABOVE THIS
24 HAIRPIN STRUCTURE, IT SAYS, "DNA POLYMERASE ON THE 29-PIECE
25 ALONE." AND THE NEXT IS "29 CAN FOLD BACK ON ITSELF." SO THIS

KLEPPE-CROSS/PASAHOW

12 1 IS A DRAWING OF THAT POSSIBILITY.

2 Q. UH-HUH. NOW, UP AT THE TOP OF YOUR NOTES ON THIS PAGE,
3 THERE ARE FOUR NUMBERED ITEMS. COULD YOU READ WHAT THOSE SAY
4 FOR US, PLEASE.

5 A. YEAH I CAN. THIS OBVIOUSLY -- AND I MUST ADMIT -- THE JURY
6 HAS TO UNDERSTAND THAT I HAVE NOT SEEN THIS PIECE OF PAPER IN 22
7 YEARS, SO IT'S A LITTLE WAY OUT.

8 BUT IT SAYS: "1. REPLICATION ON GENES."

9 THAT, OF COURSE, IS THE OVERALL GOAL OF THE KHORANA
10 LABORATORY, WHICH WE ALL WERE PART OF.

11 NUMBER TWO. "DEGREE OF COMPLETION OF REPAIR."

12 AND THAT IS WHAT I SAID EARLIER. IT WAS VERY IMPORTANT
13 THAT, WHEN YOU DID A REPAIR REACTION, THAT THE WHOLE MOLECULE
14 WAS REPAIRED AND NOT ONLY PART OF IT.

15 THE THIRD IS THE "SIZE OF TEMPLATE."

16 AND NUMBER FOUR IS "SINGLE STRAND."

17 Q. NOW, DO YOU RECALL THAT -- WELL, PERHAPS YOU'VE FORGOTTEN.

18 DO YOU RECALL THAT WE TALKED ABOUT THIS PARTICULAR SET
19 OF NOTES THAT YOU TOOK WHEN I CAME TO NORWAY TO TAKE YOUR
20 DEPOSITION?

21 A. I CANNOT REMEMBER, BECAUSE THAT WAS WHEN WE LOST THE
22 GOVERNMENT, SO I HAD MORE IMPORTANT THINGS TO THINK ABOUT.

23 (LAUGHTER)

24 THE WITNESS: IT WAS THE SAME WEEK.

25 Q. (BY MR. PASAHOW) I SEE. WELL, THERE'S A CHART HERE AT THE

KLEPPE-CROSS/PASAHOW

12

1 BOTTOM OF THE FIRST PAGE.

2 A. UH-HUH.

3 Q. AND DO YOU RECALL THAT THAT IS A CHART WHICH IS REPRODUCED
4 IN MORE FINISHED FORM IN THE ARTICLE THAT IS THE KLEPPE ARTICLE
5 INVOLVED IN THIS CASE?

6 (PAUSE IN PROCEEDINGS)

7 THE WITNESS: I CANNOT EXPLICITLY RECALL THAT, NO. NO,
8 I CANNOT, BUT . . . IF YOU -- WE CAN LOOK AND SEE IF . . .

9 (PAUSE IN PROCEEDINGS)

10 Q. (BY MR. PASAHOW) IF YOU'D LOOK AT FIGURE 11 ON PAGE 354.

11 A. YES.

12 (WITNESS SEARCHES THROUGH DOCUMENT.)

13 YEAH. FIGURE 11. YEAH.

14 YEAH. THERE YOU HAVE THE HAIRPIN AGAIN. YES, I'VE
15 FOUND IT.

16 Q. AND THAT FIGURE 11 IS A PRINTED VERSION OF THIS
17 HANDWRITTEN --

18 A. YES.

19 Q. -- NOTE; IS IT NOT?

20 A. UH-HUH. YEAH.

21 Q. NOW, IF YOU'LL TURN TO THE NEXT PAGE OF THE NOTES, IS THERE
22 ALSO A COPY OF THE CHART WHICH BECAME FIGURE 12 IN THE PRINTED
23 PUBLICATION?

24 A. FIGURE 12.

25 (PAUSE IN PROCEEDINGS)

KLEPPE-CROSS/PASAHOW

12

1 THE WITNESS: WHAT DO YOU MEAN? ARE YOU REFERRING TO
2 THE DRAWINGS ON MY NOTES IN THE MIDDLE OF THE PAGE?

3 Q. (BY MR. PASAHOW) YES.

4 A. NOT FIGURE 12, I THINK, BECAUSE I DIDN'T . . .

5 (PAUSE IN PROCEEDINGS)

6 THE WITNESS: NO. IT MUST BE -- I THINK YOU MUST BE
7 THINKING ABOUT FIGURE 10, BECAUSE IT DOESN'T -- THAT ONE DOESN'T
8 LOOK LIKE IT.

9 Q. (BY MR. PASAHOW) SO YOU THINK THAT, INSTEAD, THIS IS FIGURE
10 10 FROM THE . . .

11 A. I THINK IF I COULD BE ABLE TO READ MY NOTES, PERHAPS IT
12 WOULD BE EASIER.

13 Q. YES, OF COURSE.

14 A. (WITNESS EXAMINES DOCUMENT.)

15 IT SAYS -- I THINK I SHOULD READ IT. AND IF YOU COULD
16 PUT THE COPY OF MY NOTE ON THE BOARD, I THINK IT WOULD BE
17 EASIER.

18 Q. I'D BE HAPPY TO, IF I CAN BORROW MR. FIGG'S. WE HAD A
19 COPYING PROBLEM ON THIS PARTICULAR PAGE.

20 (PAUSE IN PROCEEDINGS)

21 THE WITNESS: I WAS WONDERING, ARE YOU REFERRING TO
22 THIS FIGURE (INDICATING)?

23 Q. (BY MR. PASAHOW) YES, THAT'S THE ONE.

24 A. YEAH, AND -- YEAH. OKAY.

25 THIS IS THE FIGURE IN THE MIDDLE OF THE PAGE 2 OF THESE

KLEPPE-CROSS/PASAHOW

12

1 SEMINAR NOTES.

2 AND YOU ARE ASKING IF THAT WAS THE SAME AS FIGURE 12 IN
3 THE PUBLISHED PAPER.

4 Q. YES.

5 A. I DON'T THINK SO, BECAUSE FIGURE 12 IN THE PUBLISHED PAPER,
6 "TEMPERATURE," IT SHOWS THE DIRECTION OF ZERO DEGREES DOES NOT
7 GO, AND IT GOES FAIRLY WELL AT 25 DEGREES.

8 IN THIS NOTE, CRUMMY AS IT IS, IT SAYS THAT THE PRIMER
9 TO DIFFERENT SIZES SUGGESTS THAT 20 HAS A SECONDARY STRUCTURE;
10 IF IT IS ALONE, YOU HAVE NO INCORPORATION.

11 SO IT SEEMS THAT I DID PUT TWO DIFFERENT TYPES OF
12 PROBLEMS: ONE IS PRIMER SIZE; ANOTHER IS TEMPERATURE.

13 Q. SO YOU BELIEVE THIS IS A HAND DRAWING OF WHAT BECAME FIGURE
14 10 IN THE PRINTED PUBLICATION; IS THAT RIGHT?

15 A. (WITNESS EXAMINES DOCUMENT.)

16 YES, BECAUSE -- AND I THINK I SHOULD STATE WHY I THINK
17 SO: BECAUSE IN THE PUBLICATION, THEY ARE DISCUSSING THE SIZE OF
18 TEMPLATE ON THE REPAIR REACTION, AND THEY USE DIFFERENT SIZE OF
19 TEMPLATE WITH THE SAME PRIMER. AND THE PRIMER IN ALL CASES ARE
20 THE SAME, AND THEN THEY ADD DIFFERENT SIZES OF TEMPLATE TO IT.
21 AND THEY USED NINE, 20, 12 AND 16, AND THAT IS EXACTLY THE SAME
22 NUMBER WHICH APPEARS IN THE SEMINAR NOTES.

23 Q. NOW, IF YOU COULD TURN OVER TO THE NEXT PAGE OF YOUR NOTES,
24 AND AT THE TOP THERE. THIS IS THE ONE I THINK I OUGHT TO HAVE
25 REFERRED TO AS FIGURE 12?

13

KLEPPE-CROSS/PASAHOW

13

1 A. YEAH. THIS -- YEAH. THIS TEMPERATURE STUDIES THE
2 INCORPORATION, ALL WITH E. COLI DNA POLYMERASE, AND IT SAYS THE
3 STUDIES GO FROM ZERO DEGREES TO 37 DEGREES.

4 YEAH, THAT WOULD BE FIGURE 12. YEAH.

5 Q. SO -- NOW, IN THAT TEMPERATURE STUDY, WHAT WAS THAT A
6 TEMPERATURE STUDY OF?

7 A. IT SAYS IN THE NOTES, AND I HAVE TO READ IT:

8 "EFFECT OF TEMPERATURE ON REPAIR ON DNA-V BY
9 E. COLI DNA POLYMERASE. THE TEMPERATURE USED ARE
10 GIVEN ABOVE AND THAT GOES FROM ZERO, FIVE, 15, 25, AND
11 37. OTHER CONDITIONS WERE AS DESCRIBED IN FIGURE 11."

12 SO THOSE ARE THE CONDITIONS.

13 Q. AND THE DNA THAT'S USED HERE AGAIN, THAT'S ONE HALF OF THE
14 SAME MOLECULE AS WAS INVOLVED IN THESE NOTES?

15 A. IT IS WHAT IS CALLED NUMBER FIVE IN THIS PAPER, AND, YES,
16 THAT IS TRUE, IT IS THE HAIRPIN, THE SINGLE-STRANDED MOLECULE.

17 Q. IN THIS FIGURE THAT IS DRAWN IN YOUR NOTES AND IS FIGURE 12,
18 WHAT WAS THE PRIMER THAT WAS BEING USED TO -- TO EXTEND THE DNA?

19 A. THE PURPOSE OF THIS STUDY WAS TO SEE IF THE MOLECULE FOLDED
20 BACK ON ITSELF. THEN IT COULD ACT AS ITS OWN PRIMER.

