The Passions of the Scientist: An Existential Approach to Science Biography

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THE LAST DECADE has witnessed a renaissance of science biography. Never has there been written so many superb portraits of scientists—Richard Westfall's Newton-study, *Never at Rest*; Kenneth Manning's *Black Appollo of Science*; William Provine's *Sewall Wright and Evolutionary Biology*; Crosbie Smith and Norton Wise's study of Lord Kelvin, *Energy and Empire*; David Cassidy's Heisenberg-biography; Adrian Desmond and James Moore's *Darwin*; and Larry Holmes's first volume on Hans Krebs—just to name some of the most impressive works.[2] Although still within the traditional confines of the genre, these and similar biographies are more detailed, better researched, more stylishly written, and more scholarly penetrating than any biography written just a generation ago. Each new tome seems unrivalled—science biography stands out as a most (if not *the* most) impressive genre in science studies.

At the same time, however, biographers, reviewers, and commentators on the genre alike seem to be less and less interested in stories about individ-

ual lives and more and more interested in using these lives for, broadly speaking, social historical purposes. The most conspicuous example of this paradoxical situation in contemporary science biography is Smith and Wise's *Energy and Empire*, which has been subtitled "a biographical study" in spite of the fact that the authors deliberately have chosen to write about a person who has left very few sources about his personal life. Another, more subtle, example is Desmond and Moore's *Darwin*. In many respects this impressive work will certainly set standards in the field. But what standards? The authors' purpose is to correct the portrait of Darwin painted by what they call "textual analysts and historians of disembodied ideas,"[3] and to write a biography that follows in the wake of "the recent upheaval in the history of science, and its new emphasis on the cultural conditioning of knowledge". Darwin is primarily seen as a product of his time and of the social context, and consequently, theirs is "a defiantly social portrait:"—only by seeing Darwin against the background of reform bills, poor law riots, industrial innovation, etc., the authors say, will his evolutionary theory make sense.

It would be foolish to deny that this program for writing science biography constitutes a healthy antidote against traditional biography with its often mindless focus on the chronology of events and achievements of the individual scientist, and its strong tendencies towards uncritical hagiography. But the authors of these social portraits seem to have forgotten that the social, political and cultural context is not the only context there is. It is as nonsensical to treat scientific knowledge as if it were isolated from the inner life of the individual scientist. The genre of biography does not acquire its distinctive qualities by turning into a critical inquiry in which the subject is mobilized as an illustration of general social or cultural contexts. Biography receives its primary qualities from being a genre through which we try to bring to life again the individual scientist. The mission of "pure biography," said Paul Murray Kendall, is "to elicit, from the coldness of paper, the warmth of a life being lived."[4]

To counteract the present strong tendencies to limit biography to a social portrait genre it is about time to recall Kendall's definition of the genre.

What differentiates biography from intellectual history, social history, or sociological case studies, is its focus on the individual scientist, the scientist in

his/her own right. On this issue I agree with L. Pearce Williams who has, in a recent programmatic article, taken a strong stand in favour of the uniqueness of the individual scientist with an argument that goes back to Dilthey: "There is only a society which each individual constructs for him- or herself.... Every person, then, at least in part, lives in a different society."[5] Although I do not agree with Williams's attempt to revive the history of scientist-kings, I sympathize with his attempt to grasp what Thomas Nagel has called "the view from inside."[6] The view from inside – that is, a combination of the scientist's personal experiences of himself and his personal experiences of the world of science outside him, including other scientists —is the only true biographical perspective.

I have two related suggestions for a revival of the core of science biography —a strong program of science biography. First, I suggest that science biography should take seriously Richard Rorty's methodological warning against redescription, and, second, I suggest that such a strong programme should take the degree of redescription as the criterion that distinguishes a biography of a scientist in his own right from social biography or sociological case studies. As Rorty points out, "most people do not want to be redescribed, they want to be taken on their own terms —taken seriously just as they are and just as they talk."[7] Since the inside view is carried by a vocabulary that is specific for each individual, biography from the inside view must, as far as possible, be sensitive to the way the person speaks about himself, his work and the world around him. The biographer is free to contrast and compare the scientist's descriptions with other descriptions of his choice — but not to redescribe the scientist in terms of these other vocabularies only. So, a biography written from the inside view is not only fundamentally a-sociological, it is also a-psychological.

