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1 Conceptual Preliminaries

Introduction

This book is concerned with the question

> What, if any, are the connections between the biological sciences (evolutionary biology, neurobiology, primatology, developmental biology, and so forth) and feminism?

And with the question

> If there are any such connections, of what significance are they?

Before we can address these questions, we need an initial understanding of what feminism is, and of what kinds of connections between the biological sciences and feminism would be important to both. To be important, such connections would have to be substantive and empirically based. It is reasonably clear what areas of study fall within the biological sciences. Just what constitutes feminism is fairly complicated and so less obvious. It is a topic we will explore in some detail in subsequent chapters as we discuss specific connections alleged to obtain between feminism and biology. But there are some things we can say here about feminism that will be helpful in setting the stage for the discussions of this and later chapters.

Many readers may think of feminism as a purely political movement – a movement that seeks to identify and remove barriers to women being full participants in all aspects of life (social, political, economic, scientific, and so on). But feminism is more than a political movement. It is also a field of study – one subfied of which is devoted to gender and science that has, over the last 45 years, evolved into a loosely-delineated, multifaceted research program. Feminist scientists and science scholars claim to have shown that

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many disciplines, including many sciences, have relied on, and in many cases, continue to rely on, unquestioned, unwarranted, and, at times also unrecognized, assumptions about gender. Feminists have argued that the research programs in which such assumptions function are in need of reexamination. Feminist researchers have also developed alternatives to assumptions, research questions, and hypotheses that they criticize. Feminists engaged in this research include field and laboratory scientists, philosophers of science, historians of science, and scholars in a variety of other disciplines.

The general focus of feminist research devoted to science, a research program that has come to be called "Feminist Science Scholarship" or "Feminist Science Studies," is on the nature, sources, and roles of culturally and historically specific assumptions about gender in various sciences. We will be concentrating on feminists' arguments about the role and consequences of such assumptions in the biological sciences. It is quite easy to show that such assumptions have led to hypotheses and theories that maintain that there are important differences between women and men – including in cognitive abilities and temperament – and even to hypotheses that men are superior to women in terms of some abilities and characteristics.

To be sure, many theories claiming that men are superior to women in one way or another are no longer viewed as credible; but feminists argue that they are not just of historical interest. For one thing, feminists argue, they provide insights into general relationships between the biological sciences, on the one hand, and the social and scientific contexts within which biological research was undertaken, on the other hand. Studying research that is now recognized as flawed because it is or was based in part on unwarranted assumptions about gender can also help us see how such assumptions can shape, limit, or contribute to research questions, methods, and, ultimately, purported findings of present day biological research.

A less obvious, and more subtle and widespread, phenomenon that feminists study, and to which they seek to draw attention, is the influence of androcentrism, or male centeredness, in biological research that is not seeking to establish or explain that men are in some way or other superior to women. Research characterized by androcentrism, feminists argue, takes the activities, behaviors, dispositions, and the like typically (or at least stereotypically) associated with men or males as their primary focus, and fails to study (or adequately study) those typically associated with women or females. We will consider feminist arguments for the presence and consequences of

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androcentrism in a variety of biological sciences, as well as the constructive alternatives feminists within these sciences have proposed.

Another focus of feminist research is the role of "gender stereotypes" and "gendered metaphors" in the biological sciences. Readers are likely to be familiar with the general issue of stereotypes but may not be familiar with the second issue. Gendered metaphors attribute gender (together with characteristics commonly associated with the gender in question) to objects or processes that are not sexed. For example, traditional accounts of fertilization appearing in biology and medical texts portrayed the egg as "passive" and the sperm as "active." The egg's activism, in relation to the fusion of egg and sperm that yields a zygote, was not discussed (indeed, it is only relatively recently that it was even recognized). To cite another example, biologists often refer to specific hormones as "female" or as "male"; but of course, hormones are not organisms and such terms do not apply to them.

Feminists also focus on "equity issues" in biology, studying the formal barriers that once prevented women from entering it; and the potential consequences of relatively homogenous science communities in terms of gender, race, and class, on the questions asked, methods employed, and hypotheses proposed. Feminists also seek to identify remaining "informal" barriers to women's full participation and success in biology as well as other sciences.

