

**Gender, Germs, and Dirt:
A Case Study of Properly
Politicised Science**

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1. Introduction

- typically, political interest is seen as a source of bias and error in scientific research
- feminist studies of science in 80s and 90s document cases where political interests have negatively affected empirical adequacy (Fausto-Sterling 1985/1992; Schiebinger 1989; Tavris 1992; Harding 1993; and Spanier 1995)
- an awkward epistemic position results though
- while criticising political interests, they've simultaneously offered prescriptions for better scientific research
- prescriptions that are themselves explicitly aligned with yet another set of political interests (e.g., feminist interests)

- in a number of well-documented cases, feminist-informed prescriptions for science have made improvements over sexist research (Fausto-Sterling 2002; Anderson 2004)
- can it be that while some political interests simply bias scientific research, some other political interests (such as feminist interests) can be used as effective resources for increasing the empirical adequacy of research?
- I discuss epidemiological and immunological studies that inform the “hygiene hypothesis”
- I argue that this hypothesis is made more empirically robust by augmenting it with a particular set of feminist political interests

- the hygiene hypothesis explains correlation between increased sanitation, and increased incidence of allergies, asthma, and other auto-immune diseases
- in industrialised nations of the global North and West, lower rates of exposure to certain kinds of bacteria and other micro-organisms, especially in childhood, have had unintended negative consequences for our immune health as adults
- one common denominator that has received no critical attention is that, women are over-represented in all relevant clinical populations
- e.g., higher rates of asthma, allergies, IBD, Crohn's, rheumatoid arthritis, multiple-sclerosis, Grave's disease, and Lupus (Jacobson, *et. al.* 1997; Walsh and Rau 2000, Bird and Rieker 2008)

- clinicians have noticed the sex differences in the populations they treat
- they trend towards reductionistic biomedical explanations for these differences
- put the focus on physiological, hormonal, and genetic accounts
- little to no attention paid to the ways these same processes are affected by:
 - complex environmental factors such as patterns of hygiene and sanitation
 - or social factors, such as the interweaving of the effects of gender, race and economic hierarchies
- biomedical accounts of the differences in the relevant morbidity rates between women and men, continue to leave a significant amount of variation unexplained

- properly augmented by feminist sociological and anthropological analyses of the gendered standards of cleanliness in children, the hygiene hypothesis might be able to account for this unexplained variation

Insofar as social preferences for cleanliness are enforced more aggressively for girls than boys, this gender difference leaves girls with lower rates of exposure than boys to an array of micro-organisms; exposure to which is required for proper immune health in adulthood.

2. The Hygiene Hypothesis

Germs, Allergies, and Asthma

- compared to children raised in urban settings, children raised on farms have lower rates of allergic rhinitis and/or conjunctivitis
- farm environments also seem to protect against asthma and wheezing
- “environmental exposure to immune modulating agents, such as environmental mycobacteria ... could explain the finding”
(Kilpeläinen, M., *et al* 2000)
- exposure to 2 or more domestic pets has a similar protective effect
- “children in a birth cohort raised in a house with 2 or more dogs or cats in the first year of life have not only less allergic sensitization to dog and cat [allergens]..., but also less sensitization to allergens in general at age 6 to 7 years”
(Ownby, *et al* 2002)

Parasites and Inflammatory Disease

- other immune-system malfunctions such as inflammatory-bowel disease (IBD) and Crohn's disease, may also be related to the hygiene hypothesis
- in industrialised urban environments where humans are largely free of contamination by parasitic worms, rates of these sorts of diseases have skyrocketed (Elliot, D.E., *et al* 2007)
- it turns out that some parasitic worms seem to have a “calming” effect on the immune system
- patients who have Crohn's disease are being effectively treated by having them ingest the eggs of the whip worm, often found in healthy pig farmers

3. Feminist Politics and the Hygiene Hypothesis

- over-representation of women in relevant clinical populations can be accounted for by my augmented hygiene hypothesis
- the strength of the augmented hypothesis is only obvious against a backdrop of feminist political commitment
- feminist politics of relevance concern the project of documenting, deconstructing, and ameliorating the varying social pressures that inform what it means to be a gendered body
- a cluster of views at once descriptive and prescriptive:
 - e.g., the content of the social roles assigned to boys and girls, men and women, is significantly driven by deeply held cultural commitments that are in some important sense:
 - arbitrarily assigned relative to features such as secondary sex characteristics
 - vigorously, though often unconsciously, enforced and rewarded from a very young age

