

# *Copenhagen* and Beyond: The “Rich and Mentally Nourishing” Interplay of Science and Theatre

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## **Introduction**

In 1959 C.P. Snow famously noted the widening gulf between “the two cultures” of the sciences and the arts and humanities. Now his concept has taken on a new urgency and is being revisited, not only in a variety of scholarly contexts, such as international conferences on the idea of the two cultures,<sup>1</sup> but in an artistic context as well. Over the past decade a new wave of plays about science has been turning the stage into a major forum for the exploration of scientific ideas and ultimately an original and creative site for the merging of the two cultures. The plays that deal with science, medicine and technology, such as *Copenhagen*, *Arcadia*, *Proof*, *Wit*, *Safe Delivery*, and *Molly Sweeney*, have made theatre more than any other art form, including film, the site of substantive interaction between the hard sciences and the humanities. These plays give new meaning to the concept of “theatre of ideas,” and many have enjoyed great stage success as well, both with audiences and with critics. Several have won prestigious awards like the Tony Award and the Pulitzer, and a few originated through organizations like the Alfred Sloan Foundation in New York and the Wellcome Trust in Britain which have sponsored the writing of new plays about science. All of these newer works build on a tradition of science playwriting that spans several centuries, from Marlowe’s *Doctor Faustus*, Jonson’s *The Alchemist*, Ibsen’s *An Enemy of the People*, and Shaw’s *The Doctor’s Dilemma* to Brecht’s

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1. “Meeting the Challenges of the Future,” The Balzan Symposium on the Two Cultures, The Royal Society, London (May 13-14, 2002), and the 2001 Forum of Sigma Xi (The Scientific Research Society), “Science, the Arts and the Humanities: Connections and Collisions,” Raleigh, North Carolina (November 8-9, 2001).

*Galileo*, Dürrenmatt's *The Physicists*, Sidney Kingsley's *Men in White* and Hallie Flanagan Davis's *E=mc<sup>2</sup>*.

The development of science playwriting is entirely consistent with the ideals expressed in Snow's original lecture. While he regrets that "there seems then to be no place where the two cultures meet," he suggests that "the clashing point of two subjects, two disciplines, two cultures—of two galaxies, so far as that goes—ought to produce creative chances. In the history of mental activity that has been where some of the break-throughs came" (Snow 16). As we shall see, the marriage of the resources of the stage with the ideas and issues of science does indeed bring about unprecedented creative chances. Snow uses the metaphor of dialogue to articulate his vision of how to unify the sciences and the arts and humanities. "Those in the two cultures can't talk to each other" (Snow 16); we must therefore hope for a "third culture" that would "be on speaking terms with the scientific one" (Snow 71). The theatrical experience is doubly dialogic; characters converse on stage, while in a larger sense the actors maintain an unspoken dialogue with the audience. The many recent science plays show how effective this multi-dimensional conversation can be, suggesting that the intersection of science and the stage may represent precisely the kind of "third culture" that Snow envisioned.

Science plays have generated widespread discussion among audiences and reviewers as well as causing a related phenomenon peculiar to *Copenhagen*: the performance-linked symposium.<sup>2</sup> They now demand scholarly attention, especially from the field of theatre studies whose own parameters have been radically changed by the popularity and growth of performance studies. While theatre has increasingly concerned itself with science, becoming the art form that most consistently and seriously engages scientific subjects, critics have been slower to examine this development in any sustained way. Given their rich dramatic tradition, it seems surprising that little critical attention has been directed at science plays. What accounts for this phenomenon, especially the spate of recent science plays? Are audiences attracted to science plays despite or because of their often difficult subject matter? Is the answer merely a socio-economic one relating to level of audience education and wealth, or are there other factors involved? And does the success of these plays suggest an interesting way to bridge the gap that still persists between the two cultures?