Finally, feminists explore whether the lifting of formal barriers and lessening of informal barriers that led to increases in the number of women engaged in specific fields in biology has had an impact on the directions or content of the research and theorizing undertaken in them. Here it is important to note that most feminists do not view the differences of interest to involve the *sex* or *gender* of researchers, but rather in what ways feminist and feminist-friendly approaches reveal unwarranted assumptions about gender in scientific practice, and how, in the case of areas of biology, such approaches have made a difference. The earlier reference to the monolithic science communities common in the past is understood by feminists in terms of the monolithic experiences and perspectives that characterized them, not the gender, race, socioeconomic status, and the like, of individual scientists. Women trained in a science characterized to some degree by androcentrism might well accept the research priorities, categorizations, methods, and hypotheses of their field. We will also find that there are male scientists who approach their subjects of study in ways that are compatible with those of their feminist colleagues and that some describe themselves as feminists.

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Readers will find that evolutionary theory is emphasized; three chapters focus directly on it (Chapters 2, 3, and 8). In addition, Chapter 4, which is devoted to primatology, discusses longstanding interests in that field to gain insights into "human nature" by studying nonhuman primates. Indeed, we will see in the discussion of evolutionary biology in Chapter 3, research devoted to identifying aspects of "human nature" is often regarded as an important aspect of evolutionary theorizing. In Chapter 6, which is devoted to medicine, we briefly consider Evolutionary Medicine. Finally, hypotheses about gender differences that we consider in the remaining chapters often trace some of their roots to evolutionary biology. Such relationships are not surprising. A common view (though it is not without its critics) was reflected in the title of a 1973 article by Theodosius Dobzhansky: "Nothing in biology makes sense except in the light of evolution" (Dobzhansky 1973).

Science Scholarship

Before proceeding, some comments about the nature of science scholarship (the study of science) are appropriate. Serious science scholarship, whether undertaken by philosophers of science, other science scholars, or scientists themselves, is committed to the view that proffered scientific claims are to be evaluated based on the *arguments and evidence* offered for them; and, for many such scholars (but not all), they are to be understood *in relation to the contexts* (scientific, *and* social, and historical) in which the claims are put forward. (Some contextualists only recognize contexts internal to science as consequential.) As many feminists whose analyses we consider do emphasize all such contexts, as well as relevant arguments and evidence, the forthcoming discussion will do so as well. "Contextualism," so understood, is initially explicated in Chapter 2 when we consider Darwin's hypothesis of sexual selection and his assumptions about sex and sex/gender differences. It is further discussed in later chapters, including different versions of it that feminists advocate. Feminist versions of Contextualism obviously do not accept the assumption that factors in the broader social context are always irrelevant to those how scientists evaluate hypotheses or to the content of science, including biology. And, as we will shortly see, Contextualism of any sort is controversial in those quarters in which an alternative approach, often called "Objectivism," is maintained. We consider Objectivism later in this chapter.

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Philosophical Issues

Here and in subsequent chapters, we introduce philosophical issues that have been of interest in philosophy of science and are relevant to feminists' engagements with biology. In this section, we take note of some of these philosophical issues but defer detailed discussion of them to subsequent chapters. We adopt this approach because the philosophical issues here introduced, as well as others introduced in subsequent chapters, are abstract and complex, and best explicated and illustrated in relation to one or more areas of research. As appropriate, earlier chapters anticipate where an issue is discussed in more detail, and subsequent chapters refer back to where a detailed discussion of a relevant philosophical issue initially takes place.

Objectivity

Objectivity is so commonly associated with science that the fact that it has different meanings is often not noted outside the context of science scholarship. As philosopher Elizabeth A. Lloyd points out, objectivity can be and often is attributed to three quite different things even when its scope is limited to science. "Objective" is sometimes attributed to scientific hypotheses and theories that are taken to be true; sometimes used to describe the attitude to their research scientists are thought or expected to have, including detachment or lack of bias; and sometimes to describe "publicly available or accessible" facts (Lloyd 1993, 353). Often attributions of objectivity, and objectivity itself, are defined in terms of "value-freedom": that scientific theorizing and knowledge claims are not informed by values, and/or that scientists' research is not motivated by values. As we will see, many philosophers and scientists, including but not limited to many feminists, have come to question the possibility of "value-free science" and some also question whether values are inherently compromising to scientific inquiry. These views and other issues we will consider have led some feminists to attempt to reconceptualize "objectivity." We discuss the issues involved and such reconceptualizations in detail in Chapter 4. By then, we will have considered research questions and hypotheses in several biological sciences, as well as feminists' critiques of aspects of them and alternatives they propose.