It goes without saying that different scientists use different languages when trying to make sense of their lives and works. In principle, then, each biography has to be based on a unique personal vocabulary. I will illustrate this point with reference to my present work on one of the leading contemporary immunologists, Niels K. Jerne.[8] Throughout his life, as reflected in letters and diaries, in our conversations, and in biographical interviews, Jerne has regularly used a vocabulary about the self and the world that incorporates

elements from classical authors such as Shakespeare, from 19th century romantic philosophers such as Kierkegaard and Nietzsche, and from modernist authors such as Dostojevsky, Kafka, and Proust. This is a language that emphasizes, more than many other ways of describing the relation between the self and the world, the passionate and existential dimensions of life. Dealing with vulnerability and doubt, with anxiety and existential loneliness, this vocabulary has very little in common with the pragmatic, energetic, lets-have-some-fun-in-the-lab vocabulary of so many biographies and autobiographies of scientists, not to mention the emphasis on power, reputation, and status inherent in the conceptual apparatus of most sociologists of science. Jerne's descriptions have, of course, been modified by his later readings and life experiences, and they have been increasingly replaced by a technical immunological jargon —but even in his scientific correspondence it is still possible to identify this existential and passionate vocabulary. Accordingly, I have chosen in this biographical work to adopt a stance that resonates with and magnifies Jerne's own understanding of self. I call it an existential approach, because it points to a dimension of uniqueness and choice, and to the scientist's ability to deal with conflicts in his or her cognitive and emotional life.[9]

An existentialist approach to science biography does not imply a rejection of the importance of the social life of the individual, nor does it involve an uncritical individualist viewpoint. The relation between the individual and society (the contrast between the life of an autonomous and authentic individual, and the life of a public individual immersed in society) is a persistent theme in later existentialist writings. Heidegger and Sartre, for example, insist that a person is necessarily a participant in —or even a product of —a public, social world. Sartre viewed the individual as an object formed by the 'Look,' of judgements and categorizations by others. Hence, you can, if you want (and most scholars in science studies in the last decade have, of course, done so) emphasize the communal aspects of science, that is, how the members of scientific 'disciplines' (sic!) are objects formed by the 'Look of the paradigm' or the 'Look of the text.'

But even Sartre and Heidegger would deny that this characterization of a life even approximates the whole story about a human existence. The decisive point is that even if a large amount of every human life is lived inauthen-

tically under the spell of the others, human beings have the capacity to undo this condition. Heidegger speaks of authenticity as something to be won in struggling out of a natural condition of inauthenticity.[10]

The notion of struggling out of inauthenticity is particularly significant in the sphere of human activities called science. After all, I guess that the reason why even social constructionists remain in academia instead of applying for a job in advertising or politics is the inherent potentiality that scholarly work gives for self-expression, "world-making," and creation of spaces of their own.[11] That is, we might as well emphasize the constant efforts scientists make to break out of the "Zeitgeist" or the "Denkkollektiv", their disobedience to the rules and discipline of the discipline, and their attempts to retain what Karl Jaspers called the 'original potential':

> Although my social I is ... imposed upon me, I can still put up an inner resistance to it.... Although I am in my social I at each moment, I no longer coincide with it.... I am not a result of social configurations ... [for] I retain my own original potential.[12]

Accordingly, contrary to the idea that the scientist is a package of social forces, the point of departure for an existential approach to biography is to understand the scientist as he is confronted with his freedom, his anxiety as he fathoms the consequences of his choices, and his inevitable feelings of guilt after having made the choice. To give attention to the ability of breaking contexts is to give freely acting, ethically responsible, individual scientists a privileged role in science biography. In this sense, the focus on the existential dimension of science saves the project of biography from being redefined as social biography.

A central element in the existentialist approach taken here is the notion of passion. Existential projects are largely coloured by emotions, or passions. Passions are rarely dealt with in the literature of history or sociology of science. If treated at all, the passions in science are restricted to "a passion to know," or sometimes the joy, or curiosity, of discovery. The widespread use of the term "scientific biography" implies that lives in science are predominantly viewed as intellectual and cognitive lives. I define passion here, not as that-which-is-not-rational, but, as the means by which we try to solve and live

out the tension between the conditions that enable us to assert ourselves as persons.[13] These conditions are, on the one hand, our desire to engage with other people and through this engagement to establish ourselves in the world; on the other hand, our need to prevent this engagement from subjugating and depersonalizing us. The passions embody this tension between longing and fear: despair, vanity, pride, jealousy, and envy are the results of a failure to overcome the tension. Hope, faith, and love are expressions of our ability to balance the tension.

