

Ros'lind

A Play by David McMullen

Host

Julian Graduate student.

Dr Ros'lind Franklin Ghostly presence.

Dr Peter Driscoll. Research scientist.

Dr Maurice Wilkins. Nobel laureate scientist

Dr Francis Crick. Nobel laureate scientist

Jessie Wilson Graduate student.

Waiter

ACT ONE

SCENE 1

SETTING: TIME - It is day. PLACE: STAGE RIGHT - A stool is sitting in a pool of light, with the rest of the stage in darkness. The HOST walks in and perches on the stool.

HOST

(Addressing the audience.)

The time is the 1960s. It is the era of the Vietnam War, the Cuban missile crisis and the assassination of John F. Kennedy, among others. The action takes place from 1962 until 1965, in and around the Kings College - Medical Research Center laboratory in Central London, UK, where Maurice Wilkins has been working on the structure of DNA using x-ray crystallography for 25 years. In 1953 both he and Francis Crick, from Cambridge, separately published the double-helical structure of DNA, for which they will receive the Nobel Prize. The mechanism of protein synthesis was not yet known yet..

SCENE 2

SETTING: TIME - 1962 PLACE: JULIAN'S LAB. A battered lab that has seen better days. There is an old x-ray machine in the corner. JULIAN is seated at an old desk reading scientific papers.

JULIAN

(To no one in particular.)

What the hell am I doing here? Next time Julian, perhaps you'll learn not to volunteer, and to keep your damned mouth shut! Now you spend your time reading dozens of journal articles about molecules whose names you can't pronounce, let alone understand what they do.

(He sits at the desk and tries to read the articles)

Oh. This is hopeless. I mean look at this one - DNA. - desoxi-something or other acid. Are you kidding me!

ROS'LIND

(Appearing out of the shadows in the room.)

And so it starts!

JULIAN

(Starting at her voice.)

Where did you come from? This is a private lab...You're not supposed to be here.

ROS'LIND

It hasn't changed much since I was here. A little dustier maybe.

(She comes over to perch on a lab bench not too far from him.)

JULIAN

You used to work here?

ROS'LIND

Did some of my best work here. Unappreciated perhaps, but none the less...

JULIAN

Sorry if I was rude. You startled the sh... hell out of me. Hello. I'm Julian.

(Offering a hand to shake. She doesn't try to shake it.)

ROS'LIND

Ros'lind. Nice to meet you. Oh. It's pronounced deoxy-ribo-nucleic acid, by the way. Boy. You are green! Chemist? Biologist?

JULIAN

Hello, Rosalind. Physicist. And yes, it's all Greek to me at the moment. What's your field?

ROS'LIND

Its Ros'lind, no A. X-ray crystallography. But trust me. It was all Greek to me too when I first came here. I had never worked on biological samples before. Coal. Carbon Crystals. It was months before I learned how to say DNA. Are you going to use Big Bertha over there?

(Pointing to the machine in the corner)

Just a tip. Be careful how you align her. She bites.

JULIAN

I beg your pardon, "Ros'lind. No A." Duly noted. Fat chance of my doing X-ray work. All the juice has already been squeezed out of that field. No, I'm going to work on looking at nucleic acid structure with absorption spectra.

ROS'LIND

Interesting approach. Getting accepted here is a coup. You must be quite something. Anyway. Gotta go. See ya kid. And congratulations.

(With that she waves cheerily at JULIAN, and disappears into the shadows.)

JULIAN

What the fuck?

SCENE 3

SETTING :TIME: Next Morning. PLACE: PETER's office. Small. Littered with books, journals and scientific papers.

PETER

So, Julian. Settling in okay?

JULIAN

Sure. What's the story behind this place? It's the most unlikely lab I've ever worked in.

PETER

Isn't it? This college was built to train priests for Henry the Eighth in the reformation. During the war, a flying bomb hit our parking lot. They found a whole lot of space under ground they didn't know they had. They were a little embarrassed by this new-fangled science, biophysics, so they thought that space would be a great place to hide us.

JULIAN

A professor from the physics department waylaid me on the way to my interview with Dr Wilkins. He told me you weren't proper physicists, and I would do better studying with him. He said he had a place open for someone to design the latest instruments.

PETER

Ah yes. Professor Camp. He never gives up. He thinks we're all crazy and doesn't know why we still get funded. But that offer's pretty funny. I have a couple of tasks I would like you to cut your teeth on, okay? (*JULIAN nods*) The first is I want to scour the City, and find out where we can get the freshest cod roe.

JULIAN

Excuse me? Did you say cod roe?

PETER

That's right. We use it to extract the DNA. It yields the best samples for x-ray crystallography. But it must be fresh from the sea.

JULIAN

Okay. Will do. And the second task?

PETER

We're getting a brand new optical instrument next week. I want you to take a hacksaw to it, cut it up and make it work a thousand times more sensitively. So you see you didn't miss out on anything with Professor Camp. You're going to be working on instrumentation anyway. Now get out of here.

Welcome to Kings. I'm sure we can find something around here to challenge you.

SCENE 4

*SETTING: JULIAN'S LAB. TIME: LATER THAT SAME DAY.
JULIAN is working at his lab bench, when JESSIE enters. She is about JULIAN'S age. She walks with a cane, and doesn't pay much attention to her appearance.*

JESSIE

Hi there. I'm Jessie. *(Shaking his hand)* Welcome to Kings!

JULIAN

Hi. Julian.

JESSIE

What's your specialty? Biologist, I hope. We sure as hell need more of them around here.

JULIAN

Physicist.

JESSIE

Oh no...We need another one of those around here like a hole in the head! Good luck. You're going to need it!

JULIAN

Excuse me?

JESSIE

You people come in here acting like you're god almighty. After all, you figure, you've cracked the problem of the atom and its nucleus. How difficult could the cell be to understand? Boy, are you in for a shock...!

JULIAN

What's your field?

JESSIE

Biochemist.

JULIAN

And what do you do around here?

JESSIE

Graduate student. I'm a year ahead of you. I'm studying with Dr. Elliot on taking pictures of live insect flight muscle with X-rays.

JULIAN

I thought that was supposed to be impossible?

JESSIE

It is. Let's hope they're wrong or I won't ever graduate from this madhouse!

JULIAN

I'm afraid you're wrong about one thing. I am not that arrogant. True, I was a summer intern at CERN, in Geneva. But I realized right away that the math behind nuclear physics and quantum mechanics was completely beyond me. I was out of my depth.

JESSIE

So, what are you doing here?

JULIAN

I'm following up on an idea I had in Geneva. It's probably batshit crazy, but it's led me here.

JESSIE

What crazy idea?

JULIAN

You wouldn't be interested.

JESSIE

Why don't you let me be the judge of that?

JULIAN

All right. But don't say I didn't warn you!

JESSIE

Get on with it already!

JULIAN

Okay. CERN is a huge accelerator designed to create high speed elementary particles and see what happens when you smash them into matter. The problem was how to make these minute elementary particles visible so they could count them. I was working on one of the ways to do that. It's called a liquid scintillator, and it was based on a very strange phenomenon.

It was basically a big glass vessel filled with a clear liquid. In it they dissolved two substances. The first substance acts as a motion detector. If an elementary particle flies by, its sensor registers it. Then it contacts the other substance which acts as an alarm. The alarm sends out a pulse of light, which is then counted. This caused the body of liquid to scintillate with light pulses, each pulse is a particle. Hence, a scintillation counter.

JESSIE

Okay. I get that, sorta. But what the hell does that have to do with cellular biology. After all, that's what we study at Kings.

JULIAN

At first sight, nothing. Then I read a paper by two French scientists, the Pullmans. They found that all of the motion detector substances used were carcinogens.

That's when I had a mind implosion. The motion detector and the alarm only communicated with each through a pulse of energy. That meant that the motion sensor carcinogens only communicated with the genetic material that led to cancer by a long range energy pulse. So much for the jigsaw puzzle interactions seen from x-ray crystallography.

JESSIE

You realize what you're saying is heresy in molecular biology. Everything is determined by how molecules mechanically fit together. I hope you didn't tell anyone about this lunacy?

JULIAN

Actually I told my physics professor when I got home. He sent me to an old college buddy of his, Professor Wilkins, and when he met me, I told him. He

went on to offer me a graduate position. So yes. I think you could say we are talking today because I told people about my crazy idea.

JESSIE

Well, you best keep your mouth shut around here, is all I can say. There are a lot of scientists climbing onto the DNA bandwagon, and the last thing they need is a someone to prove they only have half the truth!

JULIAN

I don't worry about what people think of me. I'm so new I barely understand what you're talking about when it comes to the molecules that make up the cell, let alone how they work!!