21 Q. UH-HUH.

22 A. SO THAT'S A DIFFERENT EXPERIMENT.

23 (PAUSE IN PROCEEDINGS)

24 Q. (BY MR. PASAHOW) SO THIS ONE WOULD NOT HAVE HAD A PRIMER;
25 IT WOULD BE THE REACTION THAT'S PRIMED JUST WITH THE HAIRPIN?

KLEPPE-CROSS/PASAHOW

13

1 A. NO. THERE ARE TWO TYPES OF HAIRPIN MOLECULES, AND THE
2 PURPOSE OF THIS PART OF THE STUDY WAS TO SHOW IF YOU HAVE A
3 HAIRPIN WITH A THREE . . . THREE PRIME HYDROXYL END, IT CAN
4 EXTEND. IF IT FOLDS THE OTHER WAY, IT DOES NOT COVER THREE
5 PRIME AND IT CAN ACT AS ITS OWN PRIMER.

6 Q. AND SO WHAT YOU'RE SAYING IS THAT THIS PIECE HERE COULD
7 EXTEND DOWN THIS WAY (INDICATING) WITHOUT ANY PRIMERS BEING
8 PRESENT.

9 A. IF THAT IS A THREE PRIME HYDROXYL END. AND IT SAYS IT IS
10 THE THREE PRIME HYDROXYL END, YEAH.

11 BUT THIS WAS, OF COURSE, KNOWN FROM OTHER STUDIES, THAT
12 IF YOU HAVE HAIRPIN STRUCTURE, IT COULD EXTEND.

13 Q. NOW, THERE'S ALSO A NOTE AT THE BOTTOM OF THE PAGE WE'VE
14 BEEN TALKING ABOUT, WHICH IS ANOTHER ONE OF THESE -- THESE
15 GRAPHS, AND THEN ABOVE IT THERE ARE SOME SHORT LINES DRAWN.

16 CAN YOU TELL ME WHAT THAT GRAPH SHOWS.

17 A. YEAH. AFTER 22 YEARS, I SEE THAT I SHOULD LEARN TO TAKE
18 BETTER NOTES.

19 IT SHOWS ONE LONG DNA MOLECULE AT 29 LONG.

20 WE HAVE TO START AT THE TOP THERE. YOU SEE THAT'S THE
21 ONE LONG PIECE OF DNA, SINGLE-STRANDED, AND THEN THERE'S A LONG
22 ROW OF PRIMERS OF DIFFERENT SIZE DRAWN UNDERNEATH IT, LIKE -- AT
23 DIFFERENT LENGTHS.

24 AND THE PURPOSE OF THIS EXPERIMENT IS PRIMERS OF
25 DIFFERENT LENGTHS. SO ONE IS JUST TRYING TO SEE WHAT TYPE OF

KLEPPE-CROSS/PASAHOW

13 1 PRIMER DO YOU NEED TO GET THIS REACTION GOING.

2 AND IT IS DONE AT 15 DEGREES CELSIUS WITH -- AGAIN,
3 WITH E. COLI. THE "EC" STANDS FOR E. COLI DNA POLYMERASE.

4 AND THIS PARTICULAR REACTION IS FOLLOWED BY
5 INCORPORATION OF P32, THAT IS A RADIOACTIVE LABEL, CTP, THE
6 DEOXY CTP.

7 Q. IS THIS -- IS THIS HAND DRAWING THE SAME EXPERIMENT WHICH
8 BECAME THE PRINTED --

9 A. BUT IT SHOULD --

10 Q. -- FIGURE 13 IN THE ARTICLE?

11 A. EXCUSE ME. IF I CAN FINISH THE EXPLANATION FIRST.

12 Q. I'M SORRY. I THOUGHT YOU WERE DONE.

13 A. OH, NO, NO. THIS IS JUST THE SETUP. AND THEN THE DIRECTION
14 IS WITH THE GRAPH GOING THERE.

15 YEAH. YOU HAVE TO TAKE THAT AWAY.

16 Q. OH, YOU WANT THE DRAWING BACK.

17 A. YEAH. I THINK IT IS BEST TO EXPLAIN THIS FIRST.

18 THEN YOU SEE THAT THE TIME AGAIN IS THE AXIS, WHICH IS
19 ON THE SHEET, AND THEN THE VERTICAL AXIS IS REACTION.

20 AND ALL IS DIFFERENT THINGS ARE RECORDED HERE. THE
21 BOTTOM IS 29 ALONE, AND THIS WILL BE THE INCORPORATION WITH A
22 HAIRPIN STRUCTURE. THEN YOU HAVE 29 WITH A NONA. AND,
23 OBVIOUSLY, THEY DIDN'T DO VERY MUCH BETTER. THE TOP ONE IS THE
24 HEXADECA. THAT MEANS YOU HAVE A VERY LARGE PRIMER, AND IN THAT
25 CASE, THE REACTION IS MUCH BETTER.

KLEPPE-CROSS/PASAHOW

14

1 Q. WHAT IS A NONA?

2 A. THAT IS A -- A LITTLE OLIGONUCLEOTIDE, NINE. THE . . .

3 Q. "NONA" MEANS NINE?

4 A. YEAH. YEAH.

5 Q. SO THIS WOULD BE THE -- HALF OF THE DUPLEX THAT WAS INVOLVED
6 IN THIS EXPERIMENT HERE WITH A PRIMER WHICH IS NINE BASES LONG?

7 A. YES, AND STARTING ONE OUTSIDE THE END. YOU CAN SEE THAT
8 THERE.

9 Q. UH-HUH. AND THEN THIS -- THESE LINES WOULD BE WITH LONGER
10 PRIMERS?

11 A. YEAH.

12 Q. WHAT IS A HEXADECA?

13 A. 16.

14 Q. NOW, IN THE EXPERIMENT OVER HERE, DO YOU KNOW HOW LONG THE
15 PRIMERS WERE?

16 (PAUSE IN PROCEEDINGS)

17 Q. (BY MR. PASAHOW) IS THAT -- IS THAT SHOWN IN YOUR NOTES?

18 A. YES. THERE WERE TWO PRIMERS. ONE IS 10 AND ONE IS A NINE.
19 BUT THESE TWO EXPERIMENTS CANNOT BE COMPARED BECAUSE -- OF
20 COURSE, THEY CAN BE COMPARED, BUT THEY ARE SO UNEQUAL IN THE
21 SET-UP THAT IT WILL CONFUSE THE JURY IF YOU START TO PUT THEM ON
22 TOP OF EACH OTHER.

23 IN THIS CASE, IT'S 10-FOLD EXCESS OF THE BLOCKING
24 PRIMER, SO WHEN YOU HEAT THE DNA MOLECULE, THEN THE PRIMER IS
25 THERE TO SORT OF CATCH MOLECULES. AND IF YOU CATCH IT IN A

KLEPPE-CROSS/PASAHOW

14

1 COMPLEX, IT CANNOT FALL BACK.

2 Q. UH-HUH. DO YOU KNOW WHAT THE -- WHAT THE EXCESS OF PRIMERS
3 WAS IN THIS PARTICULAR EXPERIMENT?

4 A. NO.

5 Q. THIS WOULD BE THE SAME NINE-BASE PRIMER AND THE SAME HALF OF
6 THE DNA THAT WERE PART OF WHAT WAS INVOLVED IN THE MARCH
7 EXPERIMENT THAT YOU TALKED ABOUT EARLIER?

8 A. I DIDN'T QUITE CATCH YOU.

9 Q. THE NINE-BASE PRIMER AND THE TEMPLATE DNA, BOTH OF THOSE
10 WERE PART OF WHAT WAS USED IN THE EXPERIMENT THAT'S DESCRIBED IN
11 YOUR NOTES OVER HERE, THE MARCH NOTES.

12 A. IT'S ONE HALF OF THE MOLECULE.

13 Q. NOW, THIS EXPERIMENT THAT WE'RE TALKING ABOUT NOW, THAT
14 PRESUMABLY WAS DONE AFTER THE EXPERIMENT THAT WAS DONE OVER HERE
15 IN THE MARCH NOTES?

16 A. YES.

17 (PAUSE IN PROCEEDINGS)

18 Q. (BY MR. PASAHOW) IS -- IS THERE ANYTHING IN THE PUBLISHED
19 ARTICLE ABOUT THIS EXPERIMENT HERE (INDICATING)?

20 A. NO. IT'S ONLY A REFERENCE IN THE TEXT WHICH SAYS THAT THIS
21 WORK IS IN PROGRESS.

22 Q. THAT'S AT THE VERY END?

23 A. YEAH.

24 Q. SO NOTHING -- NOTHING DESCRIBES THE TEMPLATE AND THE PRIMERS
25 THAT WERE USED HERE, FOR EXAMPLE.

KLEPPE-CROSS/PASAHOW

14 1 A. NO, NOT IN -- THIS PAPER DOES NOT DEAL WITH THAT, BUT IT --
2 IT SAYS THAT THIS WORK IS GOING ON, AND THIS IS BEING DONE.

3 Q. WHAT THE PAPER DOES DEAL WITH ARE THE EXPERIMENTS THAT ARE
4 IN THE SEPTEMBER NOTES; IS THAT RIGHT?

5 A. SOME OF THEM, YES.

6 Q. DO YOU KNOW WHEN THE OTHER EXPERIMENTS WERE DONE WHICH ARE
7 REFERRED TO IN THE ARTICLE? WERE THEY DONE BEFORE OR AFTER THE
8 EXPERIMENTS WE'RE TALKING ABOUT NOW?

9 A. SOME OF THEM ARE DONE BEFORE, IN THE -- IN -- EARLIER IN THE
10 WINTER.

11 Q. AND SOME OF THEM WERE DONE LATER?

12 A. YES.

13 (PAUSE IN PROCEEDINGS)

14 MR. PASAHOW: YOUR HONOR, WE'D OFFER EXHIBIT B-194,
15 WHICH ARE THE NOTES THAT DR. KLEPPE JUST TESTIFIED ABOUT.

16 THE COURT: ANY OBJECTION?

17 MR. FIGG: NO, YOUR HONOR, NO OBJECTION.

18 THE COURT: THEY ARE ADMITTED.

19 (DEFENDANT'S EXHIBIT B-194

20 RECEIVED IN EVIDENCE)

21 Q. (BY MR. PASAHOW) DR. KLEPPE, LET ME SHOW YOU WHAT'S BEEN
22 MARKED AS EXHIBIT A-69.

23 A. (WITNESS EXAMINES DOCUMENT.)

24 YES. THIS IS ALSO ONE OF THE MONDAY MORNING SEMINARS.
25 THIS WILL BE THE 7TH OF DECEMBER '69, AND THE PERSON GIVING THE

KLEPPE-CROSS/PASAHOW

14 1 SEMINAR IS MARV CARUTHERS.