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The "Context of Discovery" versus the "Context of Justification"

Another philosophical issue relevant to our discussion involves a distinction philosophers introduced in the 1930s between what they called "the context of discovery" and "the context of justification." In brief, the context of discovery was taken to involve how hypotheses and theories come to be proposed; the context of justification was taken to be concerned with how hypotheses and theories are tested, and accepted, refined, or rejected. Proponents of the distinction have maintained that *how* a hypothesis comes to be proposed is not important, at least not to scientists or philosophers of science interested in understanding scientific reasoning and practice. What is important is how a hypothesis fares in the context of justification (e.g., Hempel 1966). From this perspective, many of the issues feminists raise about relationships between social beliefs and values, on the one hand, and research questions and hypotheses in biology, on the other, might easily be viewed as involving only the context of discovery and, as such, having no implications for understanding scientific reasoning and practice.

But feminists argue that the cases on which they have focused and we will consider demonstrate that the assertion that the context of discovery is unimportant or irrelevant to scientific reasoning is untenable. Problems such as androcentrism, they argue, often impact the *content* of science because they carry over into the context of justification. Historically and culturally specific assumptions about women and men, feminists argue, have had significant consequences for research priorities, research questions, hypotheses, observations, and the interpretation of test results – and that this is certainly the case in areas of biology. We consider many hypotheses and evaluations of them that feminists maintain demonstrate this. Obviously, the issues raised in arguments for and against the distinction are related in ways we will also consider to the issue of scientific objectivity.

Individualistic versus Social Accounts of Scientific Reasoning and Knowledge

For most of its history (at least from the time of Plato through the mid twentieth century), philosophy has focused on individuals in its analyses of knowledge. Philosophical analyses of science emphasized the role of logical

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reasoning – attributed to scientists *qua* individuals – and the role of the sensory experiences of individual scientists in scientific inquiry.

In the latter half of the twentieth century, the individualistic view of scientific reasoning began to be challenged. Philosophers and others, including social scientists, historians of science, and feminist philosophers, argued that scientific theorizing is inherently social. It is undertaken, they pointed out, within, and is informed by, the assumptions, research questions, and theories, of specific scientific communities. Feminist science scholars we noted also argue that social contexts external to science within which science is undertaken often have an impact on the directions and content of scientific research. Proponents of these several views have called for the development of accounts of the epistemology of science that study the social factors that are part of scientific reasoning and practice, and many have undertaken such studies. What has come to be known as "social epistemology" is not in fact limited to studying the social nature of scientific reasoning and knowledge, but of all knowledge. In forthcoming chapters, we discuss arguments, albeit arguments that sometimes differ in their details, for the view that scientific reasoning and knowledge are inherently social, paying special attention to those feminist scientists and science scholars offer. As we will see, most feminists who offer such arguments reject the idea that they entail relativism (the view that there are no grounds for evaluating hypotheses and observations) and view the social nature of science as calling for a reconsideration of traditional views of scientific objectivity.

Good Science versus Bad Science

For reasons anticipated in the philosophical issues so far discussed, feminists argue that the reasoning and hypotheses in biology they criticize and propose alternatives to are not plausibly written off as "bad science." And we will find in our discussion of specific hypotheses feminists critically engage, that they are or were in keeping with the methods, research questions, priorities, data, and hypotheses many accepted in the field in which they emerged. But we will also consider arguments offered by critics of feminist science scholarship that the hypotheses feminists engage are, in fact, bad or unsuccessful science and, thus, provide little if any insights into scientific reasoning or knowledge. Obviously, this is one of the more significant and complex issues raised in and by feminist engagements with biology.

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Sex/Gender

One would hope (perhaps even expect) that the terms "sex" and "gender" so crucial to some areas of biological research and feminist science scholarship would enjoy unambiguous and generally accepted meanings. But this is not the case. In the various literatures that we consider, these terms are sometimes used interchangeably, sometimes taken to be clearly and importantly distinguishable, and sometimes understood as in need of further analysis. In the 1960s, psychologist John Money and others insisted on a sharp distinction between sex and gender as attributed to individuals. "Sex," they argued, should be used when describing the biological features of men and women. Gender, or "gender identity," results from social and cultural factors rather than biology. For obvious reasons, many engaged in the second wave of the Women's Movement embraced Money's distinction. Gender expectations, gender roles, and divisions in power along the lines of gender, they argued, are not a consequence of biology; rather, they are socially constructed and alterable.