JESSIE

(EXITING)

Still all the same, keep your mouth shut about your idea, Julian. Gotta run. Sample preparation session.

(JULIAN pushes his chair back and puts his feet up on the desk, sipping a mug of tea.)

ROS'LIND

(With the tone of a drill sergeant, she snaps at him, barking...)

Julian! Take your dirty shoes off my nice clean desk.

(JULIAN is so startled, he almost falls out of his chair. He takes his feet off the desk.)

JULIAN

You know, someone should hang a bell around your neck to warn people you're coming!

ROS'LIND

I'd like to see them try.

JULIAN

Your desk? What do you mean, your desk? This was Dr Franklin's desk, and as far as I know she died five years ago of exposure to x-rays. So I am afraid you must be mistaken.

ROS'LIND

(Pointing to the x-ray machine against the wall.)

All true. It was x-rays from that machine over there, actually, that killed me. I had no idea that all those hours looking down the x-ray beam to focus it would be so lethal.

JULIAN

You mean you're really Dr You're... a ghost? You claim you're actually the Dr Rosalind Franklin, who sat at this desk, and took the key x-ray diffraction patterns that...?

ROS'LIND

(Correcting him)

Ros'lind...No A. Solved the structure of DNA? Guilty as charged.

JULIAN

Sorry. Ros'lind. No A. My mistake. But how? What...? Why?

ROS'LIND

That about says it, I think. The answer to all three questions is I haven't the faintest idea. One minute I wasn't, and the next I was. No explanation. Just popped in and found you sitting at my desk.

JULIAN

Well, technically, the desk you used to use has been reassigned to me. So I think I can claim as much ownership of it as you.

ROS'LIND

Picky. Picky. Picky. I suppose so. But it's still my desk.

JULIAN

So you don't know why you're here? I mean dead and here.

ROS'LIND

That's correct.

JULIAN

Can anyone else see you, or could you be a figment of my active imagination. I know. You don't know.

ROS'LIND

Do I feel like I am a product of your imagination?

JULIAN

Not really. No. But I'm not sure how I would know. And you've no idea why you've come back to haunt me?

ROS'LIND

Haunt you? What a quaint idea! Well, in a way I suppose I am. If you're asking why only you can see me, and I'm dead...I suppose that does constitute a definition of haunting you. Yes. But I can assure I'm not here to scare you. Quite the contrary. If anything, I'd say I'm here to help you, to guide you.

JULIAN

I don't think so. I don't think I'm important enough to justify you expending your energy on me. I was just thinking about that machine over there, and how little we used to know about radiation poisoning. What a sad way to die! Killed by a machine. What a tragedy it was that you were killed so young in your career. Who knows what other breakthroughs you'd have made?

ROS'LIND

Why, how touching! But research is relentless and impersonal. Somebody else will do what I would have done. We just don't know who or when. By the way, you should listen to that young woman. She's got a head on her shoulders. She knows first-hand what happens if you break the male agreements in this place.

Well, I've got to go. Ta ta for now.

(With a cheery wave, she disappears into the gloom of a shadow.)

SCENE 5

SETTING: TIME: Morning a few weeks later. PLACE: JULIAN's office/lab. JULIAN is sitting at his desk, working with a spreadsheet.

PETER

(Sticking his head around JULIAN'S door.)

Heads up. Francis is visiting the lab.

JULIAN

Francis? Francis who?

PETER

Crick, of course. I suggest you put something over those results of the concentrations of nucleotides in a mixture. That's pretty remarkable work. You don't want to put it on public display around Crick. If you look around the lab, you'll see everyone is covering their desks for the same reason.

JULIAN

What the hell for? Is he some kind of neatness freak?

PETER

Worse than that. He has the reputation of being able to read people's results on their desks, backwards, and upside down. And then go on to publish them before they do!

JULIAN

You're kidding me?

PETER

No. I'm afraid not. Oh, by the way. Uncle wants you to join us at 7 for dinner tonight with Francis at Jimmy's. Gotta go.

(EXITS with a wave.)

SCENE 6

SETTING: TIME - That evening. PLACE: JIMMYS - an Italian restaurant built in a section of a bombed out underground station complete with the tubular original tiled walls. There are a number of long wooden tables, covered with red and white tablecloths. Each table is lit with a number of candles stuffed into raffia-covered Chianti bottles, dripping with candle wax from repeated burning of new candles. There are four men seated at one table. MAURICE, FRANCIS, PETER and JULIAN.

PETER

Let's get a couple of bottles of Chianti for the table. Waiter... Two bottles of Castello di Albola.

(Waiter takes the order and leaves to fill the order.)

FRANCIS

This looks like real neighborhood place. What's good here?

PETER

You'll see. They don't give you much of a choice. But whatever they're serving, it'll will be delicious.

WAITER

(Returning with the wine, which he dumps on the table with little ceremony. He speaks in a thick Corsican accent.)

Whadya want? We only got stew.

PETER

That's fine. We'll take four stews, thanks.

FRANCIS

Maurice, you saw Sydney's paper on the role of RNA in protein synthesis?

MAURICE

I saw a review copy of the paper. Sydney is a sound enough man. Looks like good work.

FRANCIS

Good work? Are you joking? This RNA that acts as a messenger... That's the key to the whole protein synthesis thing. Look...

(He starts drawing formula and flow diagrams on napkins which begin to litter the table. FRANCIS and MAURICE are in a heavy discussion about the implications. While they are talking the WAITER brings four steaming bowls of stew, and dumps them on the table.)

FRANCIS

You're right, Maurice. This stew is delicious. But I don't think you're right about the role of the ribosome...

(As they are scribbling and debating, one of the notes finds its way over towards JULIAN. He looks to see the two men are lost in conversation. Then he reaches his hand out to grab the piece of napkin covered in notes. As he does so FRANCIS reaches out with a soup ladle and raps JULIAN on the back of the hand with it. He waves his finger from side to side at JULIAN.)

FRANCIS

Not so fast, young man. There could be a prize amongst these doodles...

JULIAN

Excuse me?

FRANCIS

That scribbled notes you have in your hand.

JULIAN

(Handing back a scrunched up piece of napkin to Francis.)

Oh this? I thought it was discarded.

FRANCIS

Nothing said or scribbled at this table is ever discarded. You're playing with the grown ups now. Anything we say or doodle or scribble is ours alone. You don't take other people's results without asking them or without citing them.

(Takes the scrunpled up napkin from JULIAN and puts it in his pocket.)

PETER

Julian, for gods sake try to be cool. You're an invited guest here at this table. Behave appropriately. I know it's tempting, but, at this table, even the doodles can lead to major scientific breakthroughs.

JULIAN

I thought no one wouldn't notice...

FRANCIS

Hey kid, nice try. I would have done the same thing in your place once upon a time. Maurice, why don't you bring young Julian up for the next seminar at the Cambridge MRC. It'll do him good.

SCENE 7

SETTING: TIME - Next morning. PLACE: PETER's office. JULIAN knocks at the door.)

PETER

(Not looking up.)

Come...

Oh hi, Julian. Thank you for dropping in. I wanted to talk to you about last night. I hope you learned your lesson. Those men didn't get to where they are by not being aware of what's going on around them. We are in the business of ideas. They are a scientist's wealth. Did you really think you could get away with stealing one?

JULIAN

Well, I...

PETER

Reputations, papers and grants are all based on ones data and the interpretation of what it means. Around here you don't think of taking someone's results or conclusions without giving proper attribution. It's a big no no. Even a doodle on a napkin.

JULIAN

I am really sorry. I meant no...

PETER

(Dismissing his attempt at an apology.)

You must have impressed the big man. Francis doesn't invite just anyone to Cambridge.

JULIAN

(Shrugging his shoulders as if to "So what?")

If you say so. What can you tell me about Dr Franklin? I believe I am using the same lab she did?

PETER

What brought her name up?

JULIAN

Apparently, I am sitting at her desk.

PETER

Not much to tell really. X-ray crystallographer Maurice brought over from Paris because she had quite a reputation figuring out the structure of coal. She was assigned to bring her expertise to the DNA structure, a much more complex problem. She turned out to be a competent crystallographer, eventually being able to create the picture that allowed Uncle and Francis to crack the structure of DNA.

She was basically a skilled technician who helped Uncle complete a search he had been pursuing for twenty five years. She helped him bring it down the home stretch. But she also betrayed him by giving the key picture to Watson, while she attended a conference in Copenhagen, before Uncle even had a chance to do the full calculations to find the structure.

JULIAN

Why on earth did she do that?