To begin to answer these questions, we will take as case studies of this new wave two plays that concern themselves directly with science and technology: Michael Frayn's *Copenhagen* and Timberlake Wertenbaker's *After Darwin*. Both

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2. *Copenhagen* has taken on a life of its own through the many symposia it has spawned in cities where the play is performed. Symposia on the play's use of history, science and theatricality have been held in Copenhagen, New York, Washington, D.C., Raleigh, North Carolina, Albuquerque, New Mexico, Cambridge, Massachusetts, and Cambridge, England.

deal with “serious” science: respectively, nuclear physics and evolutionary theory. Both plays appeared in London in 1998. Both are by skilled playwrights. The first was and is a phenomenal success, both on stage and in print; the latter met with mixed reviews, and has now undeservedly gone out of print. Comparing the two is instructive. They both depict historically true incidents and characters and raise questions about “truth” and the uses of science. They are both concerned with fundamental problems of human interaction, such as intentionality and betrayal. Both capture the intensity and passion of scientific debate. And both employ similar performative strategies: each play literally enacts the scientific or technological ideas at its thematic core in a complex integration of text and performance.

At first glance, *Copenhagen* hardly seems concerned with performativity, let alone conventional theatrical methods. It seems to privilege textuality over theatricality, especially in the script which, startlingly, lacks any stage directions except intradialogic ones (simple speech acts such as when Heisenberg indicates “I crunch over the familiar gravel” or tells us that he is looking at Bohr and Margrethe). The fact that it began life as a radio play seems also to be indicative of its textual emphasis. Yet on stage, particularly under Michael Blakemore’s direction, the play demonstrates its absolute dependence on performance for the exploration and successful conveyance of its central scientific metaphor. This is also the case with *After Darwin*. Like *Copenhagen*, it is a heavily verbocentric play, yet it too relies on performance not only to demonstrate its scientific ideas but to enact them in such a way that the science is both performed for us and transformed into metaphor on the stage.

It is important to distinguish this kind of performativity from the simple demonstration of a scientific principle that can be found for instance in Brecht’s *Galileo*, when Galileo uses the stage to illustrate for Andrea his theory of the heliocentric universe. In that case, the demonstration is purely didactic and not integral to the structure of the play; nor does it serve a larger thematic purpose. By contrast, both *Copenhagen* and *After Darwin* are performative in the classic Austinian sense that they do the thing they talk about; they bring into being a material enactment of an abstract idea under discussion through a speech act. Put simply, they reflect “how to do things with words”: in this case, words such as “evolution” and “the Uncertainty Principle.” This extraordinarily thorough integration of real science into the texture of the play is one of the defining characteristics of good science plays – harnessing a scientific language to a theatrical one. The dialogue of *Copenhagen* is one long speech act that performs the uncertainty principle in a way that only the liveness and immediacy of theatre can achieve. The dialogue does not merely reflect the principle; it makes it happen, with the audience participating in that act of creation. To a lesser degree, this also occurs in *After Darwin*, and a comparison of the two plays is instructive in terms of their ability to perform, and not just talk about, the science that they engage.

### Uncertainty in Memory, History, Physics and Truth

In *Copenhagen*, three historical figures meet in the afterlife to relive a moment that had a defining impact on them personally as well as on the course of science and, arguably, of history. Those figures are the Danish physicist Niels Bohr, his wife Margrethe, and the German physicist Werner Heisenberg, and the moment they are trying to live again is Heisenberg's visit to the Bohrs in the autumn of 1941. Heisenberg came to occupied Denmark to visit Bohr in Copenhagen. Bohr and his wife Margrethe exchanged pleasantries with Heisenberg for a few minutes inside their bugged home; then the two men went for a walk in order to speak more freely to one another. They returned only a few minutes later, Bohr extremely upset, and Heisenberg made a hasty exit. From then on their friendship was broken, yet neither man ever revealed what exactly had been said during that brief walk. The play revisits this decisive moment in history and in science, positing three "drafts," as the characters call them, each with different outcomes, and the audience essentially has to choose which draft it prefers, since no concrete answers are explicitly given in the text. More importantly, the characters' own memories of the events consistently fail them or show themselves to be flawed or revised.

