

Steroid Provocations: On the Materiality of Politics in the History of Sex Hormones

According to Chandak Sengoopta, a historian of sex hormones, what most fascinated scientists in the early phases of endocrinology, in the first decades of the twentieth century, was what he calls “the plasticization of the body”: “that the body was modifiable—significantly, if not infinitely, and in relatively painless ways” (2006, 6). What particularly interests me is the modifiability that sex hormones seemed to promise and what it meant in terms of the binary of two sexes. When sex became modifiable through means other than surgery, did sex hormones also bring about tensions concerning the Western two-sex binary?

Feminist scholars have convincingly shown that many scientists have assumed a two-sex binary in their assessment of sex hormones, and these scholars have criticized the process whereby these phenomena came to be labeled “female” and “male” hormones.¹ Here, however, I pay attention to cases in which scientists and practitioners have *not* regarded these steroid phenomena primarily as sex hormones. I suggest that a focus on cases in which scientists (and other actors) have been interested in these phenomena for other reasons can complicate the previous narratives about their history. I refer in particular to cases in which the effects on sex characteristics were regarded as unwanted side effects and risks rather than defining what these steroids *were*.

I will suggest that societal concerns about the risks of steroid products have not always focused on health risks per se but rather on the risks—or provocation—that steroid products pose to the binary of two sexes, particularly when these products have transformed sex characteristics. As Celia Roberts notes, “etymologically, hormao means to excite or provoke” (2007, 199). Like Roberts, I am drawn to the verb “provoke” in relation to sex hormones because “there is an openness in this verb that leaves space for relations other than determinism” (199). An important material feminist insight

I thank the research seminar participants at the London School of Economics and Political Science Gender Institute and at the Department of Thematic Studies: Technology and Social Change at Linköping University, the research participants at the Knowledge, Science and Technology seminar held at the University of Tampere, as well as the *Signs* anonymous reviewers for insightful critique and fruitful ideas for revising earlier versions of this article. I thank the Turku Institute for Advanced Studies for funding this research.

¹ See, e.g., Oudshoorn (1994), Fausto-Sterling (2000), Roberts (2007), and Satzinger (2012).

is that so-called biological phenomena can be discussed alternatively, without assuming that their effect on sex is first and foremost deterministic (as a sentence like “Secondary sex characteristics are caused by sex hormones” would tend to imply).²

The question of sex hormones therefore not only concerns the effects of these molecules within bodies; to paraphrase Judith Butler (1990), it is also a question of the “sex trouble” that these hormones and their particular usages have brought about. Several accounts already exist of the development of marketable hormone products and the corresponding development of common public understandings regarding these hormones.³ In spite of this, the question about sex hormones’ potential to provoke the Western binary of two sexes has received surprisingly little attention.⁴ Even if women or men are discussed in all feminist sex hormone histories, much less attention is paid to the ways in which hormone products have transformed sex characteristics to the extent that the boundaries of female and male bodies have become blurred.

I will therefore explore whether the development of steroid chemistry and the use of steroids have resulted in tensions between the technological possibilities of steroids and the intelligibility of sex, where the boundaries of sexed life have become contested. My argument is that if we are to think about the relation between feminist politics and nonhuman matters, one possible approach is to acknowledge such tensions as disruptions in the binary system of two sexes. Here, I consider the blurring of the boundaries of sex as a kind of politics of sex. I reappropriate material feminist and political scientist Jane Bennett’s (2010) reading of political scientist Jacques Rancière in order to explore what politics may mean if we are to argue that in addition to deliberate human action, sex hormones have something to do with the politics of sex.

In exploring this question, I employ what Judith Halberstam has called “scavenger methodology” (1998, 13): a gathering of examples from wide-ranging sources, contexts, and times. These contexts include discussions about hormone treatments in Finnish medical journals from the 1960s, medical and media attention to steroid use in sports from the 1960s to the 1980s, and Finnish parliamentary discussions and legislation on gender reassignment in the beginning of the twenty-first century.⁵ I do not aim to tell

² On material feminism, see Alaimo and Hekman (2008).