PETER

Who knows? She could be quite temperamental. I believe she got her feelings hurt when she found out Uncle was going to publish her results. What she didn't seem understand was that it was Uncle's lab. He was entitled to. I don't think she realized that it was Uncle who laid down the 25 years history that made the breakthrough possible. After all, her previous experience was with coal, for Christ's sake. It was Uncle who gave her entree into the big league. She should have been grateful for the opportunity he gave her.

JULIAN

What ever happened to her?

PETER

Sad story, really. She died from cancer that some people think that her exposure to X-rays had a hand in. Nice person, but rather stand-offish and arrogant for a woman. Of course, her being Jewish didn't help, if you know what I mean. She went on to another college here at London University, and did some good work on viruses before she died. Such a shame.

I'll let you know when we're going up to Cambridge. How are you doing with the first task I gave you?

JULIAN

There's a place called The Fish Market at Billingsgate Market, whose claim to fame is that it has the freshest caught fish, including cod.

PETER

Great. I'll pass it on. The purchasing people will be delighted. Now your Perkin Elmer UV 137 spectro-photometer is being delivered next week sometime. You'll have your work cut out for then. Okay. Thanks for dropping in. And, in the future, no picking up doodles!

(Goes back to working on the results on his desk, ignoring him.)

SCENE 8

SETTING: PLACE - JULIAN'S LAB. TIME - Later that day.

JESSIE

(Bursting in)

You sonofa bitch! You stabbed me in the back.

JULIAN

It's good to see you too...

JESSIE

How come you rate a dinner with Crick?

JULIAN

Before you go on any more, I had nothing to do with being invited that evening. The command to attend came down from on high. I was just told to appear. Second, I took the opportunity to try to palm one of Crick's notes,

scribbled on a napkin, when I thought no one was looking. They were, and I got rapped on the hand by Crick with a soup ladle.

JESSIE

(Bursting into laughter, despite herself.)

You didn't! Oh I would have loved to see his face. Someone turning the tables on him... Priceless...

JULIAN

I'm glad you find it funny. I felt humiliated.

JESSIE

The old goat got some of his own medicine.

JULIAN

What are you talking about?

JESSIE

You heard about the fuss when we learn he's coming into the lab for a visit?

JULIAN

Dr Driscoll mentioned something about him having the reputation of being able to read and understand people's results before they can? I didn't believe them.

JESSIE

Well believe it! Crick is famous for having sticky fingers. Anybody results will do just fine. The problem is he's so damned fast, he can really troll for results on your desk without you even realizing it.

JULIAN

Not the man I met.

JESSIE

Things are not always what they seem around here. You'll find out for yourself. You really did try to take one of his notes under his gaze? I love it. By the way, I just heard that you've been invited to Cambridge by his nibs.

JULIAN

It guess so. What of it?

JESSIE

Nothing. Only I've been working here for six months, and you've been here a hot minute?

JULIAN

I don't know. I had nothing to do with the offer.

ROS'LIND

(Appearing suddenly in the room.)

I do. You're in the testosterone club...Jessie isn't. She can't see or hear me, don't worry.

JULIAN

Maybe it's because I'm a man?

JESSIE

You think! This place is rampant with misogyny. But it's not your fault I guess. You can't help being a man.

JULIAN

Thank you for that, I think. What you're implying is that bias against women is a real factor in deciding advancement.

JESSIE/ROS'LIND

You're kidding!

ROS'LIND

Of course you're not, God help me.

JESSIE

Clueless. Totally clueless.

JESSIE/ROS'LIND

Just like a man!

JULIAN

All right cut it out, the both of you!

JESSIE

Both of whom? There's someone else here?

ROS'LIND

Oops! Careful.

JULIAN

No. No one else. It just reminded me of what my mother used to say. It spooked me.

JESSIE

(Suspiciously)

If you say so...Look, I'd better be going. Have a nice trip.

(She leaves, waving goodbye)

ROS'LIND

That was a close one. Remember, you are the only one who can see me.

JULIAN

And why is that, by the way?

ROS'LIND

I don't know, really. I don't know. As I said, one moment, I wasn't there, and the next I was, talking to you. Don't ask me why.

JULIAN

Could it have to do with something you didn't finish before you died?

ROS'LIND

Don't think so. I finished everything I set out to do. The science, that is, of taking pictures of both DNA and some viruses. I laid the ground work for others to take over where I left off. If I were to hazard a guess, I'd say it has something to do with you.

JULIAN

Me? Why me? Why should I matter to you?

ROS'LIND

Perhaps what you represent?

JULIAN

A brand new graduate student, so green he doesn't know how to pronounce DNA? Seems unlikely.

ROS'LIND

Don't put yourself down. You represent the hope of the future. What might yet be. If I can influence you, maybe I can influence the future?

JULIAN

Still seems pretty far fetched to me.

ROS'LIND

You haven't seen it yet, but you're one of Uncle's wunderkind!

JULIAN

I'm what?

ROS'LIND

Special graduate students he feels can make breakthrough contributions to research. Didn't you think it was odd that he didn't care what kind of a degree you got? When you didn't qualify for a government grant, didn't you ask yourself why he offered you a full time research position as a scientific officer? A position that normally requires you have already graduated with a doctorate? Like I said wunderkind!

JULIAN

I was just so grateful to be accepted into the graduate program, I didn't want to question how or why. I found out since that Dr Wilkins is a really big deal in his field.

ROS'LIND

Every now and then Uncle has special students recommended to him who have shown unusual promise, or creativity. How did you get to see him?

JULIAN

I was recommended by one of my professors, an old college buddy of Wilkins.

ROS'LIND

As I thought. Inside track. Rather like MI-6 scouts looking for prospective spies...

JULIAN

I still don't get it. Why me?

ROS'LIND

What did you tell your professor that got him to send you to Uncle?

JULIAN

I talked about the crazy idea I had in Geneva about cancer being caused by a carcinogen through long range electronic forces. I mean, it's probably pie in the sky nonsense.

ROS'LIND

And if it isn't? If there's some basis for it?

JULIAN

It would revolutionize how we think of the cell...

ROS'LIND

Like I said, wunderkind...That kind of crazy idea is how Science leaps forward, rather than through logical inches. So maybe now you get a sense of why I came to you. Maybe if I had come back to haunt Crick, I could see making his life hell, but I'm here, not in Cambridge. And I'm not even haunting you. We're just hanging out.

JULIAN

I give up. But I agree with you about that. You're not even haunting me. I kinda like you.

ROS'LIND

Likewise I'm sure.

SCENE 9

SETTING: TIME - One year later. PLACE: A brand new research lab in a renovated seed warehouse on Drury Lane just round the corner from Covent Garden. STAGE CENTER, AND LEFT IS DARK. STAGE RIGHT is illuminated by a single spot. On a stool in the center of the spot is a stool. HOST is seated on it.

HOST

It is one year later and there have been a lot of changes. First, Maurice finally got a tenured professorship. The lab has moved out of its home in the bombed out basement of Kings College into a brand new laboratory on Drury Lane in a renovated seed warehouse. The cause of all this change? Professor Wilkins has been awarded the Nobel Prize.

SETTING: We are in the spacious entrance hall that has been decorated for a party to celebrate Maurice being awarded the Nobel Prize. The stage is dominated by two large scale models of DNA decorated like Christmas trees with lights and ornaments set at either side of the rear wall of the stage. There is a dais with a microphone. There is a bar, with champagne. Everyone has a glass. PETER is addressing a gathering of lab people and other honored guests.

PETER

I want to welcome everyone to this joyous occasion, the awarding of the Nobel Prize to one of our own, Professor Maurice Wilkins. Please raise your glasses in a toast... To Uncle!

ASSEMBLED CROWD

Professor Wilkins... Uncle...Maurice...

(MAURICE stands self-consciously to one side, obviously very uncomfortable with all this attention.)

PETER

This has been quite a journey, I can tell you, and I've been privileged to have been a part of it almost from the beginning. In 1915, Maurice was one of a group of four scientists who saw the potential hidden in the use of x-ray

diffraction in studying the structure of crystals. In a leap of faith which is almost incredible for me to imagine, the four of them saw this technique could help them resolve the structures of DNA and Protein.

From resolving the structure of common table salt, they predicted the same technique could resolve the very complex structures of biological macro-molecules. That was when Dr Wilkins chose to work on DNA.

I joined him in this work not long after that choice, and I've been with him ever since. His devotion to DNA for 25 years has been compared to the love and pursuit of a mistress. Today everything is very glamorous. It wasn't so back when I started. We had no idea what we were doing. One of the first attempts we made to get an image of DNA, was to put a piece of frozen steak in the x-ray machine! Undaunted by this evident failure, we improved our approach, eventually using feathers to tease the long molecules of DNA into liquid crystals. Immediately we began to see definitions of an underlying pattern, blurry but definitely there. We knew we were going to succeed.