The audience watches the characters in *Copenhagen* enact a process of conscious, effortful recall of a transforming moment. This moment has a certain resonance with Proust readers, since it is much like the episode in *Remembrance of Things Past* in which Marcel's tasting and smelling of the madeleine dipped in tea transports him back to his childhood in Combray (Shepherd-Barr and Shepherd 39-60). In *Copenhagen*, however, the central moment is experienced not by one but by three characters, which complicates things immensely. We quickly see that each remembers the meeting differently, down to the seemingly concrete facts such as time and place.

**Margrethe:** You couldn't even agree where you'd walked that night.

**Heisenberg:** Where we walked? Fælled Park, of course. Where we went so often in the old days.

**Margrethe:** But Fælled Park is behind the Institute, four kilometres away from where we live!

**Heisenberg:** I can see the drift of autumn leaves under the street-lamps next to the bandstand.

**Bohr:** Yes, because you remember it as October!

**Margrethe:** And it was September.

**Bohr:** No fallen leaves!

**Margrethe:** And it was 1941. No street-lamps! (Frayn 35)

The characters cannot agree on when or where the meeting occurred, let alone what words were exchanged. In conspicuously postmodern mode, the play calls into question the reliability of memory and the notion of any absolute

truth, suggesting that our memories are governed and shaped by an unconscious process of editing and revision.

The staging of the play reinforces this elusiveness. As a script for performance, the text offers no hints as to staging because there are no extradiologic stage directions. This makes reading the play difficult but is liberating for a director. In the Broadway production, there were just three chairs on stage and no other scenery or props; the stage itself was round and atom-like and the characters orbited within it as they paced through the three drafts. Director Michael Blakemore made the stage into yet another metaphor, as some of the audience sat in a tribunal at the back of the stage, watching and “judging” the action in stark marble stalls. They were in turn watched by the rest of the audience. Clearly, Frayn and Blakemore do not let the audience forget the implications of this mysterious event for both history and science. Yet the play pointedly withholds a definitive “draft” that would solve the mystery. There is no comforting finality, only more troubling questions.

It is too early to tell whether *Copenhagen* will become, like Proust’s madeleine episode, a cultural cliché for one particular type of memory—in this case, cultural memory, a multiple-witnessed, public, collective recollection. The event that Bohr, Margrethe, and Heisenberg are trying to recall was far from ordinary; its historical significance was of tremendous proportions, affecting the development and use of atomic weapons and the political map of Europe, not to mention the history of science itself. And one would think that its being a shared memory, a communal experience (much like theatre itself), would increase its accessibility as well as its reliability. When you know you are experiencing a supremely important moment you are surely going to remember it accurately. Yet, as Frayn’s play shows, this seems to make no difference; it is equally difficult to retrieve, no matter how hard the characters concentrate on establishing the truth of what has occurred. In *Copenhagen* you have interminable arguing over what happened, despite (or because of) three witnesses to the event. In Proust you have a memory that is entirely internal and has only one witness; the observer is also the participant. Can he both observe and experience simultaneously? According to Proust, yes. But Frayn employs Heisenberg’s Uncertainty Principle to show us why this cannot be. “You can never know everything about the whereabouts of a particle, or anything else,” Heisenberg says in *Copenhagen*, “because we can’t observe it without introducing some new element into the situation, a molecule of water vapour for it to hit, or a piece of light—things which have an energy of their own, and which therefore have an effect on what they hit” (Frayn 67-8). Further on Bohr explains:

[Einstein] shows that measurement—measurement, on which the whole possibility of science depends—measurement is not an impersonal event that occurs with impartial universality. It’s a human act, carried out from a specific point of view in time and space, from the one particular viewpoint of a possible observer. Then, here in Copenhagen

in those three years in the mid-twenties we discover that there is no precisely determinable objective universe. That the universe exists only as a series of approximations. Only within the limits determined by our relationship with it. Only through the understanding lodged inside the human head. (Frayn 71-2)