2 AND BEFORE I DO ANYTHING MORE, I HAVE TO SAY THIS IS
3 ORGANIC CHEMISTRY, WHICH WAS NOT MY HOTTEST SUBJECT.

4 Q. DOWN AT THE BOTTOM OF YOUR NOTES HERE, THERE'S A CHART
5 OF . . . IT LOOKS LIKE VARIOUS DNA PIECES.

6 A. UH-HUH.

7 Q. CAN YOU TELL US WHAT YOU RECORDED IN THIS PART OF YOUR
8 NOTES.

9 A. YEAH. MARV CARUTHERS WAS ONE OF THE VERY IMPORTANT PEOPLE
10 OF THE ORGANIC SYNTHESIS GROUP, AND IN THIS DECEMBER SEMINAR, HE
11 OBVIOUSLY GAVE THE GROUP SOME INFORMATION ABOUT THE SYNTHESIS OF
12 THE BLOCKING GROUPS.

13 I THINK, FOR THE JURY, YOU HAVE TO -- TO EXPLAIN
14 BLOCKING. IF YOU'RE GOING TO JOIN TWO MOLECULES WHICH CAN JOIN
15 IN VERY MANY WAYS, IT IS VERY IMPORTANT TO BLOCK ALL THE OTHERS
16 SO IT CAN ONLY CONNECT IN ONE WAY, AND THIS IS VERY DIFFICULT.
17 AND THE ORGANIC CHEMISTRY BEHIND IT IS VERY DIFFICULT. I DIDN'T
18 UNDERSTAND IT QUITE THEN AND I HAVEN'T UNDERSTOOD IT SINCE.

19 SO THAT IS THE FIRST PART OF THIS PART.

20 THE LAST PART OF THIS, HE GIVES THE GROUP LISTS OF
21 COMPONENTS AND HOW MUCH WE HAVE ON EACH COMPONENT AND THE WAYS
22 THEY ARE STORED.

23 Q. SO THE INDICATIONS HERE, THAT WOULD BE THE SEQUENCE OF BASES
24 OF A PARTICULAR MOLECULE THAT THE GROUP HAD MADE?

25 A. YES.

KLEPPE-CROSS/PASAHOW

14 1 Q. AND THE REST OF THIS IS INFORMATION ABOUT HOW MUCH THE --
2 DR. CARUTHERS HAD AT THAT TIME?

3 A. APPARENTLY, YES.

4 (PAUSE IN PROCEEDINGS)

5 Q. (BY MR. PASAHOW) AT THE TIME DR. CARUTHERS SPOKE, WAS HE
6 ONE OF THE PEOPLE THAT WAS A POST-DOC IN THE LABORATORY?

7 A. YES.

8 MR. PASAHOW: YOUR HONOR, WE'D OFFER EXHIBIT A-69.

9 THE COURT: ANY OBJECTION?

10 MR. FIGG: NO OBJECTION, YOUR HONOR.

11 THE COURT: A-69 IS ADMITTED.

12 (PLAINTIFF'S EXHIBIT A-69

13 RECEIVED IN EVIDENCE)

14 Q. (BY MR. PASAHOW) DR. KLEPPE, DO YOU RECALL WHO ATTENDED THE
15 SEMINAR ON MARCH 24TH, 1969?

16 A. NO, BUT GENERALLY THE -- AS I TOLD EARLIER, THE WHOLE GROUP
17 WOULD ATTEND.

18 Q. NOW, YOU WERE INVOLVED IN WRITING ARTICLES IN DR. KHORANA'S
19 LABORATORY, OF COURSE.

20 A. I WOULDN'T PUT IT IN THE PLURAL, BECAUSE I WROTE ONE LARGE
21 ARTICLE WITH DR. KHORANA, AND THAT I FINISHED AFTER I CAME BACK
22 TO NORWAY.

23 Q. AFTER YOU WENT BACK TO NORWAY, YOU WROTE AN ARTICLE WHICH
24 WAS ABOUT THE WORK YOU HAD DONE IN DR. KHORANA'S LABORATORY?

25 A. YES.

KLEPPE-CROSS/PASAHOW

15 1 Q. NOW, WHAT WAS DR. KHORANA'S INVOLVEMENT IN THE WRITING OF
2 THAT ARTICLE?

3 A. THE ONE I WAS . . .

4 Q. YES.

5 A. OH, IT WENT BACK AND FORTH.

6 Q. WHO PREPARED THE FIRST DRAFT?

7 A. I WOULD PREPARE THE DRAFT FOR THE EXPERIMENTS I THOUGHT
8 SHOULD BE PART OF THIS ARTICLE AND SEND IT TO HIM, AND THEN --
9 YEAH, IT WOULD BE A JOINT EFFORT BACK AND FORTH.

10 AND IT WAS REALLY HORRIBLE, BECAUSE THE RESULTS WERE
11 NOT -- THEY WERE DIFFERENT FROM WHAT WE HAD HOPED AND EXPECTED.

12 Q. DR. KHORANA STAYED VERY INVOLVED IN THE WRITING OF THE
13 ARTICLES THAT HAD HIS NAME ON THEM?

14 A. OH, YES.

15 Q. NOW, THE ARTICLE YOU WROTE, WAS DR. KHORANA AN AUTHOR ON
16 THAT AS WELL?

17 A. YES.

18 Q. DID YOU HAVE ANY ROLE IN THE ACTUAL WRITING OF THE ARTICLE
19 THAT WE'VE BEEN TALKING ABOUT IN THIS CASE AS THE KLEPPE
20 ARTICLE?

21 A. NO. AS I TOLD EARLIER, KJELL WAS VERY SENIOR, SO HE AND DR.
22 KHORANA WOULD PREPARE THAT MANUSCRIPT. AND IT WAS USUALLY THAT
23 THE PERSON WHO WAS FIRST, THE FIRST AUTHOR WOULD DO MOST OF THAT
24 WORK, ANYWAY.

25 (PAUSE IN PROCEEDINGS)

KLEPPE-CROSS/PASAHOW

15

1 Q. (BY MR. PASAHOW) NOW, WHEN YOU TOLD US ABOUT THE MARCH
2 NOTES, YOU SAID THIS SECTION HERE (INDICATING) HAD SOMETHING TO
3 DO WITH TESTING THE PRODUCT OF WHAT WAS MADE IN SOME OF THESE
4 REACTIONS INVOLVING THE PIECES OF DNA THAT DON'T MATCH UP THAT
5 ARE PICTURED ON THE FIRST PAGE OF THE NOTES.

6 A. NO, I DID NOT SAY THAT. I SAID THAT THIS FIRST PART WAS TO
7 PROVE THAT THE REPAIR REPLICATION DID GO TO COMPLETION SO YOU
8 COULD FILL IN THE MOLECULES.

9 Q. AND THAT WAS TRYING TO REPAIR THE PIECES THAT ARE PICTURED
10 UP AT THE TOP LEFT-HAND CORNER OF THE FIRST PAGE OF THESE NOTES?

11 A. YES, TO THE BEST OF MY -- YEAH. THE NUMBERS ARE DUPLEX --
12 THE NUMBERS ON THE MOLECULES ARE ON THE FIRST PAGE, AND THEN
13 THIS OBVIOUSLY IS A -- RESULTS ARE A NEAREST NEIGHBOR ANALYSIS.

14 Q. I'M SORRY. THE NEAREST NEIGHBOR ANALYSIS IS THIS SECTION
15 OVER IN HERE (INDICATING)?

16 A. YES. AND IT SAYS "RATIO," AND THAT MEANS THAT THE RATIO
17 BETWEEN AP, GP, CP -- THE TP AND CP. AND THEN IT SAYS
18 "THEORETICALLY," AND THEN IT SAYS WHAT THE EXPERIMENT GAVE.

19 Q. WHAT IS NEAREST NEIGHBOR ANALYSIS?

20 A. THIS WAS THE ONLY WAY WE HAD TO ANALYZE IN THOSE DAYS, AND
21 THAT MEANT THAT, WHEN YOU PUT TWO PIECES TOGETHER, YOU MAKE A --
22 FORCE -- YOU HAVE A FORCE GROUP BETWEEN TWO OF THE BIG
23 MOLECULES.

24 AND YOU START WITH THE PHOSPHATE ON THE END OF THE
25 MOLECULE AND THEN YOU CHOP THE MOLECULE UP WITH ENZYMES, SO IT

KLEPPE-CROSS/PASAHOW

15 1 ENDS UP ON THE OTHER SIDE, ON THE THREE-PART SIDE. SO IF YOU
2 START ON THIS SIDE, YOU CAN SORT OF MEASURE WHO WAS NEIGHBOR TO
3 WHO ON A STATISTICAL BASIS ON THE MOLECULE YOU HAVE.

4 BUT IT'S NOT A -- IT'S NOT VERY REFINED, BUT THAT'S THE
5 ONLY THING WE HAD TO DO.

6 Q. IT WAS A METHOD FOR TESTING TO MAKE SURE YOU GOT WHAT YOU
7 INTENDED TO MAKE AS YOU WERE PUTTING THESE PIECES TOGETHER?

8 (PAUSE IN PROCEEDINGS)

9 THE WITNESS: THIS WAS DONE UNDER THE REPAIR
10 REPLICATION CONDITION, BECAUSE YOU INCORPORATED THE
11 ALPHA-LABELED NUCLEOTIDES.

12 Q. (BY MR. PASAHOW) BUT THE POINT OF IT WAS TO SEE IF THE
13 PRODUCT THAT WAS MADE WAS THE PRODUCT THAT YOU WERE INTENDING TO
14 MAKE; IS THAT CORRECT?

15 A. IT DEPENDS -- I DON'T QUITE -- YOU HAVE TO BE PRECISE.
16 "INTENDING TO MAKE." BECAUSE AT THIS LEVEL, WE HAVE TWO LEVELS.