³ See Oudshoorn (1994, 2003), Fausto-Sterling (2000), Sengoopta (2006), Roberts (2007), and Satzinger (2012).

⁴ See, however, Birke (2003).

⁵ The research material for my ongoing study, from which these examples are drawn, includes legislative documents related to legal gender recognition and scientific articles from

these histories in a thorough way but rather discuss each case briefly in order to make my point about politics and to argue that alternative histories of sex hormones are possible and worth exploring more extensively.

Sex and hormones

What makes the study of hormones especially interesting for feminists is that some of them “can dramatically affect sexual development” (Fausto-Sterling 2000, 193). Because of this capacity to, for example, stimulate the growth of breasts, affect the form of genitals, and regulate the menstrual cycle, these types of hormones are persistently called “sex hormones”—even though the same hormones also “govern the processes of cell growth”—“affecting most, if not all, of the body’s organ systems” (193). What is crucial is that as soon as these phenomena, to use Karen Barad’s (2007) term, were encountered, they began to be used for the molding of bodies.⁶

The birth of endocrinology is most often credited to the mid-nineteenth century and to the idea that bodies produce internal secretions. In the beginning of the twentieth century, it was proposed that these secretions traveled from the gland where they were produced, through the bloodstream, to other parts of the body, where they provoked their effects (Roberts 2007, 35). According to the current understanding, there are various types of hormones that regulate, for example, the immune system, salt and water balance, and growth. In the early decades of the twentieth century, the relation of “sex” to these secretions and to the chemical regulation of bodies was fiercely debated. Since 1907, it has been claimed that these chemical processes also regulate bodily sex differences. This group of hor-

three Finnish medical journals, *Suomen Lääkärilehti* (Finnish medical journal), *Finska Läkaresällskapet Handlingar* (Papers of the Finnish Medical Association), and *Duodecim*, as well as newspaper material from the following archival sources: Archives of Päivälehti (the predecessor of *Helsingin Sanomat/Helsinki Times*), Archives of the Ministry of Foreign Affairs, the archives of professor of physiology and sports physician Kaarlo Hartiala (1919–2009) from the Archives of Urho Kekkonen, and Archives of the Finnish Olympic Committee from the Sports Archive of Finland. The newspaper material consists of commentaries, debates, columns, and caricatures. My study concentrates on the 1950s to the present.

⁶ Barad uses the term “phenomenon” in a particular way, as part of her indeterminate account of ontology. She suggests that anything observed by science exists only within a certain “apparatus” and is therefore not an independent object. Barad’s own examples consist of both different laboratory apparatuses and, for example, ultrasound technology, in which the phenomenon of a fetus, or an “individual infant,” is perceived (Barad 2007). On how Barad’s thinking can be appropriated for a rethinking of the ontology of sex hormones, see Irmi (2013c).

mones came to be called sex hormones, and along with a few other hormones, they were classified as steroids. Sex hormones became a solution to the debates of geneticists and physiologists about the formation of sex. In 1916, zoologist Frank Lillie proposed that sex was first determined by chromosomes and then materialized in the body through the work of sex hormones (Oudshoorn 1994, 21–24).

The research on hormones was heavily influenced by the earlier idea that specific organs were the core of sex, the ovaries for women and the testicles for men. The developing field of endocrinology continued this tradition by assuming that secretions from the ovaries were the key to female sex and that secretions from the testes caused the development of male characteristics. These secretions were named, according to this gendered perspective, “androgens” and “estrogens.” By the late 1930s scientists had, however, noted that both “male” and “female” hormones existed in the bodies of both sexes and that chemically the “male” and “female” substances were quite similar and were converted within bodies into each other. In other words, instead of essences, sex had become fluid: a question of relative amounts of these substances in bodies.⁷