Similar explanations of this idea are sprinkled throughout the dialogue. Yet Frayn avoids oversimplifying it through easy metaphor. He reminds us in his substantial postscript to the play that the Uncertainty Principle “as introduced by Heisenberg into quantum mechanics was precise and technical. It didn’t suggest that everything about the behaviour of particles was unknowable, or hazy. What it limited was the simultaneous measurement of ‘canonically conjugate variables,’ such as position and momentum, or energy and time. The more precisely you measure one variable, it said, the less precise your measurement of the related variable can be; and this ratio, the uncertainty relationship, is itself precisely formulable” (Frayn 98). Frayn warns us that “the concept of uncertainty is one of those scientific notions that has become common coinage, and generalised to the point of losing much of its original meaning” (Frayn 98). One of the dangers of the play is to tempt audiences to a reductive and vague application of the Uncertainty Principle to life in general, the kind of oversimplification Snow had warned against in his lecture on *The Two Cultures*:

It is bizarre how very little of twentieth-century science has been assimilated into twentieth-century art. Now and then one used to find poets conscientiously using scientific expressions, and getting them wrong—there was a time when ‘refraction’ kept cropping up in verse in a mystifying fashion, and when ‘polarised light’ was used as though writers were under the illusion that it was a specially admirable kind of light. Of course, that isn’t the way that science could be any good to art. It has got to be assimilated along with, and as part and parcel of, the whole of our mental experience, and used as naturally as the rest. (Snow 16)

But Frayn avoids this pitfall by making his thematic connection clear: “What the uncertainty of thoughts does have in common with the uncertainty of particles is that the difficulty is not just a practical one, but a systematic limitation which cannot even in theory be circumvented”—namely, that “thoughts and intentions, even one’s own—perhaps one’s own most of all—remain shifting and elusive. *There is not one single thought or intention of any sort that can ever be precisely established*” (Frayn 98-9; emphasis added).

As the three characters work through the possible scenarios of the meeting, they literally enact this idea through Frayn’s brilliant merging of theme with form. The dialogue brims with vivid demonstrations of the applicability of the Uncertainty Principle to the “epistemology of intention” (Frayn 2002: 22) and

the workings of memory, and as they talk the actors orbit the stage like the electrons, neutrons, and protons they signify. As soon as we become certain about one of them, we are made to doubt another, and so on. By the end of the play our own certainties have shifted; we have moved from an initial sympathy with Bohr to an ambiguity about him and his motives and a burgeoning empathy with Heisenberg in his morally complex, difficult situation. It is this aspect of the play that has sparked the greatest debate. Startlingly, Frayn finally gives us a moment that seems to defy the Uncertainty Principle, when the three characters perform their third and final “draft” in the imaginary living room of the Bohrs:

**Heisenberg:** [...] Here I am at the centre of the universe, and yet all I can see are two smiles that don't belong to me [...] I can feel a third smile in the room, very close to me. Could it be the one I suddenly see for a moment in the mirror there? And is the awkward stranger wearing it in any way connected with this presence that I can feel in the room? This all-enveloping, unobserved presence?

**Margrethe:** I watch the two smiles in the room, one awkward and ingratiating, the other rapidly fading from incautious warmth to bare politeness. There's also a third smile in the room, I know, unchangingly courteous, I hope, and unchangingly guarded.

**Bohr:** [...] I glance at Margrethe, and for a moment I see what she can see and I can't—myself, and the smile vanishing from my face as poor Heisenberg blunders on.

**Heisenberg:** I look at the two of them looking at me, and for a moment I see the third person in the room as clearly as I see them. Their importunate guest, stumbling from one crass and unwelcome thoughtfulness to the next.

**Bohr:** I look at him looking at me, anxiously, pleadingly, urging me back to the old days, and I see what he sees. And yes—now it comes, now it comes—there's someone missing from the room. He sees me. He sees Margrethe. He doesn't see himself.