We have so far focused on how feminist science scholarship explores relationships between *gender* and *science*, including biology. This is in part because many overviews of that scholarship, and many specific arguments offered by feminists, refer to issues involving "gender and science." But reexaminations of the distinction between sex and gender have been and continue to be part of feminist theorizing. The editors of a recent collection devoted to feminism and neuroscience summarized the results of such reexaminations, and concluded that a sharp distinction between sex and gender does not hold up when scrutinized (Bluhm et al. 2012). It is certainly the case that "sex differences" in behavior, abilities, temperament, and the like have long been attributed to biology, including alleged differences between men's and women's brains. But, the editors argue, because the body, including the brain, is changed by experiences and environmental factors (changes we will discuss in some detail in forthcoming chapters), the assumption that biology, including sex, is innate and stable, is unwarranted. And in relation to issues we will consider, some feminist biologists argue, as the editors put the point, that "it is impossible to disentangle the effects of sex from those of gender" on differences between women and men, including brain differences (ibid., 4).

Given these complexities, and because scientists and others whose work we consider often differ in how they use the terms "sex" and "gender," we

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will use "sex/gender" when discussing humans and "sex" when discussing other species, unless the research we are discussing explicitly defines one or both. Readers may initially find the term "sex/gender" awkward, but the research and arguments we will consider indicate that, often, it is appropriate.

There is also no consensus about the appropriateness or content of gender characteristics taken to be denoted by "masculinity" and "femininity," although we will see that these notions figure conspicuously in some biological research. Nor is there consensus or agreed-upon criteria about which entities (including but not limited to organisms) are appropriately described as "gendered." We will note differences in how the terms "masculinity" and "femininity" are used, and disagreements about their appropriateness, as they arise in the contexts of specific research programs.

Other Topics and Issues

As earlier noted, there is consensus among feminists that there are relationships between "equity issues" and issues involving androcentrism, gender stereotypes, gendered metaphors in the biological sciences, and other issues of concern to feminist scientists and science scholars. As we next briefly explore, and analyze in more depth in forthcoming chapters, the very idea that such relationships could or do obtain conflicts with longstanding beliefs about science's intersubjectivity and its autonomy from the beliefs and values characterizing the larger social contexts within which it is undertaken.

One such belief is that "who" is theorizing has no bearing on the content of science when things are going as they should. One argument taken to support this conclusion, but it is only one such argument of those we will consider, appeals to the purported distinction between the contexts of discovery and justification. So, for example, the fact that for many generations most scientists were white males, and that the larger social context within which they worked was characterized by sexist and/or androcentric beliefs, values, and policies, might have had an impact on the hypotheses they proposed – but *not* on the most important issue: how those hypotheses were tested and ultimately judged. From this perspective, scientific methods, including experimental tests, and scientific norms, can and will insure that androcentrism and/or sexism do not affect the content of science.

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A second such belief can be aptly described as encompassing two norms: first, that science must be allowed to pursue knowledge without interference based on religious, political, or other "nonscientific" views or preferences; and second, that science can and should (and some would add "does") keep itself "aloof from" non-epistemic values – that is, from any values that are unrelated to the pursuit of knowledge (e.g., Quine 1981, 49). Episodes such as The Copernican and Darwinian Revolutions underscore the rationale for the first norm. And the kinds of scientific theorizing about racial differences that occurred during the nineteenth and early twentieth centuries serve as an example for the rationale of the second norm.

Do feminists' engagements with biology violate one or both norms? As will become obvious in forthcoming discussions, most feminist scientists and science scholars – and certainly those whose work we consider – do not view their research as motivated by a desire to *undermine* science. To the contrary, their analyses of biological research are generally characterized by frequent and substantive appeals to science, including empirical evidence. They use scientific methods, data, and empirical hypotheses to challenge the assumptions and/or hypotheses they criticize. Nor do most feminists believe that the scientists whose work they criticize are guilty of conscious bias, overtly manipulating data, or misrepresenting experimental results. Research in which such things occur is patently uninteresting precisely because it provides few if any insights into the actual nature of the biological sciences or their relationship to social beliefs and values. As philosopher and archaeologist Alison Wylie makes this point, to engage in critiques of the sort feminists undertake, is to "restudy" some aspect of scientific research (Wylie 1997).

In addition, as earlier noted and as we will subsequently explore in detail, for the most part feminists' engagements with the biological sciences are by no means limited to critiques. Their engagements are frequently constructive – offering alternatives to the research and hypotheses on which they focus. Moreover, we will study specific fields in which the alternatives they recommend to traditional approaches have been accepted and have come to characterize the field in question. The qualification – "most feminist scientists" – within the previous paragraph reflects the fact that there are exceptions to these generalizations. Most of these are to be found in the early days of feminist attention to biology and gender, and more recently in postmodernist critiques of science. In the research on which we focus, such approaches are rare.

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