According to contemporary understandings, the production of hormones is much more complex and less sex segregated than first envisioned. For example, contemporary scientists suggest that ovaries primarily produce testosterone, most of which is then converted to estrogen. In addition, research suggests that the amount of estrogen produced in adult male bodies is approximately equivalent to the amount of estrogen produced in postmenopausal women’s bodies. These chemicals also have similar effects in both female and male bodies. For example, the puberty changes in both girls and boys are “kicked off” by testosterone produced in the adrenal gland. In addition, testosterone receptors exist in the clitoris, vagina, and nipples, and testosterone is believed to enable their sexual stimulation (Rako 1999, 42–44).

Since the developments of the 1930s, it has therefore been questionable to talk about “female” and “male” hormones. One of the scientists who criticized the naming of these substances as sex hormones, Dutch chemist John Freud, proposed that this naming was “not because they are very important for sexual development, but merely because the changes these substances bring about in the organism can be observed with rather crude techniques of observation” (1936, 12–14).⁸ This means that some of their

⁷ See Oudshoorn (1994, 24–39), Fausto-Sterling (2000), Roberts (2007, 38), and Marks (2010, 62–63).

⁸ This quotation is taken from Nelly Oudshoorn’s translation (1994, 35).

effects—on sex characteristics in particular—can be seen and heard without laboratory equipment. For example, if a person considered female takes a considerable amount of androgens or androgen derivatives such as anabolic steroids over a sustained period of time, that person will develop a lower voice and more body hair. Such a transformation, in turn, is a disruption in a context where a binary of two sexes is considered important and where men and women tend to be distinguished by the pitch of their voices and their amount of body hair, especially on the face.

In what follows, I argue for an understanding of politics that acknowledges the significance of sexed bodies as a political act. My suggestion is that the visible and audible effects that steroids have on sex characteristics are key to understanding why they have become enmeshed in a number of societal scandals and regulatory processes and that these effects are also key to understanding why steroids have enabled the public disruption of the binary imaginaries of sex.

Politics as disruption

There have been several attempts to propose a relationship between nonhumans and politics. In particular, environmental and nonhuman animal politics have motivated researchers to envision ethical and political practices in which the concerns of nonhumans play a role. These efforts have been motivated by the importance attributed, for example, to the continued existence of particular ecosystems, to possibilities for saving energy or dealing with waste, and to issues around animal testing and eating.⁹ However, only a few such projects have explicitly interrogated political theory when discussing what nonhuman participation may entail, and the previous encounters between science studies and political science have not accounted for the question of sex.

I find science studies' concerns about environmental and nonhuman animal politics important, but theorizations of nonhumans as actors also involve aspects that do not seem helpful in the case of steroids. Theorizing environmental politics from the perspective of democratic participation seems to rest on an argument for a nonhuman subjectivity. For example, science studies scholar and political theorist Jane Bennett, inspired by both Bruno Latour and Charles Darwin, ponders the "freedom of choice" of worms (Bennett 2010, 96–98). Myra Hird, inspired by Latour's idea of "a parliament of things," focuses on how bacteria communicate about and

⁹ See Haraway (2008), Bennett (2010), Hird (2013), Marres (2013), and Vehviläinen (2014).

“vote” for appropriate action under environmental stress (Hird 2009, 46).¹⁰ Hird writes: “A collective assessment of colonial stress as a whole is determined by cooperative perception. Starved cells emit chemical messages that convey stress. The other colony members use the information for contextual interpretation of the state of the colony relative to its own individual situation. Accordingly, each bacterium ‘votes’—it sends a message for or against sporulation. Once each member has sent its preferences and read the other messages, sporulation is initiated if the ‘majority vote’ is in favor” (46).