**Heisenberg:** Two thousand million people in the world, and the one who has to decide their fate is the only one who's always hidden from me. (Frayn 86-7)

The disembodied smiles captured in the mirror seem to allow the characters a distance they had never had before, and thus a fleeting insight as they can both see themselves and be seen, be in motion and yet measurable, do and think at the same time. But it is only fleeting. Frayn's reiterated point is that if self-knowledge is flawed, how much more limited is our access to other people's thoughts and motives. In the Proustian (modernist) view, the memory of what happened during the 1941 meeting is like those smiles in the mirror; it can only be retrieved through the unexpected tapping of deeply sealed recesses of our unconscious, through the mechanisms of involuntary memory. The great differ-

ence in Frayn's plural, postmodern conceptualization of memory, of course, is that there aren't really any sealed vessels anymore—there is ultimately no one “true” memory, only multiple “drafts.”

*Copenhagen* continues to stir debate and controversy. In February 2002, due to the attention the play has brought to the relationship between Bohr and Heisenberg and particularly the play's sympathetic, almost heroic depiction of Heisenberg, the Bohr family released letters it had previously had sealed in the Bohr archives. This epistolary cache (accessible on the web site of the Niels Bohr Archives) contains drafts of letters Bohr wrote to Heisenberg many years afterwards but never sent, alluding to their meeting in 1941. The letters shed fascinating new light on the event, with Bohr speculating much as the play does about what Heisenberg *thought* that Bohr was thinking and vice versa. “I got a completely different impression of the visit than the one you have described,” writes Bohr to Heisenberg in one draft of a letter never sent. “I am greatly amazed to see how much your memory has deceived you,” he states in another. These new letters have prompted Frayn to write an additional “post-postscript” to the play. In it he calls the release of materials “the most surprising result of the debate set off by the production of the play”—an unprecedented instance of life imitating art, one might say. But as Frayn himself points out, these letters by no means resolve the question of what really happened in that meeting in 1941. Their only real effect on the play is to call into question Frayn's sympathetic rendering of Heisenberg as having moral qualms about developing an atomic bomb. Frayn acknowledges the impact of these revelations on his work, but only in terms of the postscript, not the play itself: “When and if we do another edition of the play, I think I will certainly have to record [in the postscript] that these letters have been published, and we now have Bohr's direct testimony as to what his feelings were” (Glanz). One might argue that Frayn's play, with its theme that we can never be certain of either our own or other people's thoughts and motives, will always be protected no matter how many documents may emerge attesting to “the truth” of the event, since its central concern is not finally historical but philosophical and epistemological in nature. “Whatever was said at the meeting, and whatever Heisenberg's intentions were, there is something profoundly characteristic of the difficulties in human relationships, and profoundly painful, in that picture of the two ageing men [...] puzzling for all those long years over the few brief moments that had clouded if not ended their friendship. It's what their shades do in my play, of course. At least in the play they get together to work it out” (Frayn 2002: 24).

### Science and Social (R)evolution

Timberlake Wertenbaker's play *After Darwin* ranges widely over scientific and technological topics. Like *Copenhagen*, *After Darwin* raises questions about how we know as well as what we know. Although not a stage or print success like *Copenhagen*, the play has some strong thematic points and represents an



important if overlooked contribution to the genre of science dramas. It employs a metatheatrical technique much like Stoppard's *Arcadia*, with the same actors doubling characters from two different historical periods, in Wertebaker's case the mid-nineteenth century and the present. This is done to enhance the thematic use of evolutionary theory, a subject only dealt with previously on stage in J. Lawrence's and R. E. Lee's *Inherit the Wind*, a play in which the science is rendered but not intellectually engaged or performed as Wertebaker attempts in *After Darwin*.

The present-day characters are actors, Tom and Ian, putting on a play about Charles Darwin (Tom) and Robert FitzRoy (Ian), the captain of the *Beagle*, who hired Darwin to accompany him as a naturalist on his voyages to South America. The scenes alternate between this historical costume drama and the present, in which Tom and Ian talk with each other and with the Bulgarian director, Millie, and the African-American playwright, Lawrence, about the play, their private lives, their past experiences and their present aspirations. Millie is trying to gain British citizenship by proving that she has "something unique to contribute" (Wertebaker 27). Lawrence is a black professor whose success is due to the sheer survival instincts of his mother, who raised him in a ghetto in Washington, D.C. to read "Shakespeare, Milton, *Moby Dick*,...[but] no black writers. No writing on slavery...[and] it worked, I guess" (Wertebaker 57). As one reviewer notes, Lawrence "has evolved and adapted more than anybody else onstage," although the desperate Millie is "trying to camouflage her identity and join the English species" (Nightingale).