17 FIRST, YOU MAKE A DUPLEX. THAT YOU CAN TEST IN ONE
18 WAY. AND THEN DO YOU FILL OUT THE DUPLEX WITH -- I HAVE TO READ
19 THIS VERY CAREFULLY, BUT THIS IS OBVIOUSLY A NEAREST NEIGHBOR
20 ANALYSIS. AND TO DO THAT, YOU HAVE TO INCORPORATE ALPHA-LABELED
21 PHOSPHATES, THE OPPOSITE END NUCLEOTIDES.

22 Q. UH-HUH. WELL, FOR EXAMPLE, TO TAKE THE ICOSA-I AND I GUESS
23 IT'S II HERE -- IS THAT WHAT THESE TWO HERE REFER TO?

24 A. UH-HUH.

25 Q. AS EACH OF THOSE FILLED OUT, IT SHOULD ADD A CERTAIN SERIES

KLEPPE-CROSS/PASAHOW

16

1 OF LETTERS, A'S, G'S, T'S AND C'S, IS THAT RIGHT, FROM BOTH
2 SIDES HERE?

3 A. CAN I COME DOWN?

4 Q. OF COURSE.

5 THE COURT: SURELY.

6 THE WITNESS: BECAUSE I THINK IT'S EASIER.

7 I FEEL LIKE I'M AT EXAMS. I THINK I SHOULD GET
8 THE . . .

9 (PAUSE IN PROCEEDINGS)

10 THE WITNESS: YES. YOU ARE ASKING ABOUT . . .

11 Q. (BY MR. PASAHOW) WHAT I WAS ASKING IS, AS THIS FILLS OUT --

12 A. YEAH.

13 Q. -- IT ADDS A CERTAIN SERIES OF BASIS, A'S, C'S, G'S AND T'S
14 TO BOTH SIDES.

15 A. YEAH. I HAVE TO EXPLAIN FIRST: ICOSA MEANS 20, SO IN THIS
16 CASE WE HAVE TWO OLIGONUCLEOTIDES 20 BASES LONG. AND THIS THE
17 ONE YOU HAVE TO MAKE EACH OF THE MOLECULES.

18 AND THAT IS TRUE. BOTH HAVE HYDROXIDE ON THIS END AND
19 ON THIS END.

20 SO IF YOU GIVE THIS TO A DNA POLYMERASE, YOU ALSO --
21 YOU ALREADY HAVE SOMETHING TO START ON. SO YOU CAN START TO
22 FILL IN THE MOLECULES THIS WAY AND THAT WAY.

23 Q. AND WHEN WE COME OVER HERE TO THE NEAREST NEIGHBOR ANALYSIS,
24 WHAT WE'RE LOOKING AT IS AT LEAST PART OF WHETHER OR NOT IT MADE
25 WHAT YOU EXPECTED IT TO MAKE; IS THAT RIGHT?

KLEPPE-CROSS/PASAHOW

16 1 A. YES. YOU SEE, IF -- IN THIS CASE, YOU DO AN EXPERIMENT WITH
2 INCORPORATION OF ALPHA-LABELED CTP AND ALPHA-LABELED TTP. SO
3 THEORETICALLY, YOU CAN CALCULATE IF THIS WENT TO COMPLETION, YOU
4 SHOULD HAVE ZERO IN THE A, BECAUSE IT DIDN'T HAVE ANY NEIGHBORS
5 THERE, YOU SHOULD HAVE TWO IN THE G, THREE IN THE T, AND ONE IN
6 THE C.

7 WHAT YOU GOT WAS .1, WHICH IS ABOUT 10 PERCENT, YOU GOT
8 2.7, 3.2, AND 1. SO THIS IS THE WAY THESE WERE ANALYZED. SO
9 IT'S ON A STATISTICAL BASIS.

10 Q. BUT IN -- IN SIMPLE TERMS, AT LEAST, THE POINT IS, YOU'D
11 LOOK AT A THEORETICAL SERIES OF RATIOS OF WHAT'S INCORPORATED
12 AND COMPARE THAT TO WHAT YOU ACTUALLY MEASURED.

13 A. YES.

14 MR. FIGG: YOUR HONOR, I'M SURE IT'S UNINTENTIONAL, BUT
15 MR. PASAHOW CONTINUES TO SAY "THIS IS WHAT YOU DID" OR "YOU
16 MADE" AND I THINK IT --

17 THE WITNESS: YEAH.

18 MR. FIGG: -- SHOULD BE CLEAR THAT WHAT IS RECORDED
19 HERE IS WHAT DR. KJELL KLEPPE DID.

20 THE COURT: YES.

21 MR. PASAHOW: WELL, OF COURSE.

22 Q. DR. KLEPPE, THOUGH, YOU DID DO NEAREST NEIGHBOR ANALYSIS; IS
23 THAT RIGHT?

24 A. YES, BUT AS I TOLD YOU AGAIN, I DID THE RNA.

25 (WITNESS RESUMES WITNESS STAND.)

KLEPPE-CROSS/PASAHOW

16

1 Q. NOW, WHEN DR. KLEPPE EXPLAINED TO THE GROUP THIS EXPERIMENT
2 DOWN AT THE BOTTOM HERE, DID HE PRESENT A NEAREST NEIGHBOR
3 ANALYSIS OF THE RESULTS OF THAT EXPERIMENT?

4 A. NO, NOT TO MY RECOLLECTION, BUT IT IS 22 YEARS.

5 Q. WAS IT DIFFICULT TO DO A NEAREST NEIGHBOR ANALYSIS AT THE
6 TIME PEOPLE WERE WORKING IN DR. KHORANA'S LABORATORY?

7 A. NO. THE ESSAY ITSELF WAS NOT DIFFICULT, BUT IT IS VERY HARD
8 TO MAKE THE ALPHA-LABELED P32 NUCLEOTIDES. TODAY, YOU BUY THEM,
9 BUT AT THAT TIME WE MADE THEM.

10 BUT THE ESSAY ITSELF WAS NOT DIFFICULT.

11 Q. NOW, IN RUNNING THE TEST THAT MEASURES THIS GRAPH HERE, THE
12 MAKING OF THE INCORPORATED DNA, THAT WOULD REQUIRE YOU TO MAKE
13 THE ALPHA-LABELED BASES; IS THAT RIGHT? THE ALPHA-P32-LABELED
14 BASES?

15 (PAUSE IN PROCEEDINGS)

16 THE WITNESS: IF YOU WANT TO DO A NEAREST NEIGHBOR
17 ANALYSIS, YOU ALWAYS HAVE TO ALPHA LABEL.

18 Q. (BY MR. PASAHOW) UH-HUH.

19 A. BUT TO MEASURE THIS REACTION, YOU CAN JUST MEASURE
20 INCORPORATION OF ANY NUCLEOTIDE AND ANY TYPE OF LABEL
21 NUCLEOTIDE, SO THAT IS A DIFFERENT THING.

22 Q. DO YOU KNOW WHAT THE LABEL WAS HERE? DO YOUR NOTES SAY
23 THAT?

24 A. NO, MY NOTES DOES NOT SAY THAT.

25 (PAUSE IN PROCEEDINGS)

KLEPPE-CROSS/PASAHOW

16 1 Q. (BY MR. PASAHOW) IN ORDER TO DO A NEAREST NEIGHBOR
2 ANALYSIS, YOU HAD TO MAKE THE DNA THAT YOU WERE GOING TO DO THE
3 NEAREST NEIGHBOR ANALYSIS ON RADIOACTIVE; IS THAT RIGHT?

4 A. THAT IS THE WHOLE POINT OF THIS, YES.

5 Q. AND IT HAD TO HAVE A CERTAIN LEVEL OF RADIOACTIVITY IN ORDER
6 TO BE ABLE TO DO A NEAREST NEIGHBOR ANALYSIS.

7 A. YOU HAD TO HAVE A CERTAIN AMOUNT OF COUNTS, YES.

8 Q. AND COUNTS ARE THE COUNTS OF THE RADIOACTIVITY GIVEN OFF BY
9 THE MOLECULE?

10 A. YES.

11 Q. IF THE EXPERIMENT WAS DONE AND IT DIDN'T GIVE YOU ENOUGH
12 COUNTS, ONE WAY TO INCREASE THE AMOUNT OF COUNTS SO YOU COULD DO
13 A NEAREST NEIGHBOR ANALYSIS WAS TO USE A MIXTURE OF THE BASES
14 THAT HAD A HIGHER SPECIFIC ACTIVITY OF RADIOACTIVITY; IS THAT
15 RIGHT?

16 MR. FIGG: YOUR HONOR, MR. PASAHOW'S GETTING VERY MUCH
17 INTO EXPERT TESTIMONY AT THIS POINT. I'VE NOT OBJECTED
18 BECAUSE . . . BECAUSE DR. KLEPPE OBVIOUSLY IS A SCIENTIST WHO IS
19 FAMILIAR WITH THIS WORK.

20 BUT, AS YOU RECALL, MR. PASAHOW OBJECTED STRENUOUSLY TO
21 OUR ASKING DR. KLEPPE ANY EXPERT TYPE QUESTIONS, SO I HAVE TO
22 VOICE AN OBJECTION HERE.

23 THE COURT: WELL, SHE MAY TESTIFY, IF SHE CAN ANSWER,
24 AND OBVIOUSLY THAT MAY OPEN THE DOOR FOR REDIRECT EXAMINATION.

25 YOU MAY ANSWER THE QUESTION.

KLEPPE-CROSS/PASAHOW

17 1 THE WITNESS: NO, I MAY NOT, BECAUSE I HAVE TO HAVE IT
2 REPEATED, BECAUSE IT WAS SO UNCLEAR.