I suggest that this ability to handle the enabling conditions of self-assertion is an integrated part of the life and work of every scientist. In our attempts to assert ourselves through scientific and scholarly work, we are permanently at risk. In projecting our thoughts into the social space, in acts of "world-making," we are constantly taking the risk of being rejected and overwhelmed by others. Scientists who choose to go their own way are committed to acts of courage, "always risking a fearful penalty if they are wrong."[14]

In spite of the rare occurrence of passions in the history of science literature, scientists have used a rather varied passionate lexicon. Biographical and autobiographical reports provide a rich insight into the different accounts of the passions involved, for example, the intense feelings of pain associated with trying to solve a problem, the joy when the solution comes, and at the same time the feeling of fear, anxiety, even terror during the process. Despite the collective nature of its results ("the context of justification"), science in the making ("the context of discovery") is probably one of the most lonely activities in the modern world, and it is often a painful activity as well. The pain may have its origin in activities outside the walls of the laboratory, or it may have its roots in the despairs inside. But whatever its source it colours and pertains through the life of the scientist, irrespective of his scholarly standing. As one physicist says:

> You go through this long, hard period of filling yourself up with as much information as you can. You just sort of feel it all rumbling around inside of you .... Then ... you begin to feel a solution, a resolution, bubbling up to your consciousness. At the same time you begin to get very excited, tremendously elated—pervaded by a fantastic sense of joy .... But there's an aspect of terror too in these moments of creativity.... Being shaken out from your normal ex-

> perience exhances your awareness of mortality.... It's like throwing up when you're sick.[15]

Perhaps no fear is stronger than that which Harold Bloom calls "the strong poet's anxiety of influence," his "horror of finding himself to be only a copy or a replica."[16] It is not only a fear that one's works will be forgotten or ignored, but also that, "even if they are preserved and noticed, nobody will find anything distinctive in them,"[17] that one's findings will be redescribed in terms of other findings.

A biography can also be defined as existential if it deals with the dilemma of a person who struggles with the fundamental choices of his existence and tries to assert himself through creative work. In Michael Polanyi's words, "all kinds of rational knowing involve an existential participation of the knower ... the shaping of knowledge is achieved by pouring ourselves into new forms of existence."[18] Polanyi describes "the tacit dimension" of scientific discovery as involving "existential choice":

> We start the pursuit of discovery by pouring ourselves into the subsidiary elements of a problem and we continue to spill ourselves into further clues as we advance further, so that we arrive at discovery fully committed to it as an aspect of reality. These choices create in us a new existence, which challenges others to transform themselves in its image. To this extent, then, `existence precedes essence', that is, it comes before the truth that we establish and make our own.[19]

With his notion of existential choice Polanyi identified a dimension of science that has been neglected in the (now fashionable) turn towards social studies of science. There is a more fundamental meaning of choice involved here, however. The notion of existential choice was first defined by Kierkegaard in his treatise of the aesthetical and ethical in *Either-Or*.[20] The idea of "either-or" does not denote a choice between this action or that action, or even between good and evil, but a choice between living an ethical life, that is, a life where questions of good and evil guide your actions, or to remain in an aesthetic stage where questions of good and evil are basically irrelevant.[21] In fact, Kierkegaard operates with two aesthetic modes: the sensuous and immediate aesthete (embodied by Don Juan) and the reflective and abstract aesthete

(embodied by the Seducer in *The Diary of the Seducer*,[22] and claims that scientists operate in the realm of the latter.

In contrast, what would an ethical life in science look like? A leap into an ethical stage does not imply that the scientist has to abandon science, but that aesthetic priorities (search for Beauty, Truth; doing research for the sake of joy, power, etc.) are subordinated to the ethical priority of having chosen oneself in science: "[T]he ethical individual is transparent to himself," says Kierkegaard, but the expression "know thyself" is not enough to characterize an ethical life:

> The ethical individual knows himself, but this knowledge is not a mere contemplation,... it is a reflection upon himself which itself is an action, and therefore I have deliberately preferred to use the expression `choose oneself' instead of know oneself.[23]

So, to understand how one scientist may choose himself as an ethical individual, how this choice penetrates his scientific work and achievements, and, conversely, how another scientist may refrain from choosing himself, and thus remain in the despair of an aesthetic life —these are core issues in existential biography.