Then the team was joined by an x-ray crystallographer from France, Dr. Franklin. She showed that our x-ray images were blurry because our DNA samples had crystallized into two separate forms. She found a way to only have one form in a crystal. The result is the beautiful image of a series of blips arranged in exes that the world now knows. The picture that led to the famous double helix structure that led to three people winning the Nobel Prize for it. Drs Crick, Watson and our own Uncle, Professor Maurice Wilkins...

(Crowd breaks out into rounds of applause and whistles and cheers. PETER points to UNCLE, beckoning him up to the dais. He comes unwillingly.)

UNCLE

Thank you. Thank you all for coming. Drink up!

JESSIE

I hardly know anyone here.

JULIAN

I know what you mean. Ever since the announcement, this lab has been crawling with American scientists.

JESSIE

They're all too busy jockeying to get the attention of the TV cameras to do any research.

JULIAN

Let's get out of here.

SCENE 10

SETTING: TIME - Continuation of Scene 9. PLACE - JULIAN'S new lab. It is a spacious affair with a wall of windows overlooking Drury Lane. The lab bench runs the length of the wall under the windows. Part of it is set up as JULIAN'S desk area. The rest is covered with laboratory equipment. There is a spectrophotometer. JULIAN and JESSIE ENTER.

JESSIE

Wow! Nice digs. This is the first time I've been in here. Very fancy. That scene was nauseating

JULIAN

The party was media insanity...

JESSIE

It's true. But that's not what I'm talking about. A bunch of pompous, old, misogynistic fat pigs, preening themselves as they gloat in an orgy of self congratulation.

ROS'LIND

(ROS'LIND enters without JULIAN noticing.)

You can say that again!

JULIAN

(Jumps, startled.)

Shhh... Why don't you say what you really mean?

JESSIE

You're doing it again. Talking to someone only you can see.

JULIAN

You're imagining things.

JESSIE

Maybe...Anyway, as I was about to say, those pompous arseholes stole the Nobel Prize. It was someone else's work. Makes me furious to see them taking a victory lap.

JULIAN

I'm sorry. What the hell are you talking about?

JESSIE

Ros'lind Franklin. That's what I'm talking about. And if you weren't so busy toadying up to Crick, you'd know what I meant. Boy, did they ever see you coming. Fruit ripe for the picking. A real patsy.

JULIAN

All right. Now you've gone too far. You've no need to go insulting me. What did I ever do to piss you off?

JESSIE

You went along for the ride. All it took was a little ego flattering.

JULIAN

Okay. I can see you're mad as hell. I still don't get what the problem is. As Dr Driscoll just said, all that happened today was that Professor Wilkins got rewarded for following his idea that the structure of DNA could be resolved with X-rays. It only took him twenty five years. But he succeeded. He did it. He took the famous picture that led to the famous double helix structure. With the help of Crick and Watson, he did it.

JESSIE

But did he? That's the real question, isn't it?

JULIAN

Did he what?

JESSIE

Take the famous X-ray picture.

ROS'LIND

Listen to him. He's onto something.

JULIAN

Well not personally, no. Ros'lind Franklin actually took the picture. But she was on his team, worked in his lab. Same thing. Brilliant work. But built on Wilkins 25 years work.

JESSIE

Was she?

JULIAN

Was she what?

JESSIE

On his team? Actually, she was hired by the head of the lab, Dr Randall, while Wilkins was out of the lab. He appointed her to lead the DNA team, without telling Wilkins. He got pissed, and never accepted Ros'lind and things were chilly between them ever since.

ROS'LIND

You can say that again. Chilly doesn't begin to describe it.

(JULIAN scowls at ROS'LIND.)

JESSIE

Then she did the unforgivable. She solved Wilkins' problem. How dare she? A newcomer. And a Jew. Worse still, a woman. She reviewed all the x-ray pictures Wilkins had taken, and immediately saw a problem that everyone else had missed. The reason the pictures were somewhat blurry was not, as Wilkins and his team had thought, poor x-ray technique or instrumentation. was because the x-ray pattern was made up of two different forms of DNA that overlapped. So she set about refining the sample to get one with just one crystalline structure of DNA.

ROS'LIND

It fell out immediately. DNA structure is very sensitive to the level of humidity. It exists in two forms, A and B, depending on the moisture level. By controlling the moisture, I was able to separate off the A form. When we took the x-ray picture of the purified form, there it was. The most beautiful pattern of spots I had ever seen. It was quite beautiful.

JESSIE

She got immediate results. And she was right. The simplification to one DNA structure yielded a clear x-ray picture. No more blurring. No doubt. DNA had a simple helical structure. She set about measuring and defining the picture. While she was doing that she shared her success with her colleague, Wilkins. She also published an confidential internal Medical Research Council memo.

JULIAN

The way I heard it, she also took the picture to a meeting in Copenhagen, and shared it with Watson from Cambridge. She betrayed Wilkins to Watson and Crick, letting them solve the structure before Wilkins even had a chance to do it.

JESSIE

Where did you hear that crap?

ROS'LIND

Complete fabrication. Never happened.

JULIAN

From Peter Driscoll. That's the official line in the department.

JESSIE

He's having you on...

ROS'LIND

He lied! I didn't go to that conference. I never was in Copenhagen with or without that damned picture.

JULIAN

I don't believe you. Why would he do that? What's in it for him?.

JESSIE

The person who got his nickers in a twist when he saw that picture, was Dr Wilkins. I think he got jealous that, after twenty five years looking for this answer, a totally unknown newcomer stepped in and scooped him. What's worse was that it was a woman too. Plain old fashioned envy mixed with male ego.

JULIAN

I'm sorry. This is too much to accept. Professor Wilkins is a world-famous, reputable and established bio-scientist. It was his vision 25 years ago that led to him searching for the structure of DNA at a time when that was unthinkable. He's the reason I'm here in his lab, learning from him. Since I've been here, I've come to know him as a gentle man who avoids conflict. He's a role model for me. I admire him. You have no evidence for what you are suggesting. This is just bias on your part.

JESSIE

Well, I can't get into Dr Wilkins head. You're right. And I appreciate how much you respect Uncle and the others. I understand that you don't want to hear your heroes have clay feet.

JULIAN

You smug son of a bitch. I don't understand why you've taken such a dislike to a group of scientists I came here to study with. I'm sick of hearing you run them down all the time. If you can't find something good to say about them, I'd appreciate it if you didn't say anything at all. I enjoy our friendship, Jessie. Don't push it too far...

JESSIE

I think you've got your genders a bit confused, but I get your point. You're acting like I'm being irrational, that I am reacting emotionally, may I say, like a woman? That I'm just attacking them because they're men. Nothing could be further from the truth, and I can prove it.

JULIAN

Like how?

JESSIE

Well, you will agree that it was the existence of the Ros'lind's famous X-ray picture that led to the three men being awarded the Nobel Prize.

JULIAN

I suppose so.

JESSIE

And you'll also agree that it isn't done to use another person's results without referencing them in the citations for any paper you publish.

JULIAN

(Laughing.)

Absolutely. Crick made that very clear at our dinner when I tried to take his scribbled notes.

JESSIE

Then how do you explain that there are no references, or citations, to Ros'lind's picture in any of the papers published in the famous issue of Nature on the double helix.

JULIAN

You're mistaken. You have to be.

JESSIE

Look it up. It's in the public record. There's no mention of Franklin or her x-ray picture in either Wilkins and Gosling's, or Watson and Crick published papers. If you don't believe me, check it out!

ROS'LIND

She's right, you know. I never understood why. Just a credit would have been nice. After all, it was that picture that made everything else possible that followed.

JULIAN

Even if that were true, which I find incredible, it still wouldn't make her eligible for the Nobel Prize. She was dead when they awarded it.

JESSIE

True. But the real question is whether the committee would have awarded the prize to these three men at all if they knew they stolen the main X-ray evidence in their publications.

JULIAN

I've got that issue of Nature Right here, somewhere...Let's see if what you say is right. I doubt it. It's not possible they left it out.

(JULIAN rummaged through a pile of journals at one end of his bench.)

Aha! Here it is. Let's see...

(JULIAN finds the two articles, and pores through them.)

I don't believe it. You're right. I never noticed it before. I mean, I never checked the cited references before, but there's no mention of Franklin In either Uncle's or Crick's paper. How is that possible?

JESSIE

She's dead, isn't she? Who's going to protest?

JULIAN

Oh, come on. This is shameless! Outright excluding her work? Did they think no one would notice It?