- our current assignment of social roles is not easily modified,
- most feminists believe that the historical evidence regarding human flourishing shows us that there are more relevant criteria for assigning social roles, such as individual interest and/or skill
- great deal of data supporting this cluster of political views
- but there are of course a number of people who still do not share these political interests
- believing that gender role assignments are less than arbitrary, perhaps “natural” or mandated by theological design
- individual interest and skill are less relevant
- if someone holds these latter views, or is unaware that there is a position to be taken on these points, or has heard of the feminist positions outlined and thinks them reasonable, but does not identify them as key organising principles
- then they are less likely to notice, or think necessary, or even relevant, an analysis of the way in which gender roles can have an effect on any particular scientific hypothesis
- gender, in these instances, is inappropriately “disappeared”

- feminist claim of relevance to hygiene hypothesis:
- masculine gender-role assignment involves a social acceptance of playing in dirt and mud for those (typically boys) so assigned
- an acceptance that does not extend to the feminine gender role (and typically assigned to girls).
- these differential social expectations regarding cleanliness are reflected in and reinforced by gender differences in children's clothing, participation in sports, and adult supervision of children's play

4. Gendered Norms of Cleanliness

- girls are dressed more often than boys in clothing that is not supposed to get dirty, and that restricts the sorts of movements that would get one dirty in the first place (Martin 1998)
- girls do not participate in sports with the same frequency as boys, and girls more often than boys play indoors (Pomerleau, *et. al.* 1990)
- sports, and outdoor play generally, increases the chances for exposure to the micro-organisms found in dirt (Lanphear & Roghmann 1996)
- parents structure and supervise the play of girls more than that of boys (Caldera, Huston, and O'Brien 1989), which is likely to result in girls being kept cleaner than boys

- many parents continue to reinforce traditional gendered norms of hygiene in their preschool children, e.g., in how children are dressed.
- a study of American children in a preschool setting found one third of the five-year-old girls came to school in dresses *each day* (Martin 1998)
- wearing a dress limited girls' physicality
- knowledge about how to behave in a dress is also restrictive.
- many girls already knew that some behaviours were not allowed in a dress:

“Vicki, wearing leggings and a dress-like shirt, is leaning over the desk to look into a ‘tunnel’ that some other kids have built. As she leans, her dress/shirt rides up exposing her back. Jennifer (another child) walks by Vicki and as she does she pulls Vicki's shirt back over her bare skin and gives it a pat to keep it in place. It looks very much like something one's mother might do.”

- these young children have already internalised the rule that when wearing a dress they must constantly monitor their decorum
 - who knows what immodesty might otherwise result, what dirt (metaphorically and literally) might cling
 - in the playgrounds of the Northern West, cleaning and pollution rituals abound, with all the appropriate gender-role accompaniments
 - concerns with “cooties”, and other “pollution rituals” are especially prevalent in children ages 6-9
 - field work in late 70s and early 80s at schools in Michigan and California, shows that girls are far more likely than boys to be associated with cooties
 - and to be ostracised as carriers of cooties
 - girls, more than boys, must guard against these and other forms of pollution
- (Thorne 1993)

5. Increasing the Empirical Adequacy of the Hygiene Hypothesis

- improvements to the hygiene hypothesis that attention to feminist interests allow
- beginning with asthma: age interacts with sex in a way that is consistent with my augmented hygiene hypothesis
- before puberty, boys have higher rates of asthma than girls
- after puberty, the sex difference reverses
- reasons for the age-link remain unclear
- a number of competing biomedical explanations for the “over-active” immune systems of women relative to men
- no accepted biomedical explanations available for the over-active immune systems of boys relative to girls
- it might be that there is a critical period involved
- a developmental period during which the immune system properly exposed to potential allergens, responds with asthmatic symptoms, and after which shows a “settling effect”

- those children, typically boys, properly exposed during the critical period, respond with asthmatic symptoms early on, but then their symptoms abate
- those children, typically girls, not exposed during the critical period, respond with asthmatic symptoms later, and for the rest of their lives
- a critical period of just this sort was found in study about two or more pets in the home at infancy protecting children against allergies at six years of age
- the positive effect was not found if the pets were introduced later than infancy
- in what the authors note as a “puzzling” aside, the protective effect of pets in the home was significantly more marked for boys than girls

- thinking in terms of gender differences in hygiene also helps identify new relevant sources of evidence for the hygiene hypothesis
- opens up further avenues for study
- epidemiologists and immunologists have not yet linked gendered norms of cleanliness to morbidity rates for auto-immune disorders
- but some epidemiological studies of children mention gender differences in exposure to dust, dirt, and germs
- these studies, not previously believed to be relevant, could be used to provide support for and point towards the further development of the hygiene-hypothesis