Kierkegaard distinguishes between the "inward" versus the "outward" history of the individual.[24] Outward history is the story of the strife through which the individual tries to acquire something, the strife in which he overcomes the hindrances to posses something. In outward history, the true reflective aesthete (the author, the poet, the scientist) prefers to relate an individual life as it was concentrated in the moment. To quote Kierkegaard again:

> Imagine, then, a knight who has slain five wild boars, four dragons, and delivered three enchanted princes, brothers of the princess whom he worships. In the romantic chain of reasoning this has complete reality. To the artist and the poet, however, it is of no importance at all whether there are five or only four monsters slain.... He hastens on to the moment. He perhaps reduces the number, concentrates the toils and dangers with poetic intensity, and hastens on to the moment, the moment of possession. To him the whole historical succession is of comparatively little importance.[25]

Authors and poets see no point in dragging in all the details. Neither do scientists. Kierkegaard's description of the aesthete's concentration on the "moment of possession" is reminiscent of the way scientists write about their scientific lives in autobiographical form. It does not really matter whether they killed a thousand rabbits or ten thousand mice for their experiments, or how many postdoctoral students passed through their laboratory. What matters is the significant moment —the moment of discovery, the moment when a new model of nature is conquered and possessed. Most science biographies are also written in terms of outward history in Kierkegaard's sense.

But when it comes to inward history, the life of the individual cannot be concentrated in one, or a few, single moments, since it deals with the succession of a life in time where "every little moment is of the outmost importance."[26] Whereas outward history can represent pride ("for the essential point in pride is not succession, but intensity in the moment"), it cannot represent humility, "because here if anywhere we are dealing with succession."[27] Therefore, both the traditional biographer who focuses on the dramatic events of a life, and the scientific aesthete who, in his autobiographical concentration, focuses on the moment have difficulties in catching the non-dramatic succession of all the small events in the ethical life of the individual scientist.

The many occasions when the scientist cared for a graduate student, the seemingly infinite number of times when he patiently waited for the experimental results to come, the humility and modesty with which he accepted critique from his colleagues – nothing of this lends itself to a dramatic biographical narrative. Yet they are essential aspects of what it means to lead an ethical life in science. To grasp the inward history while at the same time being able to write a biographical portrait that anybody cares to read and can be read intelligibly--this is the challange for an existential approach to science biography.

Notes

1. Mailing address: Department of Life Sciences, Roskilde University, P.O. Box 260, DK-4000 ROSKILDE, Denmark. E-mail: thomass@ruc.dk. This work was supported by grants from the Swedish Research Council for the Social Sciences and Humanities, and from the Mellon Foundation to Horace F. Judson, Stanford University. An earlier version was presented at the 2nd Joint British-North American History of Science Conference, Toronto, Ontario, July 25-28, 1992.
2. Richard S. Westfall, *Never at Rest: A Biography of Isaac Newton* (Cambridge: Cambridge Univ. Press, 1980); Kenneth R. Manning, *Black Apollo of Science: The Life of Ernest Everett Just* (New York: Oxford Univ. Press, 1983); William B. Provine, *Sewall Wright and Evolutionary Biology* (Chicago: Univ. of Chicago Press, 1986); Crosbie Smith and Norton Wise, *Energy and Empire: A Biographical Study of Lord Kelvin* (New York: Cambridge Univ. Press, 1989); David C. Cassidy, *Uncertainty: The Life and Science of Werner Heisenberg* (New York: W.H. Freeman, 1991); Adrian Desmond and James Moore, *Darwin* (London: Michael Joseph, 1991); Frederic L. Holmes, *Hans Krebs: The Formation of a Scientific Life* (New York: Oxford Univ. Press, 1991).
3. This and the following quotes from Desmond and Moore, *Darwin,* op.cit., p.xx.
4. Paul Murray Kendall, "Walking the Boundaries," pp.32-49 in Stephen B. Oates (ed.), *Biography as High Adventure; Life-Writers Speak on Their Art* (Amherst: The Univ. of Massachusetts Press, 1986) (on p. 49.)
5. L. Pearce Williams, "The Life of Science and Scientific Lives", *Physis,* vol.28:199-213 (1991). (on p.207.)
6. Thomas Nagel, *The View from Nowhere* (New York: Oxford Univ. Press, 1986).
7. Richard Rorty, *Contingency, Irony, and Solidarity* (Cambridge: Cambridge Univ. Press, 1989) (on p.89).
8. Jerne (b.1911) was the intellectual leader in the establishment of the discipline of immunology in the 1960s and 1970s, that is, when it evolved into "a subtile and sophisticated science out of the boredom of blind serology." (B. Pernis and A.A. Augustin, "[Review of C. Steinberg and I. Lefkovits, The Immune System: A Festschrift in Honor of Niels Kaj Jerne], *European J. Immunol.*, vol.12:3, 1982.) His first theoretical contribution was the selection theory of antibody formation in 1955 (N.K. Jerne, "The Natural-Selection Theory of Antibody Formation", *Proc. Nat. Acad. Sci.*, vol.41:849-57, 1955), which was later reformulated by Burnet as the clonal selection theory (F. M. Burnet, *The Clonal Selection Theory of Immunity* (Nashville, Tenn.; Vanderbilt Univ. Press, 1959), and now considered to be the central dogma of immunology (cf. E.S. Golub, *Immunology: A Synthesis*; Sunderland, Mass.: Sinauer, 1987, Ch.1.). In 1963 he invented the hemolytic plaque technique for detection of single antibody producing cells, a method that became one