As the play progresses, the action in each time frame becomes increasingly dramatic. Darwin and FitzRoy become estranged as the very religious captain feels increasingly threatened by the implications of Darwin's scientific findings and ideas. Meanwhile Tom confides in Ian that his dream of becoming a film actor is about to come true; he has been hired to appear in a movie, but will have to quit the play in order to do so, which means the play will have to be cancelled. In order to save the production, Ian betrays Tom and sabotages his career by secretly e-mailing the film director and telling him that the homosexual Tom is HIV positive.

Reviewing the play for the *New York Times*, Benedict Nightingale acclaimed it as "even more absorbing" than Wertebaker's highly successful breakthrough play *Our Country's Good*, and noted the similarities between *After Darwin* and *Copenhagen* in their energetic use of science on stage. The play presents evolutionary theory through two prisms: the scientific and the social. Darwin and FitzRoy confront the scientific theory and its philosophical and religious implications, while the modern-day characters act out social Darwinism, which seems to be defined as people being incredibly selfish in order to survive and having no moral qualms about their deeds so long as they can justify their motives in terms of sheer survival. Tom defends his defection to the film project by citing adaptation and survival; Ian justifies his betrayal of Tom as survival not just of himself but of the others in the production and of the play itself: "I don't want

another two years without work. I want to survive, I want Millie to survive, I want this to survive" (Wertebaker 66). The doubling of roles also draws attention to Wertebaker's thematic emphasis and the parallels she is drawing: Darwin is played by Tom, and FitzRoy by Ian. FitzRoy became so distraught at the implications of Darwin's findings that he confronted his former friend with a pistol, a scene that is included in the play and that parallels Ian's distress and desperation to salvage the play at all costs. Just as FitzRoy wants his faith to survive intact, Ian wants the play to go on, yet both know that Darwin/Tom's decisions are essentially unavoidable and necessary and must be accepted. They object to the way, in their eyes, Darwin and Tom "play God," yet they fail to see their own interventions in the same hubristic light.

There is a subplot that relates directly to evolutionary theory while also deepening the character of FitzRoy. In the historical scenes, references are made to FitzRoy's well-known penchant for converting "natives" to English dress, manners, culture, and above all religion. The prime example of this is Jemmy Button, "civilized" by FitzRoy and then reintroduced to native culture with disastrous results. Wertebaker's strategy of having Lawrence tell Jemmy's story dramatically highlights the idea of successful integration through adaptation. "[Jemmy] had adopted Englishness with total enthusiasm, but had then readopted the customs of his tribe with equal commitment, thus becoming perhaps one of the first people to suffer the stresses of biculturalism, a condition which was to reach epidemic proportions in the late twentieth century. Jemmy Button's own tribe is now extinct" (Wertebaker 32). Has Lawrence's success at adapting to the dominant culture come at the price of denying his own roots? Jemmy's tragic story seems to cast Lawrence's tale of survival in an ambiguous light.

In addition to the ways in which the modern characters enact and thus confirm the ideas of evolution to which FitzRoy is so resistant, there is also an interesting technological angle to the play. Ian "babysits" a Tamagotchi toy for his daughter, and this virtual pet places on the actor persistent demands for virtual sustenance and attention. He must attend to its beeping and interruptions, and do so speedily lest the creature die and he thus traumatize his daughter. A lot is at stake here since Tom only sees her every other weekend; in this parental competition, he cannot afford to alienate her, and so becomes a slave to the whims of this electronic creature. The device of the Tamagotchi pet thus reinforces the theme of inhumanity and emotional depravity inherent in Ian's betrayal of Tom, and suggests that contemporary life is characterized by a greater "reality" in virtual relationships than in flesh-and-blood ones. It is a bleak message about the implications of technology as a dehumanizing force, a message further conveyed through Ian's use of e-mail to destroy Tom's plans and hopes.