JESSIE

Well, no one has, so far, so I guess they were right. They treat her as valueless; her work as forgettable, like a plumber's or a lab assistants. She's become a non-person. Invisible. A nobody.

JULIAN

If I hadn't seen it with my own eyes, I wouldn't have believed it. They have no consciences. They act as if there are no consequences.

JESSIE

Well, there aren't any, are there? They're free to do whatever they want to.

JULIAN

Why would they do it? What difference would it have made to them or their careers, if they had just cited her work? Such arrogance! They have everything. Everything I aspire to. And they pissed on it as if it had no importance. They have made a mockery of everything I believe in. Why? Why?

JESSIE

Because she was a woman. She just didn't count. Her only role was to advance the men. It was misogyny plain and simple.

JULIAN

But you're a woman. That would mean...

JESSIE

Exactly. It's not just a single crime. It's a crime spree that continues today unchecked.

JULIAN

I can't believe Driscoll looked me straight in the eyes and fucking lied to me. Unbelievable.

JESSIE

Poor Julian. He's been lied to. Treated as a non-person. Poor baby.

JULIAN

Oh shut up. Maybe I did deserve that, but I don't want to hear it.

JESSIE

You're upset that he lied to you to cover up their crimes. Once. Welcome to my life. Women face this every day of their working lives. Get used to it. We have to.

SCENE 11

SETTING: TIME - One evening a week later. PLACE: JULIAN'S LAB. JESSIE bursts in excitedly.

JESSIE

We did it! You know I've been working with Dr Elliott on ways to get an x-ray pattern from living muscles tissue in an insect. Well, last night we did it.

JULIAN

You did the impossible?

JESSIE

Normally it is, but I came up with the idea that if you stun the flies with gas, and act very quickly, it should work. There is enough organization in the muscle tissue for you to get a decent pattern. Elliott is working out the structure as we speak. Finally, some decent work in this television set of a lab.

How about you? You must be pretty well set with the paper about base measurements.

JULIAN

Close. But something else is bugging me about Watson and Crick's coding scheme. Nothing as perfect as life ever came from the pieces just bumping into each other by chance. It's nonsensical.

JESSIE

Watch out. That's heresy! Crick is likely to squish you like a bug for casting shadows on his perfect double helix, jig saw universe. The Gods will not be pleased...

JULIAN

Talk to me. its only a crazy idea right now, but it won't leave me alone.

JESSIE

Come over here. You've got to see this! You're never going to believe it.

JULIAN

What are you talking about?

JESSIE

It's like something out of the Amsterdam Red Light District!

JULIAN

You're kidding me! That woman in the window on the other side of the street? Is she's a hooker? She's beckoning to us.

JESSIE

I think it's more likely to you. I'm the wrong gender.

JULIAN

The way things are nowadays, you can't be sure of that.

JESSIE

You know there have been brothels on Drury Lane since the fourteenth century. The way I see it, she has more right to be here than we do.

JULIAN

Maybe that's how the old man found this place. I can see him lying in her bed afterwards, when he looked up and saw the seed warehouse. That's just the

ticket for my new lab, and so convenient too...he thought. Ah. Pity. She's closed the blinds.

JESSIE

All right. That does it. That's enough foolishness. I have to go home. You should too.

JULIAN

I will soon. I just want to think through my crazy idea about coding. If I'm going to be accused of heresy, I might as well do it right. Night.

JESSIE

If you say so. I think you're nuts, but I'll leave you to it. Night.

(JULIAN leans back in his chair, puts his feet up on the bench, closes his eyes to contemplate his "crazy idea." After a few minutes the silence is broken by ROS'LIND who appears suddenly.)

ROS'LIND

Well, you've settled in to the new lab okay. Meeting the neighbors I see...

JULIAN

Shit! I still say they should hang a bell on you. I haven't seen you since we've been in the new lab. Why are you here now?

ROS'LIND

Nice to see you again too. I'm here because something important has just happened.

JULIAN

Really? Out in the world?

ROS'LIND

No. In this lab. Right now. To you!

JULIAN

Someone's pulling your leg, if you have one. Nothing has happened here. Certainly nothing of any importance.

ROS'LIND

Really? And what exactly were you doing when I came in?

JULIAN

I was thinking about a crazy idea I had. Just daydreaming.

ROS'LIND

What idea?

JULIAN

Nothing. It was silly...

ROS'LIND

What silly idea, exactly?

JULIAN

I've been thinking recently about Crick's idea of how the messages in genes are converted into proteins.

ROS'LIND

And?

JULIAN

Well, he seems to think that this whole process is like a cosmic jigsaw puzzle driven by heat. The genetic message is translated one base at a time by simply fitting the bases that read it into it one base at a time. Like the pieces of a jigsaw puzzle.

ROS'LIND

And what's wrong with that? I think it follows directly from the structure shown by X-ray diffraction.

JULIAN

Because that's a picture of how the molecule is stored in the cell, not when it is active. That's not how its sequence is read. I think the method he used to "see" the molecule changed how he saw them. The mechanism Crick suggests would lead to so many mistakes it would be a miracle any living cell would survive at all.

ROS'LIND

So what happened to change your view of that process?

JULIAN

You're an established scientist. I'd be too embarrassed to tell you.

ROS'LIND

If I am anything, I'm a dead established scientist. I think impressing me is the very least of your worries.

JULIAN

I couldn't get the feeling out of my head that something was terribly wrong with Crick's model, but I couldn't put my finger on what it was. So I sat back, closed my eyes and tried to imagine what actually happens inside the cell. Suddenly I found myself falling dizzily until I was inside an actual cell. There was the grey wall of the nucleus. There were the ribosomes strung out along the messenger RNA like so many pearls on a string. There was the beginning of a protein string whose sequence of amino acids was determined by the message written along the messenger RNA.

Next something flew past my ear. Then something else by my other ear. I was stunned. I had no idea what was happening. Then I finally realized what was happening. The transfer RNAs with their amino acids were being pulled to the messenger RNA by some sort of force! They were being driven to line up on the messenger RNA to make a protein.

I came out of my trance just before you popped into my lab unannounced, and sat for a moment dazed by what I had seen. In my vision, the generic mating of base pairs wasn't random as Crick had suggested. It seemed to be driven by a long range force. Was that even possible?

Then I came to my senses. Scientists don't dream the solutions to their questions. They set up an experiment to test their hypothesis. They take measurements, and use them to justify their belief in their prediction. I wasn't doing science. If anything, I was being an artist.

Either I have outgrown my career as a scientist, or I've gone mad...I'm voting for the former.

(ROS'LIND starts applauding)

Mocking a person is not nice, even if you are a ghost! I trusted you...

ROS'LIND

Touchy! Touchy! I was applauding, not mocking you, my sensitive friend. That was a tour de force...Brilliant.

JULIAN

Now it's you who's gone mad! What I told you was a reverie...Not real science.

ROS'LIND

Maybe, but what you described might modestly be described as a breakthrough.

JULIAN

Now I know you didn't just leave the land of the living, you left the rational world as well. I just proved that the last thing I am is a scientist. I should quit research and try to turn my ravings into art.

ROS'LIND

On the contrary, my inexperienced friend. Insight by dream is a perfectly respectable method of moving the sciences forward. For example Kekule, (*Pronounced Ke-kue-lay*) a respected German chemist, was trying to understand the structure of benzene. It has six carbon atoms linked together in a line to form a structure which, by rights, should make it a fat. He had discovered that fats were six or more carbon atoms joined in a straight line. They were insoluble in water, and had no optical spectrum. But benzene was soluble and electronically alive with a definite spectrum. That was impossible!

Frustrated with the problem, the story goes, he fell asleep in an arm chair in the French Royal Society in Paris. I am sure that more than a little fine brandy was involved. He began to dream. In his dream he saw a whole swarm of snakes swim up and stare at him as if they were mocking him. Then one of the snakes bit itself on the tail, making a circle. He started awake, knowing what the structure of benzene was... six carbon atoms joined in a circle, each sharing all of the electrons to absorb light, becoming electronically alive.

Later, in telling his experience to the same French Royal Society, he said : "Let us learn to dream, gentlemen, and then perhaps we shall learn the truth." By the way, Kekule's insight laid the foundation to understanding the ring structures in the bases of DNA. You wouldn't be able to measure their spectra without Kekule's ring structures. Remember, you still have to follow up and do the experiments to show your insight is accurate. But it looks to me like you've laid out a rich path of research for your life.

JULIAN

You've got to be kidding me! I expected you to shoot me down, not support this insanity.

ROS'LIND

What insanity exactly are we talking about? I assume we are not talking about the insanity of your having your so-called vision.