3 (LAUGHTER)

4 Q. (BY MR. PASAHOW) LET ME SEE IF I --

5 MR. FIGG: THAT'S MY OTHER OBJECTION, YOUR HONOR.

6 THE COURT: THAT'S ANOTHER GOOD OBJECTION, WHAT YOU
7 SHOULD HAVE THOUGHT OF.

8 Q. (BY MR. PASAHOW) LET ME SEE IF I CAN IMPROVE IT, IN THAT
9 CASE.

10 THE COURT: LET ME ASK YOU THIS: HOW LONG ARE YOU
11 GOING TO BE ON THE REST OF YOUR CROSS?

12 MR. PASAHOW: MAYBE 10 MORE MINUTES, YOUR HONOR.

13 THE COURT: AH, OKAY. LET'S GO FORWARD, SO YOU CAN
14 CLEAR IT UP.

15 THE WITNESS: YEAH.

16 Q. (BY MR. PASAHOW) YOU TOLD US THAT IN ORDER TO DO NEAREST
17 NEIGHBOR ANALYSIS, YOU'D NEED A CERTAIN LEVEL OF COUNTS IN THE
18 PRODUCT BEFORE YOU STARTED; IS THAT RIGHT?

19 A. YES.

20 Q. NOW, IN ORDER TO GET THE COUNTS INTO THE MOLECULE, WHAT YOU
21 WOULD DO IS ADD A RADIOACTIVE BASE DURING THE EXTENSION
22 REACTION; IS THAT RIGHT?

23 A. YES. YOU WOULD MAKE A BUILDING BLOCK IN SUCH A WAY THAT IT
24 IS RADIO-LABELED EXACTLY WHERE YOU WANT IT, AND IN THIS CASE IT
25 HAS TO BE ON THE ONE PHOSPHATE ATOM BASE.

KLEPPE-CROSS/PASAHOW

17 1 BUT I THINK IT IS VERY FAIR TO POINT OUT THAT THESE
2 MOLECULES WERE SO SCARCE, SO YOU COULDN'T EVEN DECIDE AND DO AN
3 EXPERIMENT WHICH YOU ADD UP THE POLES, BECAUSE THEN WHAT WOULD
4 YOU USE THAT FOR? I MEAN, THE ORGANIC PEOPLE WOULDN'T ALLOW YOU
5 TO DO THAT SORT OF THING.

6 SO YOU WOULD -- YOU'D BE SURE THAT YOU STARTED OUT WITH
7 NUCLEOTIDES WHICH WERE HOT ENOUGH -- "HOT" MEANS RADIOACTIVE
8 ENOUGH -- SO YOU HAVE COUNTS. AND, OF COURSE, THIS WAS A
9 CHALLENGE, BECAUSE THE HALF-LIFE OF THESE MOLECULES, RADIOACTIVE
10 MOLECULES, IS ABOUT TWO WEEKS. SO IF YOU STARTED WITH A NEW
11 AMOUNT, AFTER TWO WEEKS YOU HAVE HALF, SO YOU HAVE TO . . . IT
12 CERTAINLY WAS A PROBLEM, BUT THE EXPERIMENTS WILL BE DESIGNED SO
13 THIS WAS TAKEN CARE OF.

14 Q. DR. KLEPPE, WHEN YOU WOULD ADD THE BASES, WHAT YOU WOULD DO
15 IS ADD A MIXTURE OF THE BASE YOU WANTED TO LABEL -- SOME OF THEM
16 WOULD BE HOT AND SOME OF THEM WOULD BE COLD -- MIXED UP
17 TOGETHER?

18 A. YOU ALWAYS HAD TO HAVE -- YOU HAD TO -- FIRST OF ALL, YOU
19 HAD TO DESIGN YOUR EXPERIMENT SO YOU KNEW WHAT YOU WERE ASKING.
20 AND IF YOU WERE ASKING WHO IS THE NEAREST NEIGHBOR TO A C, THAT
21 WILL BE ONE QUESTION, AND YOU CAN ONLY ASK ONE QUESTION IN ONE
22 REACTION.

23 SO THEN YOU WOULD HAVE THIS C LABELED, BUT THE OTHER
24 THREE OTHERS HAD TO BE UNLABELED BECAUSE YOU ARE GOING TO SEE
25 WHO IS -- WHO OF THEM ARE GOING TO BE LABELED WHEN YOU ANALYZE

KLEPPE-CROSS/PASAHOW

17 1 THEM. AND THAT WOULD BE THE NEAREST NEIGHBOR. THAT IS WHY IT'S
2 CALLED THE NEAREST NEIGHBOR.

3 Q. UH-HUH. NOW, IN THE EXAMPLE YOU GAVE, WHERE WE'RE LABELING
4 THE C'S IN A NEAREST NEIGHBOR ANALYSIS --

5 A. UH-HUH.

6 Q. -- WOULD ALL OF THE C'S THAT WE USED IN THAT EXPERIMENT BE
7 RADIOACTIVE?

8 A. NO. DO YOU MEAN EVERY MOLECULE? NO, NO, NO. THAT DOES NOT
9 WORK, BECAUSE IF EVERY MOLECULE WAS RADIOACTIVE, THE REACTION
10 WOULDN'T GO AT ALL, BECAUSE EVERY TIME YOU HAVE A RADIOACTIVE
11 MOLECULE, IT WOULD GO TO SOMETHING ELSE, SO IT ISN'T -- SO YOU
12 HAVE OTHER MOLECULES.

13 NO. WHAT YOU'RE DOING IS, YOU HAVE SOME ARE
14 RADIOACTIVE AND SOME ARE NOT, AND DEPENDING ON HOW HOT IT IS,
15 THE NUMBER OF RADIOACTIVE WAS UNLABELED.

16 Q. IS THAT SOMETIMES CALLED SPECIFIC ACTIVITY?

17 A. THAT IS ALWAYS CALLED SPECIFIC ACTIVITY, BUT I DIDN'T WANT
18 TO GIVE A LECTURE ABOUT THAT.

19 Q. SO SPECIFIC ACTIVITY IS A MEASURE OF HOW HOT THE C'S ARE IN
20 THIS PARTICULAR CASE.

21 A. IT HAS TO DO WITH -- I MEAN, THESE THINGS ARE MEASURED IN A
22 TYPE OF GEIGER COUNTER. SO THE SPECIFIC ACTIVITY WOULD IN A WAY
23 BE, HOW MANY COUNTS DO I GET PER VOLUME MOLECULE?

24 Q. NOW, YOU DID THESE EXPERIMENTS WHERE YOU WOULD MEASURE THE
25 RADIOACTIVITY OF A -- OF A PARTICULAR MOLECULE?

KLEPPE-CROSS/PASAHOW

17

1 A. YES. YOU MEAN USING THE SCINTILLATION COUNTER? YES.

2 Q. YOU SAID YOU USED SOMETHING CALLED A SCINTILLATION COUNTER?

3 A. THIS IS A LITTLE MORE REFINED THAN USING A GEIGER COUNTER.

4 A GEIGER COUNTER IS VERY CRUDE. A SCINTILLATION COUNTER TAKES
5 UP MORE COUNTS.

6 Q. IN WHAT?

7 A. IT'S JUST AN INSTRUMENT. IT IS OF NO IMPORTANCE HERE WHAT
8 TYPE OF INSTRUMENT YOU USE TO -- TO DO THESE THINGS.

9 Q. AND SO YOU'D PUT A FLUID IN THE SCINTILLATION COUNTER THAT
10 HAD THE HOT BASES, AND IT WOULD GIVE YOU KIND OF A GEIGER
11 COUNTER READING?

12 (PAUSE IN PROCEEDINGS)

13 THE WITNESS: YEAH, IT WOULD GIVE YOU A NUMBER, YES.
14 AND THE HIGHER THE NUMBER, THE HOTTER THE STUFF. AND THE LONGER
15 YOU HAVE IT -- LEAVE IT THERE, THE HIGHER THE NUMBER, YEAH,
16 SO . . .

17 Q. (BY MR. PASAHOW) AM I RIGHT THAT THE THING YOU PUT INTO THE
18 SCINTILLATION COUNTER TO COUNT WOULD HAVE THE BASIS IN SOME SORT
19 OF A FLUID?

20 A. YES, YES. THE WHOLE -- IT'S A . . . I MIGHT EXPLAIN IT.
21 YOU MEASURE PIECES OF LIGHT GOING UP, BECAUSE WHEN THE
22 RADIOACTIVE HEATS THE MOLECULES IN THIS FLUID, IT EMITS LIGHT
23 AND THAT'S WHAT YOU MEASURE. AND ACCORDING TO HOW MANY HITS,
24 YOU HAVE MORE LIGHTS INVOLVED.

25 (PAUSE IN PROCEEDINGS)

18

KLEPPE-CROSS/PASAHOW

18

1 Q. (BY MR. PASAHOW) NOW, THESE ARE THE ORIGINAL CARBON COPIES
2 OF THE NOTEBOOKS THAT WERE MAINTAINED BY DR. KJELL KLEPPE DURING
3 THIS PERIOD?

4 A. IF I CAN SEE THEM.

5 (WITNESS EXAMINES NOTEBOOKS.)

6 THIS IS WHAT I FOUND OF WHAT HE HAD -- HAD -- WHAT
7 COPIES HE HAD FROM THAT PERIOD.

8 Q. ON THE NOTEBOOK THAT HAS THE ROMAN NUMERAL I ON THE COVER,
9 WOULD YOU TURN TO THE PAGE THAT HAS THE NUMBER 88 ON IT, PLEASE.

10 A. (WITNESS COMPLIES.)

11 YES, PAGE 88.

12 (PAUSE IN PROCEEDINGS)

13 Q. (BY MR. PASAHOW) DOES IT LOOK TO YOU LIKE, AFTER THE CARBON
14 WAS MADE, SOMEBODY WENT THROUGH WITH A PEN AND MADE SOME CHANGES
15 TO IT?

16 A. IT WAS DEFINITELY NOT SOMEBODY. IT WAS DR. KJELL KLEPPE.

17 Q. I WAS GOING TO ASK THAT.

18 A. I THINK THAT IS VERY IMPORTANT --

19 Q. UH-HUH.

20 A. -- BECAUSE I KNOW HIS WRITING.

21 Q. SO DR. KJELL KLEPPE WENT THROUGH THE CARBON COPIES AND --
22 AFTER HE PULLED THEM OUT SOMETIMES AND MADE CORRECTIONS?