of the most widely used in cellular immunology in the 1960s and 1970s (N.K.Jerne and A.A. Nordin, "Plaque-Formation in Agar by Single Antibody-Producing Cells", *Science*, vol.140:405, 1963.), and in 1973 he formulated the idiotypic network theory (N.K.Jerne, "Towards a Network Theory of the Immune system", *Ann. Immunol., Inst. Pasteur*, vol.125C:373-89, 1974.), a grand synthesis of the regulation of the immune system, which is still debated among immunologists. For these and other achievements Jerne was awarded the Nobel prize in physiology or medicin in 1984. In addition to his scientific contributions, Jerne also stands out as the main organizer of European immunology with his creation, in 1970, of the Basel Institute for Immunology, at that time the largest research center for immunology in the world. I have not incorporated concrete illustrations from the Jerne-biography in this preliminary paper. For a standard short biography of Jerne, see *Dansk Biografisk Lexikon* (2nd ed).

9. The notion of existential biography has mainly been used in connection with Sartre's biographical works (the biographies of Flaubert, Baudelaire, Jean Genet, etc.). Sartre's biographies are problematic, however. For example, he has difficulties in distinguishing the life of the subject from his own literary ambitions, and the works are more Freudian and Marxist than existentialist.
10. cf. David E. Cooper, *Existentialism: A Reconstruction* (Oxford: Basil Blackwell, 1990), particularly chapter 7.
11. Nelson Goodman, *Ways of World-Making* (Indianapolis: Hacket, 1978).
12. Karl Jaspers, *Philosophy* (3 vols), vol.2 (Chicago: Univ. of Chicago Press, 1970), p. 30. (quoted from Cooper 1990, op.cit. p.110.)
13. Roberto M. Unger, *Passion: An Essay on Personality* (New York: The Free Press, 1984), particularly pp.115ff.
14. June Goodfield, *An Imagined World: A Story of Scientific Discovery* (New York: Harper & Row, 1981), p.235.
15. Joan Dash, *A Life of One's Own: Three Gifted Women and the Men They Married* (New York: Harper & Row, 1973), p.318.
16. Harold Bloom, *The Anxiety of Influence* (Oxford Univ. Press, 1973), p. 80 (quoted from Rorty 1989, op.cit. p.24).
17. Rorty 1989, op.cit., pp. 23-24.
18. Michael Polanyi, *The Study of Man* (Chicago: The Univ. of Chicago Press, 1959), pp. 32,34.
19. Michael Polanyi, *The Tacit Dimension* (Garden City, N.Y.: Doubleday, 1966), p.80.
20. Søren Kierkegaard, *Either/Or,* vol.1-2 (Princeton: Princeton Univ. Press, 1946).
21. Kierkegaard 1946, op.cit., pp.143ff. The scientist as an aesthete in Kierkegaard's sense is typified in the autobiography of the molecular biologist Jim Watson: James D. Watson, *The Double Helix: A Personal Account of the Discovery of the Structure of DNA* (London: Weidenfeld and Nicolson, 1968).

22. The distinction between the sensuous and the reflective aesthete is blurred in *Either/Or*, but becomes more clear in *Concluding Unscientific Postscript*. I am grateful to Timothy P. Jackson for making this distinction clear to me.
23. Kierkegaard 1946, op.cit., p.216.
24. The English translation of *Either-Or* uses the terms "internal" and "external" (Danish: "indvortes" and "udvortes"), but in order not to give false associations with the internalism-externalism distinction in the historiography of science, I prefer "inward" and "outward".
25. Kierkegaard 1946, op.cit. pp. 112-13.
26. Kierkegaard 1946, op.cit., p.113.
27. Kierkegaard 1946, op.cit., p.113.