JULIAN

You're right. The insanity I was referring to was what I saw in the vision. It's really about the size of the cell itself. The genetic code focuses on what happens at the molecular level of DNA. This is the world of x-ray images. The size of the bases is around a billionth of a meter. The size of the cytoplasm in the cell can be 1000 times larger.

To put those sizes in terms we can visualize let's blow up the base pair until it's the size of a table top at Jimmies. That's around 6 feet, or two meters. To get a sense of the size of the cell, we'd have to blow it up until it's the height of the flight of a commercial airliner flying overhead, that's about tens of thousands of meters. If you looked down from a plane on the city and streets you're flying over, you'd be lucky to see the sign outside Jimmies as a speck of light. That's how vastly different the size of the DNA, and that of the cytoplasm in the cell are.

Molecular parts needed to build a protein can potentially come from anywhere in the cell. The codon in the DNA would be like a speck of light to the other molecules in the cell. You can't rely on heat to bring them together. You need a way to draw them together that spans the enormous relative distances between them. That's what the content of my vision showed me. The existence of a long distance force driven by the electronic shells around the bases. Crazy like I said.

ROS'LIND

Crazy if you've never seen liquid helium flow out of a glass onto the floor. Like I said, it takes a special kind of scientific insight to see it at all. A Wunderkind."

JULIAN

But that's the point. This whole insight is personal to me. It has no scientific validity on its own.

ROS'LIND

You can be as circumspect as you want. The fact is that this hypothesis is out in the open for anyone to evaluate. The barn door is wide open and that horse has left the stable.

JULIAN

How? You're the only person who knows anything about my insight, and I'm not too sure you count as a person or that anyone else would or could listen to you.

ROS'LIND

Leaving aside for the moment your comments about me, as I understood it, you told a whole slew of people about your insights. And don't tell me they wouldn't have believed you. You're here aren't you?

JULIAN

What am I doing? I'm talking to a goddam ghost, for Christ's sake. You're probably a part of my delusion. Shit. I'm going to get a drink.

SCENE 12

SETTING: TIME - It is early evening one month later. PLACE: JULIAN'S LAB.

JESSIE

You've got to hear this...

JULIAN

Good morning to you too!

JESSIE

You're not going to believe what I just saw.

JULIAN

Okay. I'll bite. What?

JESSIE

You know Jenkins?

JULIAN

The American biochemist?

JESSIE

That's the one. Well when I got in this morning, Jenkins was walking up and down the hallway, with a copy of the New York Times in his hands.

JULIAN

You mean the one that has the story that Nirenberg, in America, published the complete genetic code for living things? Brilliant work.

JESSIE

The same. Well, Jenkins was pacing up and down, wailing for Christ's sake, that the last great problem in genetics had been solved. His life in science was over. He was going to spend his time mopping up after Nirenberg!

JULIAN

What a douche bag! He couldn't be more wrong.

JESSIE

I know. If anything, Nirenberg's paper will open up the floodgates of applications. Rather than being the last big finding, it's likely to be just the first.

JULIAN

Talking of firsts, have you had any luck getting your paper on the insect flight muscle published?

JESSIE

Yep. The journal, Cell. That is, after we've made a few corrections to the manuscript, it's going to be published.

(ROS'LIND enters and starts applauding. JULIAN is startled.)

JULIAN

Congratulations. That's quite a coup.

JESSIE

Thanks. It is pretty good, isn't it? Acceptance for review by Cell on the first try, with my first paper! Not too shabby.

JULIAN

Do you know how long it will be before they publish it? When can we see your opus in print?

JESSIE

About a month or two, I think. What about your paper on recognizing and measuring the levels of nucleotides in a solution?

JULIAN

Who knows? They can take forever. All I know is it's been accepted for publication. We'll see.

JESSIE

All right. That's enough of that. What the hell's going on? For some time now, you keep listening and reacting to someone who's not visible. And don't tell me it's my imagination. My mama didn't raise any stupid girls. Out with it.

ROS'LIND

You've been busted. Might as well come clean. Tell her...

JULIAN

You're going to think I've lost it.

JESSIE

You can't look more crazy than you already do.

JULIAN

Okay. Well ever since I started using the desk in the old lab, I keep having a visitor, plain as day, who just pops in without any warning. She claims she's a ghost. Although you couldn't prove it by me.

JESSIE

She? She who?

JULIAN

I think I see the ghost of Ros'lind Franklin.

JESSIE

(Struggling to stifle laughter)

That's priceless. And she's here now?

JULIAN

She is.

JESSIE

How come, if she really is real, no one else can see her?

ROS'LIND

Oh. I'm real right enough. I just don't control who can see me.

JULIAN

She says she's real alright, but can't choose who can see her

JESSIE

I am a scientist. I deal in things that can be observed. If I can't see it or measure it then, for me, it doesn't exist.

JULIAN

What do you think it means that I can see her?

JESSIE

It must be some kind of delusion.

JULIAN

The first person who saw super-cooled, liquid helium flow out of a jar onto the floor, probably thought they were being delusional too. But they weren't. It was just a state of matter that had never been seen before.

JESSIE

Okay. I'll agree it's possible Dr Franklin exists after death, but it's extremely unlikely. The more likely conclusion is she's a creation of your own mind. To you, she is extremely real.

JULIAN

It's not my fault if you don't believe me.

JESSIE

You say you can see and hear her. So you can translate her for me. Okay. I'll play along. Why are you here, Dr Franklin?

ROS'LIND

Like I told Julian, I don't know. One minute I wasn't there, the next I was. At first, it was that I thought Julian needed my support. He didn't come with an overabundance of self esteem. A little naive as I am sure you've noticed.

JULIAN

She says: She doesn't know why. She assumed that she was there to support me. She thinks I need it because I lack self esteem, and I am a little naive.

JESSIE

I prefer to think of him as unspoiled. But yes, that's why I became his friend. Brilliant but doesn't know it.

ROS'LIND

And then some.

JULIAN

She agrees with you.

JESSIE

If I were you, Ros'lind, I would be mad as hell at what was done to me. I'd want to get even. Just be sure you're not using Julian to have your revenge. As his friend, I would not take it kindly.

ROS'LIND

Even if I was, I'm not sure there's much you could do about it. I have to leave. Ta ta for now.

(Leaves the lab.)

JULIAN

She says she's already dead. What more can you do to her?

JESSIE

You aren't. You tell her I'll find a way if she hurts you.

JULIAN

She can't hear you. She's left.

JESSIE

What bothers me is why she's here at all. I can't buy she turned up to bolster your ego. Dr Franklin is, or was, a mature, sophisticated, educated woman. She's not the kind of person who would let a betrayal like she's suffered go unanswered. She has a plan to get even with Crick and Wilkins, and I am afraid you are a part of her plan.

JULIAN

So, you admit she's real.

JESSIE

She's real to you. No. What bothers me is that some part of your mind has decided to take on her case as your own. I'm worried what revenge that part of your mind is planning, you are likely to be a casualty of that revenge.

JULIAN

I still think you're mistaken. She's never been anything but supportive.

JESSIE

She's right about one thing. You're far too naive. Before this is over, you're likely to be facing disaster as a result of her need for vengeance.

SCENE 13

SETTING: TIME- One month later PLACE:- The same. JULIAN is reading a copy of the Journal Cell. JESSIE comes in looking black as thunder.

JULIAN

I have a copy of your article in Cell. Congratulations.

JESSIE

Congratulations? Hell! We were robbed.

JULIAN

You mean this other paper published with yours?

JESSIE

Did you see that one? Yes. It's the reviewer's. He delayed the publication of our paper by pointing out we had got the wrong name for the insect flight muscle we used. Then he repeated our experiments, and published a paper as though his team was doing the same work as our lab was.

JULIAN

Did you? Get the wrong name?

JESSIE

We're bloody biochemists, for Christ's sake. Of course we didn't know the insects physiology. We got the damned X-ray picture, didn't we? Anyway, then he had time to repeat our work, and publish it with ours. That way he gets joint credit for the work.

JULIAN

Aren't you mad? I would be.

JESSIE

Fit to be tied! Instead of enjoying my first published paper in a top of the line journal, I feel like I've been raped.

JULIAN

Why would they steal your results?

JESSIE

You are a little naive. It's a cutthroat business, and they know they can get away with it.

JULIAN

I didn't get into this business to get ahead in my career by stealing someone else's results. Being acclaimed as the first to discover something really doesn't matter that much to me. What matters is having an idea that moves knowledge forward. To live at the edge of what is known. You had the idea about insect flight muscles. That's what really matters. So someone takes it because they have an impoverished ego, depresses me. You can and will have another idea. They probably never will.

JESSIE

You, my friend, are a hopeless romantic. The world doesn't function that way. Where did you come from? I fear for you. Bye.