The play's complex, multi-faceted use of concepts like evolution, adaptation, survival, and extinction has led to the criticism that Wertebaker "bangs away at her theme a bit relentlessly. With everything from Tamagotchi pets to Balkan history pressed into what becomes a running debate about Darwinism, you cer-

tainly get the feeling that a program-seller might at any moment leap onstage to announce her imminent sex change" (Nightingale). *After Darwin* may be less successful than *Copenhagen* in its performative demonstration of scientific ideas, but it should be remembered that where Frayn is dealing with a science that is not well-known to the general public—his play has in fact been praised for its ability to educate the audience about nuclear physics—Wertenbaker must contend with often deeply-held assumptions on the part of her audience about the social as well as the scientific implications of such terms as "adaptation" and "natural selection." Since in her play "the dramatic brew is rich and mentally nourishing, embracing as it does questions of God and godlessness, determinism and free will, biology and ethics" (Nightingale), *After Darwin* deserves to be given a new life on the stage. It remains to be seen whether this play will enjoy eventual success through revisions and through its participation in the sustained development of science on stage, but to date it is the only play to integrate evolutionary theory both thematically and formally in a thoroughgoing and innovative way.

### Conclusion

*Copenhagen* is an example of a science play that successfully integrates its scientific subject matter into the resources of the theatre. Both the science and the characters are deep and complex. The staging conveys the themes, and the science is not watered down and oversimplified as Snow admonished in the above quotation; it is not made reductive but rather enlarged through an accessible demonstration. The play is so stunning because it represents that "clashing point" between the two cultures—the merging of the sciences and the humanities in balance, so that neither is compromised. The physical resources of the theatre are successfully enlisted to illustrate and flesh out an abstract scientific idea. *After Darwin* also skillfully enlists the materiality of the stage to convey the human dimension of a "hard" scientific idea. It takes the complex subject matter of evolutionary theory, engages a number of interesting related issues such as adaptation and mutation, and brings the whole to dramatic life by straddling two very different sets of characters in contrasting historical periods. Yet in dealing with evolution, Wertenbaker has the formidable task of bringing to audiences a new awareness of concepts about which they already may have both scientific understanding and deeply-held feelings relating to issues of religious faith. This could be more fully addressed; for example, nowhere in the numerous arguments between FitzRoy and Darwin about the role of God in Darwin's theory does the playwright mention that Darwin himself changed his position on this issue in the course of his life. The audience leaves without a hint of the spirituality he may have arrived at later in life, signaled by the significant emendation that he made to the final paragraph of the last edition of *On the Origin of Species* when he inserted the word "Creator" in a sentence that had previously made no mention of any divine intervention in the natural world. This informa-

tion might deepen the play's presentation of both the character of Darwin and his theory.

Despite their divergences, both plays reflect a significant change in what contemporary theatre engages as its subject matter and how it uniquely performs that new material. No previous age has seen the surge of science plays that we are currently witnessing, and surely this is not coincidental. At our historical moment, science is such a prevalent part of our lives, through extensive media coverage of controversial ethical issues relating to scientific discoveries, through greater access to medical information and the unspoken imperative that we take more responsibility for our health, and through a post-Cold War apprehension that we need to be knowledgeable and vigilant about the uses of science—that science is relevant to us all, not just the experts. Perhaps this partially explains today's audiences' openness and receptivity to science plays. Or perhaps it is simply that for too long, as Martin Esslin has complained, new plays have been lacking in substantive ideas, and have concerned themselves mostly with depictions of squabbling families, broken marriages, maudlin love stories, and unhappy children. "Drama, which translates the abstract into concrete human terms and allows the playwright to establish a veritable experimental laboratory of political and sociological issues, is an ideal medium of the exploration of [...] immensely fruitful lines of inquiry" (Esslin 30). Dramatizing scientists and scientific ideas fills this void in the theatre in its harnessing of intellectual inquiry and debate to the art and machinery of the stage—exactly that "third culture" that audiences and playwrights alike seem to be seeking.

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