23 A. (SHAKING HEAD.)

24 I THINK THIS IS AN IMPLICATION WHICH ON BEHALF OF KJELL
25 I FIND, IN FACT, INSULTING. BUT I CAN TRY TO EXPLAIN HOW THESE

KLEPPE-CROSS/PASAHOW

18

1 THINGS WERE DONE.

2 Q. WELL --

3 A. BECAUSE OF THE LONG --

4 Q. I THINK I --

5 A. NO. I THINK I HAVE THE FLOOR NOW.

6 IT WAS A LONG EXPERIMENT, AND, OF COURSE, YOU DO
7 CALCULATIONS, AND IN THIS CASE OBVIOUSLY HE HAD -- HE HAD
8 MISCALCULATED, AND THEN HE WENT BACK AND ON BOTH PAGES HE WROTE.
9 OBVIOUSLY, CARBON PAPER WILL BE FURTHER BACK IN THE BOOK.

10 Q. UH-HUH.

11 A. SO I THINK THAT THIS . . . YEAH. I DON'T THINK THAT WAS A
12 FAIR WAY OF PUTTING IT.

13 Q. WELL, WHAT I WANTED TO ESTABLISH IS THAT HE WENT BACK AND
14 CAREFULLY CORRECTED THE CARBONS TO REFLECT WHAT HE WANTED THEM
15 TO CORRECT.

16 A. YOU MUST UNDERSTAND THAT, WHEN YOU DO AN EXPERIMENT, WHICH
17 TAKES DAYS AND DAYS, YOU DO YOUR CALCULATIONS IN BETWEEN. AND
18 OBVIOUSLY HE -- WHEN HE WENT OVER IT AGAIN, PERHAPS WHEN HE WAS
19 PREPARING THE MANUSCRIPT, I DON'T KNOW, HE SAW THAT HE HAD HAD A
20 MISCALCULATION WHICH HE'D DONE.

21 AND HE ALSO PUT IN, INSTEAD OF, YOU SEE -- IN THE LINE,
22 INSTEAD OF THEORETICAL, A "90 PERCENT" WITH THE SAME TYPE OF
23 PEN, "COUNTS PER 20 MINUTES." THE REPLICATION IS -- AND
24 THEREFORE -- AND THEN INSTEAD OF I THINK IT SAYS 85 PERCENT OF
25 REPLICATION, HE SAID, "APPROXIMATELY 80 PERCENT OF REPLICATION."

KLEPPE-CROSS/PASAHOW

18 1 ALL THESE THINGS ARE CORRECTED IN THE SAME WAY.

2 Q. UH-HUH.

3 A. SO OBVIOUSLY THIS WAS DONE WHEN HE WENT THROUGH THE
4 EXPERIMENT, AND NOT SOMETIMES AND ALL THE TIMES AFTERWARDS. IT
5 HAS TO DO WITH THE WORK OF HIS EXPERIMENT.

6 Q. AND SO YOU TAKE THIS TO BE DR. KJELL KLEPPE'S GOING THROUGH
7 THE CARBONS TO MAKE SURE THAT THEY CAREFULLY CONFORM TO HIS
8 RECOLLECTION OF WHAT HE HAD DONE A DAY OR TWO AFTERWARDS IF HE
9 HAPPENED TO SEE THAT THERE WERE MISTAKES.

10 A. WHETHER IT WAS DONE A DAY OR TWO, I CANNOT CONFIRM, BECAUSE
11 I DIDN'T SEE HIM DO IT.

12 Q. UH-HUH. WOULD YOU LOOK AT THE NOTEBOOK THAT IS NUMBER TWO.

13 A. YES. OH, THIS ONE.

14 Q. AND THE PAGE THAT IS NUMBERED 18.

15 A. IN THE FIRST PART OF IT?

16 Q. YES.

17 A. YEAH.

18 (WITNESS COMPLIES.) YES.

19 Q. (INDICATING.)

20 DID -- DID DR. KLEPPE HAVE AN INK ENTRY ON THAT CARBON
21 PAGE?

22 A. YES. IN HIS LIST OF EXPERIMENT NUMBER 17, HE HAS A LIST OF
23 ALL THINGS GOING INTO THE EXPERIMENT, BUT OBVIOUSLY HE HAD NOT
24 WRITTEN THAT HE NEEDED THE POLYMERASE ENZYME. SO HE PUTS IN
25 WITH HIS PEN AGAIN ONE MICROLITER OF DNA POLYMERASE 1, WHAT IS A

KLEPPE-CROSS/PASAHOW

18 1 COMMON POLYMERASE. AND I THINK THAT . . . YEAH.

2 (PAUSE IN PROCEEDINGS)

3 Q. (BY MR. PASAHOW) WOULD YOU TURN, PLEASE, TO THE PAGE THAT
4 HAS THE NUMBER 47, AND I BELIEVE IT'S THE BACK PART OF THAT,
5 WHICH WOULD BE NOTEBOOK NUMBER THREE.

6 A. (WITNESS COMPLIES.) YES.

7 (PAUSE IN PROCEEDINGS)

8 THE WITNESS: YEAH.

9 Q. (BY MR. PASAHOW) IS THAT --

10 A. THAT IS 47.

11 Q. I'M SORRY. I MEANT PAGE --

12 A. YEAH.

13 Q. -- 47 IN THE FRONT PART, NOTEBOOK NUMBER TWO.

14 IS THAT EXPERIMENT NUMBER 28?

15 A. IT SAYS ON THE TOP EXPERIMENT 28, YES.

16 Q. ARE THERE SOME INK ADDITIONS OR CHANGES ON THAT PAGE?

17 A. YES. THIS IS A VERY SWEET ONE, AND IT REALLY SHOWS HOW
18 CONSCIENTIOUS HE WAS, BECAUSE HE HAD EVEN ADDED, HE USED
19 SILICONIZED TUBE.

20 Q. UH-HUH.

21 A. AND THAT MEANS THAT HE HAS USED A SPECIAL GLASS TUBE WHICH
22 HAS BEEN SILICONIZED ON THE INSIDE.

23 (PAUSE IN PROCEEDINGS)

24 (COUNSEL AND WITNESS CONFER)

25 Q. (BY MR. PASAHOW) SO HERE IN EXPERIMENT 28, HE WAS BEING

KLEPPE-CROSS/PASAHOW

19

1 CAREFUL TO LIST THE SILICONIZED TUBE THAT HE USED?

2 A. (NODDING HEAD.) YES.

3 Q. AND IN NOTEBOOK NUMBER THREE, WOULD YOU LOOK, PLEASE, AT THE
4 EXPERIMENT WHICH IS ON PAGE 48, WHICH I BELIEVE IS ALSO NUMBERED
5 EXPERIMENT 48.

6 A. (WITNESS COMPLIES.)

7 YES. PAGE 48. YEAH. I'M SORRY. PAGE 48, YES.

8 Q. (INDICATING.)

9 DOES THAT HAVE AN INK ADDITION TO IT?

10 A. YES. HERE IT SAYS, 15 DEGREES.

11 (PAUSE IN PROCEEDINGS)

12 THE WITNESS: BUT THE -- THE TEMPERATURE HAD NOT BEEN
13 RECORDED ON THE TOP OF THE PAGE, SO IT SAYS 15 DEGREES ON THE
14 BOTTOM OF THE PAGE.

15 Q. (BY MR. PASAHOW) NOW, YOU TOLD US THAT IT TOOK ABOUT TWO
16 YEARS TO MAKE THE ICOSA THAT IS HERE IN THE MARCH NOTES?

17 A. YEAH.

18 Q. AND THAT WOULD BE 20 BASES LONG?

19 A. YES. AND THERE WERE ONLY TWO PERSONS IN THE WORLD WHO HAD
20 DONE THAT, TWO GERMAN POST-DOCS, HENRY BUCHI, AND HANS WEBER. I
21 NEVER MET THOSE GUYS, BUT I WILL REMEMBER THE NAMES FOREVER,
22 SO . . .

23 Q. DO YOU HAVE AN ESTIMATE OF HOW LONG IT TOOK TO MAKE THE
24 WHOLE PIECE OF THE GENE THAT DR. KHORANA WAS WORKING ON?

25 A. TO MAKE THE WHOLE PIECE OF THE GENE? TO MAKE THE WHOLE GENE

KLEPPE-CROSS/PASAHOW

19

1 COMPOSED -- COMPOSED OF THE PIECES?

2 Q. YES.

3 A. I DON'T EXACTLY KNOW WHEN ORGANIC SCIENTISTS STARTED BECAUSE
4 LOTS OF ORGANIC WORK HAD GONE ON HOW TO MEASURE -- HOW TO DO
5 THIS JOINING. SO, NO, I WOULDN'T KNOW. FIVE TO . . . FIVE
6 YEARS. THAT WILL BE A GOOD GUESS.

7 Q. AND, OF COURSE, THAT WAS MORE THAN ONE PERSON'S EFFORT
8 DURING THAT FIVE YEARS.

9 A. YEAH.

10 (PAUSE IN PROCEEDINGS)

11 Q. (BY MR. PASAHOW) DR. KLEPPE, LET ME SHOW YOU A SERIES OF
12 EXHIBITS WHICH -- EXHIBITS WHICH HAVE BEEN MARKED B-198 THROUGH
13 B-202.

14 STARTING WITH B-198, CAN YOU TELL ME WHAT IT IS.

15 A. THIS IS OBVIOUSLY THE FULL OF THE BOOK LIKE THIS
16 (INDICATING), WHERE THIS IS PART OF THE LABEL (INDICATING.)

17 BUT DO YOU WANT ME TO GO THROUGH EVERY PAGE?

18 Q. WELL, COULD YOU CONFIRM FOR US THAT THE REMAINING PAGES ARE
19 IN DR. KJELL KLEPPE'S HANDWRITING?

20 A. YES, I CAN. IT IS IN HIS HANDWRITING.

21 Q. AND THOSE ARE PAGES FROM HIS NOTEBOOK.

22 A. YES.

23 (PAUSE IN PROCEEDINGS)

24 THE WITNESS: THERE SEEMS TO BE EVERYWHERE HERE . . .

25 SHALL I GO THROUGH ALL OF THEM? I MEAN --

KLEPPE-CROSS/PASAHOW

19

1 MR. PASAHOW: WELL, PERHAPS, YOUR HONOR, IF WE TOOK OUR
2 MORNING RECESS NOW, DURING THE RECESS --

3 THE WITNESS: YEAH. I COULD GO THROUGH THEM, BECAUSE
4 IT WOULD BE TOO MUCH HERE.

5 AND THIS CALLED B-199. THAT IS KJELL KLEPPE'S NOTEBOOK
6 FIVE, SEVEN TO 10.

7 THE COURT: AND HOW ABOUT THE SECOND SET THERE -- THIRD
8 SET, RATHER?

9 THE WITNESS: OKAY. YEAH. IT IS IN HIS HANDWRITING,
10 AND I COULD GO THROUGH THEM CAREFULLY AFTERWARDS. IT'S IN HIS
11 HANDWRITING.