(ROS'LIND reenters)

ROS'LIND

She's right, you know. The world of science is like everywhere else. It's full of people who are greedy, unscrupulous, interested in getting ahead at any cost. I should have thought that my story would have shown you that. Your idealism is a very special gift which I think you share with only a few other brilliant and unconventional minds.

JULIAN

I came here to pursue an idea, a dream. I came to see a little further into the world of scientific knowledge. What I'm seeing all around me is the complete antithesis. It offends me, disgusts me. I don't know if I can stomach this life. Speaking of taking advantage of things, Jessie's right, isn't she?

ROS'LIND

I'm sorry? What are you talking about?

JULIAN

You've not been completely candid with me. Its true I am the reason you came back, but its not true that you're here to support me out of altruism. You want me to help you get even with those who stole from you. I'm to be your secret weapon. You want me to put on armor and fight for you, wearing your colors.

ROS'LIND

You've got it backwards. You have it within you to make a significant change in our understanding of molecular biology. You just lack the courage and the conviction to realize and take advantage of your vision. I'm just here to encourage you. To give you...

JULIAN

Balls!

ROS'LIND

Well, I'm too ladylike to use such language, but essentially, yes.

JULIAN

That's all very nice, and as you say, ladylike. But I detect a much darker, more sinister purpose. I don't think it was by chance that you chose me to "visit." They are treating me as one of their in-group. I'm beginning to feel like an unexploded time bomb of emotions. Hell, I'm even having dinner with Wilkins and Crick tomorrow night.

ROS'LIND

It's true I wanted to make you aware of just who the scientists were you are joining. But that was so you would know what you are getting into. I don't need you to fight my battles for me.

JULIAN

And, if I don't, who exactly is going to do that for you? You are dead, remember.

From where I'm standing, the men who have been my role models, are looking more and more to me like unethical, immoral thieves, prepared to steal from anyone without compunction, just to gain glory, fame and, yes, grants. It seems as if I've been living in a delusional world where Santa Claus and the tooth fairy are real.

ROS'LIND

Do you believe that? That you're delusional? It's not how I see you.

JULIAN

Oh come on now. You heard me talk about seeing visions. What else would you call it? Certainly not science.

ROS'LIND

Maybe. But I'm more interested in what you saw in your so called visions, than that you saw them. I mean what would it mean to science if you were correct?

JULIAN

We're really doing this?

(ROS'LIND just looks at him expectantly)

I guess we are...If I'm right, then we could potentially affect what's happening at the genetic level inside the cell from outside of it. A bit like a tricorder in Star Trek. The benefits to medicine could be unimaginable. No more jigsaw pieces. Just electronic fields. Certainly worth making an effort to try to see if anything like that could be possible.

ROS'LIND

But... I hear a but coming.

JULIAN

The downside could be disastrous for mankind. Once the idea was released from the bottle, there would be no way to put it back in. Man would have the capability to control mankind from the outside through what amounts to the use of radio waves. History has shown us that if science can be something, it will almost certainly do it. The history of Hiroshima shows you how far man will go. Once Einstein had found the relationship $E=mc^2$, the atomic bomb was inevitable. You think a despot, or a religious fanatic, or even a greedy capitalist would deny themselves the chance of controlling people electronically to serve their own needs?

ROS'LIND

You're comparing yourself to Einstein now?

JULIAN

Of course not. Einstein proved his crazy idea was correct, that matter could be converted into huge amounts of energy. I have no idea whether I am right. But, just on the chance that I might be, can I afford to risk it? This problem has just become my worst nightmare. The scientists that I once admired and looked up to have been shown to have the morals of alley cats. If I can't trust Wilkins or Crick, who can I trust?

ROS'LIND

So, that's it? You've got your feelings hurt and you're not going to play? You're just going to pack up your belongings and go home? Sounds like you're being a whiney baby to me.

JULIAN

Fuck you. It's not like that. I wasn't sure about following up on my crazy idea even before I came to Kings. And that was when I trusted Uncle and Francis. Now I don't trust anyone. I am completely lost about what to do. .

ROS'LIND

Not even yourself?

JULIAN

It's precisely because I have begun to accept that I might be one of Wilkin's "wunderkinds," that this crisis has come up. I've always believed that my strange insights are very likely to be accurate in the privacy of my own mind. But I was never ready to share them publicly. I was certain people would laugh at me.

Now I am beginning to build a career based on the very public airing of one of these insights, supported by a number of scientists I used to respect. This was to be my moment, the moment I have waited for all my life, the moment when I become accepted publicly for what I have seen privately. And now, in that moment, I feel both acknowledged and betrayed in the same breath.

ROS'LIND

It sounds to me as though you are afraid of speaking up to these scientists.

JULIAN

If I stand up to them, it's career suicide for me. If I don't, then it's equivalent to agreeing with them, and benefiting from their treason. I have to tell you that this situation scares the pants off of me. I don't know what I'm going to do.

SCENE 14

SETTING: PLACE - JIMMY'S RESTAURANT. TIME - One week later. MAURICE, FRANCIS, PETER and JULIAN are seated around a table enjoying a meal together. ROS'LIND appears and goes to stand silently behind JULIAN's chair.

PETER

Our Julian here just published a paper in J. Mol. Biol. on calculating the concentrations of nucleotides from their absorption spectra. Nice piece of work.

FRANCIS

As part of your flow DNA sequencer?

PETER

Hope so. We're having a little problem binding the digestion enzymes to the columns, but I'm sure we'll be able to fix it.

FRANCIS

Promising. So, young Julian, what are you working on now? (*JULIAN hesitates.*)

JULIAN

It's very preliminary work. Just a crazy idea really. I'm not sure it's ready for public discussion yet.

PETER

It's all right, Julian.

JULIAN

If you say so. Okay. Well the idea arose because of the focus of x-ray crystallography. Basically your work has opened the door into the inner workings of the cell. The problem is that I don't deal with crystals. I see the positions of the electrons or to be more precise, electron shells by looking at their absorption spectra. And they are far from being in crystals. It's like the old saying, If the only tool you have is a hammer, you tend to see every problem as a nail.

My tool is UV spectra. It can show how molecules behave dissolved in the cell's cytoplasm. I came to the conclusion I was looking at a completely different world than the one in your crystals. It is a world of long range forces relative to the size of the double helix.

These forces come from the electron shells that surround the nucleotides and reach out to the electron shells in other nucleotides long before they are close enough to bond.

What kinds of forces? That was the question. Then I read a paper from Cambridge University that showed that a molecular radio antenna could resonate with another identical molecular radio antenna over very long

distances. My idea is that the nucleotides could act, under the right conditions, as identical molecular radio antenna, and attract each other over long distances in the cell.

FRANCIS

Wait a minute. Let me see if I've got what your suggesting right. Your saying that the genetic code is driven by long distances by some quotes resonant forces between codons?

JULIAN

I don't know if it's driven by them, but it certainly would affect how it is carried out. The way I see it, this idea just builds on your brilliant work.

FRANCIS

Maurice...What kind of a madhouse are you running at Kings? This is absolute nonsense. Dangerous nonsense. Julian, where did you get such an insane idea? Who's been talking to you?

JULIAN

No one. They're my own ideas.

FRANCIS

You ought to be fucking ashamed of yourself. For God's sake abandon this madness and find a proper research project.

MAURICE

Easy, Francis. No point in insulting the kid. He's just following down a crazy idea. No more crazy than the one we chased down 25 years ago...

FRANCIS

Speak for yourself, Maurice. I didn't start to work on the DNA problem until the fifties. You had to develop a DNA x-ray picture before there was anything to get my teeth into.

ROS'LIND

Stand up for yourself, Julian. He's just trying to defend his legacy. He's more afraid of you than you are of him. You are the future he fears.

JULIAN

I'm sorry, Dr Crick. I meant no disrespect to your double-helical DNA model. I was trying to get a handle on how the whole thing works in the cell. I don't believe the whole system is driven by heat.

FRANCIS

So you think you can make up some magical force to replace it? Totally insane. Go back to the x-ray picture. That's the only magic there is. Everything comes from the picture. Long range forces? Are you insane?

ROS'LIND

Stand your ground. He's blustering.

JULIAN

I'll agree with you that your mechanism for expressing the genetic code comes directly from the x-ray picture. By the time that comes into play, my process has guided the overall expression of the code, while your process guides the detailed expression of the codon.

FRANCIS

We deal in science, not crystal ball gazing. Our process is built on an actual physical photograph. I'd back my x-ray photograph any day against your mythical force.

ROS'LIND

More bluster. Stick to your guns, Julian.