- one such study concerns the transmission of *Ascaris lumbricoides* (large intestinal roundworms) among rural populations in Southern Ethiopia (Vechiatto 1997)
- transmission route involves “ingestion of infective eggs from soil contaminated with human feces or uncooked vegetables contaminated with soil containing infective eggs”
- infants are often accompanied by domestic dogs throughout the day, homes have dirt floors, and livestock are brought into homes at night
- “70% of all outpatients treated for helminthiases were children under fourteen years of age” especially among 1-4 yr. olds
 - note the sex difference: 20.5% of males in this age group had *Ascariasis* infection, as opposed to only 13.5 % of females
 - this gap closes in later ages, e.g., 5-14 year olds, where rates lower – in males to 8.9% and females to 11.3%
 - “making it difficult to establish statistically significant sex-differences in worm infection”

- the change across age groups might be related to hypotheses about differential hygiene expectations for boys and girls
- infants, both male and female are under greater parental supervision than are older children
- social studies of gendered norms for hygiene show that for females, more than males, greater supervision comes with increased restrictions on how and where they play
- perhaps these gendered facets of parental supervision explain the fact that in the 1-4 age group, significantly fewer girls than boys were found to have parasites
- if the modalities of exposure to harmful parasites are similar to those for the more helpful parasites that calm over-active immune systems...
- then epidemiological studies like these, attending to gendered norms of cleanliness, might help explain why girls have higher rates than boys of the relevant immune problems

- if the augmented hygiene hypothesis is true,
 - if increased hygiene negatively affects immune health
 - and if immune health differs by sex (as research shows it does)
 - then we should see sex differences in the morbidity rates for these illnesses
 - and here we do!
-
- epidemiological research in rural Guinea, and Southern Ethiopia, introduces another avenue of study that could provide evidence for the hygiene hypothesis
 - such research undertaken outside the industrialised North and West, provides opportunity for cross-cultural, natural experiments

First sort of experiment:

- whether the gender norms that place higher standards of cleanliness on girls than boys hold across different cultures:
 - from field work in Bengali, India
 - women and girls are expected to bathe more often than men and boys
 - expectations that are related to views of women and girls as naturally dirtier than men and boys
(Lamb 2005, 213)
 - for these women and girls, the practice of bathing, often twice or more times daily, consists mostly in a ritual rinsing with water, rather than wringing one's hands with anti-bacterial soap, or guarding against cooties
 - but the gender differences in cleanliness run parallel to purity notions associated with femininity in the North and West

Second sort of experiment:

- whether those epidemiological studies of the rural South and East that reported higher levels of ingestion of micro-organisms in boys, also found this to be correlated with those boys having a lower incidence of allergies, asthma, and IBD:
 - we already know that the incidence and prevalence of these diseases is lower in the more rural nations of the South and East, relative to the industrialised North and West
 - we don't know whether morbidity patterns in the South and East feature the same sex differences as are found in the North and West
 - Hiwi settlements of Venezuela have lower rates of allergies than are typically found in populations of the industrialised North and West (Hurtado, *et. al.* 1997)
 - Hiwi girls spend significantly more time than do boys engaging in “grooming behaviors,” *and* that these behaviours “serve to eliminate ectoparasites”
 - they did not note in their study whether there were any sex differences in parasite exposure between Hiwi boys and girls, though the grooming behaviour suggests there is.

- they also did not note whether there were any sex differences in incidence and prevalence of allergies in either children or adults
- though the presentation of their data suggests that they have this information available
- (they present data comparing Hiwi girls and women to girls and women from Western populations, for example)
- given no attention to the socialisation processes that differentially affect hygiene expectations for boys and girls, it is likely that the researchers did not think that sex differences within the Hiwi populations were relevant for analysis and presentation
- paying attention to gender differences in hygiene provides a means of recognising potential evidence for the hygiene hypothesis that might be otherwise ignored

6. Conclusion

- political interests are ubiquitous in all aspects of scientific activity
- not all political interests are of a piece
- some political interests can actually increase the empirical adequacy of scientific research in a variety of ways
- problems with empirical adequacy of current research:
 - 1st - hygiene hypothesis researchers have not sufficiently attended to, or accounted for, the “feminisation” of the morbidity rates they seek to explain
 - 2nd - clinicians who treat and study these illnesses *have* noticed sex differences but they have tended towards reductionistic biomedical explanations for these differences

Regarding the 1st problem

- important sources of evidence for the hygiene hypothesis have been ignored
- a number of natural experiments remain unpursued
- a number of interaction effects such as age by sex, remain unaccounted for

Regarding the 2nd problem

- reductionistic focus on biomedical processes continues to leave large amounts of variation unexplained

- feminist political interests that inform the augmented hypothesis help fill in some of the explanatory gaps about sex differences in autoimmune diseases
- these political interests also respond to a number of outstanding puzzles in the hygiene hypothesis research
- make available new sources of evidence
- and suggest designs for a number of cross-cultural and other natural experiments

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