12 YES, AGAIN HIS HANDWRITING, YES.

13 THE COURT: OKAY. DO YOU -- ARE YOU JUST ABOUT
14 FINISHED WITH YOUR 10 MINUTES?

15 MR. PASAHOW: YES, YOUR HONOR. MY ONLY REMAINING THING
16 IS TO OFFER THESE FOUR EXHIBITS.

17 THE COURT: ANY OBJECTION?

18 MR. FIGG: YOUR HONOR, MAY WE JUST TAKE A QUICK LOOK AT
19 THOSE EXHIBITS?

20 THE COURT: SURE. SUBJECT TO REVIEW OF THEM DURING THE
21 RECESS.

22 THE WITNESS: YES.

23 THE COURT: HOW LONG ARE YOU GOING TO BE ON REDIRECT?

24 MR. FIGG: JUST A FEW MINUTES.

25 THE COURT: WELL, LET'S TAKE OUR RECESS. YOU CAN

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QUICKLY REVIEW THEM, OR DR. KLEPPE CAN REVIEW THEM, AND THEN WE'LL RECONVENE AND FINISH WITH HER EXAMINATION, AND WE WILL GET YOU ON YOUR WAY.

THE WITNESS: GOOD.

THE COURT: OKAY. THANK YOU.

LADIES AND GENTLEMEN, FOLLOW THE INSTRUCTIONS I'VE GIVEN YOU, AND WE'LL SEE YOU AT THE CLOSE OF THE RECESS.

(JURY EXCUSED)

(RECESS TAKEN AT 10:05 A.M.)

(CONTINUED ON NEXT PAGE - NOTHING OMITTED)

1 THE COURT: WE HAVE THE EXHIBITS ALL STRAIGHTENED OUT
2 NOW?

3 MR. PASAHOW: YES, YOUR HONOR.

4 TWO THINGS: FIRST, MR. FIGG AND I ARE PREPARED TO
5 STIPULATE THE NOTEBOOK, EXHIBIT B-196, B-197, B-198, B-199,
6 B-200, B-201 AND B-202 EACH ARE COPIES OF DR. KLEPPE'S
7 NOTEBOOKS.

8 MR. FIGG: WE HAVE NO OBJECTION TO THOSE EXHIBITS, YOUR
9 HONOR.

10 THE COURT: YOU STIPULATE BOTH TO OR AGREE WITH THAT
11 STIPULATION AND THE EXHIBITS MAY BE ADMITTED; IS THAT CORRECT?

12 MR. PASAHOW: AS TO THE SECOND POINT, YOUR HONOR, MY
13 COLLEAGUES TELL ME -- MAYBE I MISUNDERSTOOD WHAT HAPPENED
14 EARLIER. AS YOUR HONOR KNOWS IT'S OUR CONTENTION THESE
15 NOTEBOOKS ARE IRRELEVANT BECAUSE THE WORK THAT IS SHOWN IN THEM
16 WAS NEVER PUBLICLY KNOWN.

17 I THOUGHT YOUR HONOR RULED THE NOTEBOOKS MR. FIGG WAS
18 OFFERING WOULD COME INTO EVIDENCE, BUT MY COLLEAGUES APPARENTLY
19 TELL ME THAT DIDN'T HAPPEN.

20 MR. FIGG: WE HAVEN'T OFFERED THEM YET.

21 MR. PASAHOW: WHAT WE WANT TO DO IS OFFER THE COMPLETE
22 SET OF NOTEBOOKS CONTINGENT UPON YOUR HONOR'S RULES ON ADMITTING
23 PARTS OF THE NOTEBOOKS.

24 MR. FIGG: YOUR HONOR, I'M NOT SURE WHEN YOU WANT TO
25 HEAR --

1 THE COURT: WE CAN TAKE THIS UP AFTER DR. KLEPPE'S
2 TESTIMONY AND WHEN THE JURY HAS TAKEN ITS NEXT RECESS THEN.

3 MR. PASAHOW: IN ANY EVENT, THESE ARE NOW IDENTIFIED.

4 THE COURT: OKAY. MR. FIGG.

5 REDIRECT EXAMINATION

6 BY MR. FIGG:

7 Q. DOCTOR KLEPPE, DO YOU RECALL MR. PASAHOW ASKING YOU ABOUT
8 SOME INKED IN CHANGES THAT YOUR LATE HUSBAND HAD MADE TO HIS
9 NOTEBOOKS?

10 A. YES, I DO.

11 Q. AND YOU'VE TAKEN -- YOU'VE KEPT A LOT OF LABORATORY
12 NOTEBOOKS IN YOUR DAYS AS A SCIENTISTS, I TAKE IT?

13 A. YES, I HAVE.

14 Q. IS IT COMMON FOR A SCIENTISTS TO SOMETIMES -- MIGHT
15 DETAIL -- OR ACCIDENTALLY LEAVE A DETAIL OUT WHEN KEEPING A
16 LABORATORY NOTEBOOK?

17 A. NO ONE IS ANY GUARENTEE FOR NOT DOING MISTAKES, SO
18 SCIENTISTS ARE NO EXCEPTION TO THAT. BUT WHAT I THINK IS VERY
19 IMPORTANT IS THAT YOU'RE VERY CAREFULLY GO THROUGH THE NOTES
20 AFTERWARDS AND THAT IS WHAT HE HAD DONE, AND PUT IN AN ENZYME.

21 OF COURSE, IT'S OBVIOUS YOU NEED AN ENZYME, SO I DON'T
22 THINK I WOULD HAVE PUT IT IN, BUT HE WAS VERY CONSCIENTIOUS.

23 Q. BUT EVEN WITH THAT REVIEW, IS IT SOMETIMES POSSIBLE TO MISS
24 A FEW MISTAKES THAT YOU MAKE?

25 MR. PASAHOW: EXCUSE ME, YOUR HONOR. MR. FIGG IS

1 1 CALLING FOR SPECULATION NOW.

2 MR. FIGG: YOUR HONOR, IT'S EXACTLY --

3 THE COURT: THE OBJECTION IS OVERRULED.

4 THE WITNESS: WOULD YOU REPEAT THE QUESTION, PLEASE.

5 Q. (BY MR. FIGG) EVEN WHEN A SCIENTISTS GOES BACK AND REVIEWS
6 THE NOTEBOOK, DO YOU SOMETIMES OVERLOOK MISTAKES THAT HAD BEEN
7 MADE?

8 A. OH, YES. UNFORTUNATELY, WE ALL DO IT.

9 Q. OF COURSE.

10 DOCTOR KLEPPE, MR. PASAHOW WAS ASKING YOU ABOUT SOME
11 EXPERIMENTS THAT YOU HAD REFERRED TO IN YOUR SEMINAR NOTES IN
12 SEPTEMBER 1969.

13 A. YES, I HAVE THEM HERE.

14 Q. YES, I'VE FORGOTTEN THE EXHIBIT NUMBER. MAY I SEE THAT A
15 MOMENT?

16 A. YES.

17 Q. HE SHOWED YOU A COPY OF EXHIBIT B-194.

18 A. YES, I HAVE IT HERE.

19 Q. AND IN PARTICULAR HE HE WAS ASKING YOU ABOUT THIS GRAPH HERE
20 ON THE EXPERIMENTS WITH THE PRIMERS OF VARIOUS LENGTHS?

21 A. YES, THAT IS ON THE THIRD PAGE OF THIS SEMINAR NOTES.

22 Q. AND I BELIEVE YOU SAID THAT THAT GRAPH CORRESPONDED TO
23 FIGURE TEN IN THE KLEPPE PAPER; IS THAT CORRECT?

24 A. NO. NO, THAT IS NOT CORRECT.

25 Q. I'M SORRY, DID I GET THE WRONG ONE, TOO?

1

1 A. YEAH, YOU ARE IN GOOD COMPANY.

2 Q. LAWYERS DON'T READ THESE THINGS QUITE AS WELL AS SCIENTISTS.

3 A. YOU SEE --

4 THE COURT: IT HAS TO BE FIGURE 13, IF I CAN HELP.

5 MR. FIGG: YES, I'M SORRY, THAT'S CORRECT.

6 Q. NOW, DOCTOR KLEPPE, CAN YOU DETERMINE FROM THE FIGURE LEGEND
7 UNDER THAT FIGURE WHAT THE RATIO OF PRIMERS TO THE TEMPLATE WAS?

8 A. YES. IF I CAN READ IT.

9 Q. YES, TAKE YOUR TIME.

10 A. CONCENTRATION OF THE DNA USE, THAT IS THE ONE SINGLE STRAND
11 PIECE WHICH IS NUMBER FIVE HERE, WAS 200 PICOMOLE PER MILLIMETER
12 AND THAT OTHER PRIMER WAS 400. SO THAT IS VERY EASY TO
13 CALCULATE A RATIO WHICH IS 400 DIVIDED BY TWO HUNDRED.

14 Q. SO TWO TO ONE?

15 A. TWO TO ONE.

16 Q. MY POSTER DISAPPEARED.

17 THE COURT: REFERRING BACK TO YOUR SEMINAR NOTE FROM
18 KJELL KLEPPE'S MARCH 1969 SEMINAR, WHAT WAS THE RATIO OF PRIMERS
19 RECORDED THERE?

20 A. THAT WAS THE RATIO, THAT IS TEN FOLD, SO THAT MEANS TEN
21 PRIMERS PER MOLECULE. THESE PAPER THAT WAS ONLY TWO PRIMERS PER
22 MOLECULE.

23 Q. DR. KLEPPE, DID YOU RECORD A CONTROL EXPERIMENT HERE WHICH
24 DR. KLEPPE PERFORMED THIS REACTION WITHOUT PRIMERS PRESENT?