JULIAN

There's nothing mystical about my so-called mystical force. It's a real physical effect, whether you choose to believe it or not. Much as the genetic code was real before anyone could imagine it, let alone define and describe it as your work made possible. You can sneer at me all you want, it doesn't make you right.

MAURICE

Easy there, Julian. You've made your point. There's no need to be insulting to my guest.

FRANCIS

It's all right, Maurice. The boy just needs straightening out. He's simply delusional.

ROS'LIND

Condescension is the weapon of a bully.

JULIAN

First of all, with respect, you don't have to be so condescending. I haven't been anyone's boy in a while now. Secondly, you say I'm delusional, but am I? What am I really saying that's so delusional? I accept that at the level of molecular bonding, which is about a billionth of a millimeter, your Watson-Crick pair bonding leads directly to the genetic code. A brilliant piece of work even if its origins are less than clear.

What I am suggesting is that your coding interaction may also act from as far away as the distance across the cell. That is 1/10 millimeter for most cells in the human body, which is five orders of magnitude larger than the molecular world you have described with x-rays.

To make the difference between how you are looking the world, as opposed to the way I view it, lets blow up the DNA helix so it is the size of this table, or about 3 feet. Now if I blow up the rest of the cell to the same amount, where would the cell membrane be?

Well you'd have to move out to the height of an airplane flying at tens of thousands of feet! If you could look down on this this restaurant from that height, you might see it as a speck of light in the darkness, if you could see it at all. This table would be too small to register at all. at asame amount The world I am talking about is like looking at this restaurant from a satellite orbiting the Earth in a high orbit. In other words. In other words, we are talking about two different worlds each of which doesn't know the other is exists.

How is talking about something that is so far away a delusion? It still has to be proven, I agree. And the proof may involve mathematics that still has to be developed. Unlikely? Possibly. Hypothetical? Speculative? Definitely. In the realms of the currently unknown. Undoubtedly. But delusional? Hardly.

FRANCIS

It's delusional because you have no physical measurements to hang your dangerous dreaming on. We have x-ray crystallography, the real pictures of the diffraction of x-rays on a film. Other scientists can try to repeat our work

and show the results are reproducible. This is the real world not a hallucination.

ROS'LIND

He's just defensive about losing his dominant position, his fame, in the world of molecular biology. He's used to being the alpha dog. The man who discovered the Golden Helix, the key to the genes we inherit. The man who installed a wrought-iron, golden helix as the gate to his estate, and then threw a series of orgies behind them. If your idea is even half as powerful as I think it might be, he could end up as being a side note in the history of biology. Of course he's defensive.

JULIAN

That's true. And I congratulate you all for your excellent work, even if the attribution of it may leave a lot to be desired. But it wasn't always so. In the beginning, all you had were the findings of the effects of x-rays on inanimate salt crystals. It took real imagination to see the possibilities of that measurement system on something as huge and complex as DNA or protein.

And Dr Wilkins made another stab in the dark that DNA was the basis of gene action. That wasn't a gimme either. About a year ago, I myself heard an American scientist come to a lecture by Dr Wilkins, about the role of DNA, and accuse him of being delusional. He maintained that DNA wasn't complex enough to be the source of gene action. It had to be expressed through a protein. And that was only a year ago. Dr Wilkins had already published his work on x-ray crystallography, but hadn't received the Nobel Prize yet.

MAURICE

He's got you there, Francis. I remember that incident. It was in the old lab. And he wasn't alone in suggesting you and I were delusional. It was a commonly held belief before the prize.

FRANCIS

On the contrary, Maurice. He makes my point. I agree that you were a visionary when you first started with trying to resolve the structure of DNA. Some might even have called you delusional. But when James and I published our paper in Nature about the Double Helix, it was all based on scientifically provable evidence, x-rays. Just as your original visionary work was. What young Julian here is suggesting has no such reliable physical measurement to be based on. Like I said, delusional.

And don't think I missed that smart-assed remark you made, young Julian, about "the attribution of it may leave a lot to be desired." I assume by "it" you meant the attribution of the x-ray picture?

ROS'LIND

Now its getting interesting. Strap yourself in. It's going to be a bumpy ride.

JULIAN

I did.

FRANCIS

Now you're completely out of line. The attribution was to Maurice's lab.

MAURICE

Here I agree with Francis. The attribution was impeccable. I don't know what you're talking about. He got it from me. It was a collaboration between our two labs.

JULIAN

(Starting to get mad)

That's a problem, as I see it. You didn't actually take the x-ray picture either. You got it from someone else.

PETER

Oh. You mean Rosalind Franklin. True. But she was part of the team. She worked for Dr Wilkins. So of course, he had access and the use of any picture she developed.

ROS'LIND

I wasn't working in his lab. I had my own department, my own lab, my own techniques.

JULIAN

When Dr Franklin arrived at Kings, you were not here, Dr Wilkins. Dr Randall, the head of the laboratory, appointed her as head of the DNA team, taking control of it effectively away from you. The x-ray pictures she produced were her product and her's alone. You needed to get her agreement to use or share them.

PETER

That's why she could go behind Uncle's back and share the picture with Jim Watson, in Copenhagen. She betrayed him and everyone else at the lab.

JULIAN

I know that's the story you told me, but there's not a word of truth to it. First Dr Franklin never attended the Copenhagen conference, so she couldn't have given her x-ray picture to anyone there. Second, didn't you, Dr Wilkins, give the picture to Dr Watson. So if there was a betrayal, it was by you of Dr Franklin, not the other way around. But all of that is irrelevant. One way or another, both you and Dr Crick needed that picture to solve the double-helical structure of DNA in your Nature papers. You couldn't have done it without it.

My problem is that in neither paper did either of you mention Dr Franklin's work, or cite her contribution. There's no mention of her at all in either of your papers. I know you know how serious this is, Dr Crick, since you scolded me for trying to take a scribbled note from you last time we ate here.

FRANCIS

I'm not going to sit here and be insulted by your student, Maurice. I suggest you get him a leash on him so he can't bite anyone else.

(With that, FRANCIS stomps off out of the restaurant. ROS'LIND walks over to sit at a table to one side.)

PETER

You just made yourself a powerful enemy, Julian.

(JULIAN goes over to sit at ROS'LIND's table.)

JULIAN

Satisfied?

ROS'LIND

No, but it's a start.

JULIAN

I hope it was worth it. I believe you have just cost me everything. Crick and Wilkins are not enemies to be taken lightly. My life in science is over.

ROS'LIND

So is mine. You still have the rest of your life to do with as you wish.

JULIAN

But research was my whole life. My loyalty to you has lost me that life.

ROS'LIND

Haven't you seen it yet? Your life in science was held hostage to the whims of old white men. They would only let you be successful if you followed their wishes and prejudices. As women, Jessie and I never had a chance. As a man, you only thought you did. You found out the cost for keeping it was your silence. I gave you a chance to redeem your self respect. You should thank me.

JULIAN

Thank you? What a novel idea! What came to mind was more to curse you.

ROS'LIND

That's your choice of course. But I would remind you that all the choices you made were your own. You came to your own conclusions and took the actions you did on your own volition. I'm hardly to blame.

JULIAN

You manipulated me. You played on my worst fears and best impulses.

ROS'LIND

Maybe. I prefer to think I just showed you a despicable reality, and trusted you to step up.

JULIAN

It's true you just opened my eyes to what was going on. You never told me what to do about it. What happened was my own suicidal choice. Thanks a lot! I'm glad you're not my enemy.

ROS'LIND

You're welcome! Stop worrying. I have faith in you. You're going to do fine.

JULIAN

Nice words. But I should remind you that you're a ghost. It's no skin off your nose, if you even have one.

SCENE 16

SETTING: TIME - Now. PLACE - JULIAN'S LAB

The stage is shrouded in darkness. There is a spot highlighting a stool set STAGE RIGHT. The HOST is seated on the stool.

HOST

So there you have it. I'll leave the final evaluation of whether or not a crime, or a failure of scientific morality, occurred for you, the audience. The problem of misogyny continues today. Jessie, facing the same prejudice that Ros'lind faced, took a position, upon graduating at the same institution in Paris that Ros'lind used to work at. It is never ending. Julian withdrew from a career in scientific research. Dr Wilkins never spoke to him again until the day he died. Dr Crick acquired a mansion he called The Golden Helix. Wrought iron gates, emblazoned by a golden double helix guarded the driveway up to the mansion. The place became famous in Cambridge for a series of ostentatious orgies Dr Crick hosted there. Julian spent the rest of his life bridging the gap between science and the public's understanding of science in print, on television and in the classroom.

And science? Science rolls on as inexorably as the seasons and the tides, washing equally over everything.

THE END