25 A. YES, THERE ARE THREE CONTROL EXPERIMENTS, AS I EXPLAINED.

2

1 ONE OF THEM WITHOUT PRIMERS AND THEN WE DIDN'T GET ANY
2 CORPORATION ET AL., SO CANNOT BE MADE WITHOUT PRIMERS.

3 Q. SO NONE OF THIS RADIOACTIVE DNA WAS INCORPORATED WHEN HE DID
4 NOT USE PRIMERS?

5 A. THAT IS RIGHT.

6 Q. CAN YOU . . . NOW, MR. PASAHOW REFERRED YOU TO FIGURE 11 IN
7 THE KLEPPE PAPER WHICH DEPICTED THE HAIR PIN STRUCTURE I THINK
8 YOU CALLED IT?

9 A. UH-HUH. YES.

10 Q. CAN YOU CONCLUDE FROM THE NOTES YOU TOOK HERE WHETHER THERE
11 WAS THAT KIND OF SYNTHESIS GOING ON IN THE EXPERIMENT DR. KLEPPE
12 WAS PERFORMING?

13 MR. PASAHOW: EXCUSE ME, DOCTOR. YOUR HONOR THE
14 QUESTION CALLS FOR EXPERT OPINION. IF DR. KLEPPE IS ALLOWED TO
15 TESTIFY ON THEM, I THINK WE SHOULD BE ALLOWED TO HAVE THE
16 REBUTTAL WITNESS YOUR HONOR PREVENTED US FROM HAVING.

17 THE COURT: WHO WAS?

18 MR. PASAHOW: DR. BARBARA WOLD.

19 MR. FIGG: WELL, YOUR HONOR, MR. PASAHOW CLEARLY OPENED
20 THE DOOR TO THIS TESTIMONY WHEN HE WAS ASKING DR. KLEPPE ABOUT
21 THESE SAME KIND OF THINGS.

22 I CAN WITHDRAW THE QUESTION. I CAN DEAL WITH THIS
23 ISSUE WITH DOCTOR VAN DE SANDE JUST AS EASILY.

24 THE COURT: FINE. I THINK THAT WILL KEEP THINGS A
25 LITTLE TIGHTER. THANK YOU.

2 1 Q. (BY MR. FIGG) DR. KLEPPE, AGAIN, REFERRING TO THIS FIGURE
2 ON YOUR SEMINAR NOTES AND COMPARING IT TO FIGURE 13.

3 A. SEMINAR ON THE 13TH OF SEPTEMBER?

4 Q. YES, ON THE 13TH OF SEPTEMBER. AND I'M COMPARING IT TO
5 FIGURE 13 IN THE KLEPPE PAPER.

6 A. YES.

7 Q. YOU DIDN'T HAVE THE KLEPPE PAPER OR DRAFT OF IT IN FRONT OF
8 YOU WHEN YOU WERE TAKING THIS SEMINAR NOTE, DID YOU?

9 A. NO, OF COURSE, NOT.

10 Q. WHAT DID YOU COPY WHEN YOU TOOK THIS SEMINAR NOTE?

11 WAS THIS ONE OF THE GRAPHS DR. KLEPPE PUT UP ON THE
12 BLACKBOARD?

13 A. YES, THAT WAS THE CUSTOMARY WAY WE DID IT. THE GRAPHS PUT
14 ON THE BLACKBOARD AND YOU COPY AS SHOWN AND FOR OUR OWN USE.

15 MR. FIGG: WE HAVE NO FURTHER QUESTIONS, YOUR HONOR.

16 THE COURT: MR. PASAHOW.

17 RE CROSS-EXAMINATION

18 BY MR. PASAHOW:

19 Q. DR. KLEPPE, ON THESE NOTEBOOKS THAT WE'VE BEEN TALKING
20 ABOUT, HAD ANYONE SEEN THEM BETWEEN THE TIME THAT DR. KLEPPE
21 KEPT THEM AND THE TIME THAT YOU SHOWED THEM TO SOMEBODY IN
22 CONNECTION WITH THIS CASE, SO FAR AS YOU KNOW?

23 MR. FIGG: OBJECTION, YOUR HONOR. THIS IS OUTSIDE THE
24 SCOPE OF THE REDIRECT.

25 THE COURT: TECHNICALLY HE'S RIGHT, BUT BECAUSE IT GOES

2
1 TO AN ISSUE, THE OBJECTION IS OVERRULED.

2 YOU MAY ANSWER.

3 THE WITNESS: TO MY KNOWLEDGE, NO.

4 MR. PASAHOW: I HAVE NOTHING FURTHER, YOUR HONOR.

5 THE COURT: I'LL LET YOU FOLLOW-UP SINCE I LET HIM OPEN
6 THE DOOR TO THAT. THIS IS ONE EXCEPTION TO THE TENNIS MATCH
7 RULE.

8 FURTHER REDIRECT EXAMINATION

9 BY MR. FIGG:

10 Q. DR. KLEPPE, I THINK YOU SAID ON DIRECT EXAMINATION THAT THE
11 SCIENTISTS BROUGHT THEIR NOTEBOOKS WITH THEM WHEN THEY GAVE
12 SEMINARS.

13 A. YES.

14 Q. WAS THERE A CUSTOM AND PRACTICE IN THE KHORANA LABORATORY
15 WITH RESPECT TO WHETHER OR NOT A SCIENTIST WOULD DISCUSS ALL OF
16 THE EXPERIMENTS RECORDED IN THE NOTEBOOK WHEN THAT SCIENTIST WAS
17 GIVING A SEMINAR ON THAT SUBJECT?

18 A. NO. OF COURSE, THE SCIENTIST WHO GAVE THE SEMINAR WOULD, OF
19 COURSE, HIMSELF DECIDE WHAT TO PRESENT, BUT SINCE WE WERE SO
20 INVOLVED WITH EACH OTHER, I CANNOT UNDERSTAND WHY ANYONE
21 SHOULDN'T PRESENT WHAT THEY HAVE DONE.

22 YOU MUST REMEMBER YOU ALWAYS HAD TO DO SOME SORT OF
23 PROOF THAT YOU HAD DONE SOMETHING ALSO, SO I MYSELF TRIED TO
24 PRESENT SEMINAR WHICH WERE EXPERIMENTS WHICH WERE NOT HUNDRED
25 PERCENT GOOD, BUT IT HAD TO BE DONE BECAUSE YOU COULD KNOW HOW

2
1 TO CHANGE THE CONDITION SO IT COULD BE BETTER NEXT TIME.

2 Q. SO THE POINT OF THE SEMINAR WAS TO DISCLOSE THE WORK THAT
3 YOU WERE DOING AND GET FEEDBACK FROM THE OTHER SCIENTISTS?

4 A. YES.

5 MR. FIGG: THANK YOU, DOCTOR.

6 THE COURT: MR. PASAHOW, DO YOU HAVE ANY FOLLOW-UP ON
7 THAT?

8 MR. PASAHOW: NO, I DON'T. THANK YOU, YOUR HONOR.

9 THE COURT: WERE THE PAGES THAT DESCRIBED AND TELLS --
10 THAT YOU DESCRIBED THAT WERE POSTED DURING THESE SEMINARS AND
11 WHOEVER THEN WAS LECTURING OR TALKING ABOUT THE WORK THEY HAD
12 DONE, WERE THESE PAGES THAT CAME FROM THESE NOTEBOOKS?

13 THE WITNESS: YOUR HONOR, IT WOULDN'T BE A PAGE. IT
14 WOULD -- THE RESULTS THAT WERE PRESENTED AS A GRAPH, SO THERE IS
15 DRAWINGS OF GRAPHS WOULD THEN BE THE ORIGINAL DRAWINGS OF THE
16 GRAPHS WHICH WOULD BE STUCK IN THE NOTEBOOK FOR THE SCIENTIST
17 WHO HAD DONE IT, YES.

18 THE COURT: THEY WOULD TAKE THOSE GRAPHS OR OTHER NOTES
19 FROM THE --

20 THE WITNESS: FROM THE LABORATORY NOTEBOOK AND PUT THEM
21 ON THE BOARD. THEY WERE USUALLY MADE OF BIG SHEETS OF GRAPH
22 PAPER.

23 THE COURT: ANYTHING FURTHER, COUNSEL?

24 MR. FIGG: YOUR HONOR, WE OFFER EXHIBITS A-67, A-67A.
25 AND I UNDERSTAND YOUR HONOR IS GOING TO WITHHOLD RULING ON THE

3
1 NOTEBOOK EXCERPTS, BUT FOR PURPOSES OF IDENTIFICATION WE WOULD
2 NOTE EXHIBIT A-70, A-71 AND A-72. I THINK THAT'S IT.

3 MR. PASAHOW: YOUR HONOR, I EARLIER STATED AND YOUR
4 HONOR RULED ON MY OBJECTION TO A-67A. AND A-67 I UNDERSTAND IS
5 SIMPLY A SMALLER VERSION OF THAT. WITH THE INCORPORATION OF MY
6 OBJECTION TO THAT, I THINK THAT MATTER IS READY FOR YOUR HONOR'S
7 RULING.

8 THE COURT: YOU'RE SATISFIED YOU'VE ILLICITED ALL OF
9 THE TESTIMONY YOU NEED TO WITH RESPECT TO CLARIFYING THOSE
10 ISSUES?

11 MR. FIGG: I'M SORRY.

12 THE COURT: YOU HAVE ILLICITED ALL OF THE TESTIMONY YOU
13 NEED TO FROM DR. KLEPPE WITH REGARD TO THE CLARIFICATION OF
14 THOSE ISSUES?

15 MR. FIGG: ON THE AUTHENTICITY OF THE DOCUMENTS WE DO,
16 YOUR HONOR. DOCTOR VAN DE SANDE MAY OFFER ADDITIONAL TESTIMONY
17 DEALING WITH MR. PASAHOW'S OBJECTION.

18 THE COURT: OKAY. THANK YOU.

19 ANY REASON WHY DR. KLEPPE MAY NOT BE EXCUSED WITHOUT
20 BEING SUBJECT TO BEING RECALLED?

21 MR. PASAHOW: NONE, YOUR HONOR.

22 MR. FIGG: NO, YOUR HONOR.

23 THE COURT: THANK YOU VERY MUCH. I'M SORRY WE HAD TO
24 INTERRUPT THE PROCEEDINGS A COUPLE OF TIMES HERE AND DELAY YOUR
25 RETURN TO NORWAY.