Here Hird is clearly walking a tightrope. However, she argues, the microbiologists who study bacteria are walking a tightrope as well. This is because the above account about “political” behavior among bacteria implies a struggle “between a strong eschewal of anthropomorphizing bacterial processes and a commitment to acknowledging the sophistication of bacterial organization” (Hird 2009, 53). In this struggle lies a key to understanding the confrontation between poststructuralist and material feminisms, which leads to the following question: are the activities of “nature” something to be acknowledged by feminist scholars and feminist politics, or are descriptions such as voting, coding, or communication, as several poststructuralist thinkers (e.g., Sullivan 2012) have claimed, mere labels given by humans, where subjectivity is problematically ascribed to nature? Within science studies, Noortje Marres’s (2013) approach comes close to the poststructuralists’, because she calls attention to how humans bestow different materials with different political meaning.

Crucially, either the actions of nonhumans seem to be denied or ignored or the question of the subjectivity of nonhuman phenomena seems to be taken as the starting point for the political significance of their actions. The latter is the case in both Hird and Bennett. This practice reiterates what political scientist Tiina Vaittinen, following Giorgio Agamben, has described as a distinction between “*bios* as the politically relevant life and *zoē* as the mere fact of living, or ‘bare life’” (Vaittinen 2014, 107). Noting the prevalence of this assumption in feminist political theories of care, Vaittinen argues that this distinction is problematic because it a priori excludes vulnerable bodies—such as those not capable of communication—from the sphere of political agency and renders them as mere objects of political endeavors.

In accounts of nonhumans and politics, such as those of Bennett and Hird, the theorization of nonhumans as active seeks to counter the human-

¹⁰ In short, the notion of a parliament of things denotes forms of decision making in which the concerns of not only human but also nonhuman actors are taken seriously. For an assessment of Latour’s variable accounts of politics, see Tamminen (2012).

subjectivity-centered notion of politics by arguing for a nonhuman subjectivity. This subjectivity includes, for example, the ability to communicate, make choices, or vote. Such formulations, instead of questioning the boundary between bare life and political agency, seem to have set the boundary in motion: while in most political science settings the boundary lies between humans and nonhumans, the boundary is now *moved* in order to include an expanding range of nonhumans assumed to be capable of political subjectivity.

In order to explore the political beyond questions such as who is capable of political subjectivity, where exactly the boundaries should be drawn, or whether assigning political subjectivity to nonhuman animals or bacteria is debatable anthropomorphizing, I have chosen to approach politics from another angle. With this end in view, the understanding I have chosen focuses less on political subjectivity and draws instead on the process of disruption as a political act (Rancière 1999).

As Jenny Edkins has proposed, acts of disruption need not be related to “grand moments of openness or undecidability that arise in between established social systems” (1999, 5). Here, I pay attention to much more modest, momentary disruptions. I fully admit that this is a gross reappropriation of the constructions of Rancière (1999), who has theorized disagreement. Rancière in fact has explicitly stated that nonhumans do not qualify as actors in his scheme of thought (Bennett 2010, 106). Nevertheless, I suggest that this approach supports an account of steroid participation in politics. In this article, I rely on Bennett’s interpretation of Rancière.

For Rancière, a political act consists of a disruption, in which bodies not previously recognized by the public enter the scene more visibly than before. From this perspective, politics does not necessarily involve preserving a particular order or action that “respond[s] to already articulated problems” (Bennett 2010, 105). Instead, a political act disrupts the prevailing order: disrupting bodies expose “the arbitrariness of the dominant ‘partition of the sensible’” (105; see also Rancière 2013, 7–8). For my purposes, such disruption concerns the binary distinction between the two sexes.

As Bennett points out, Rancière’s thoughts can be reappropriated by broadening the understanding of who or what can cause a disruption: “Is the power to disrupt really limited to human speakers?” (Bennett 2010, 106). Another way to broaden this thinking so as to account for nonhumans is to choose “to define what counts as political by what *effect* is generated: a political act not only disrupts, it disrupts in such a way as to change radically what people can ‘see’” (106–7). I suggest that the idea of the political act as disruption proves helpful for understanding the actions of steroids. This is because their specific way of affecting bodies has

fueled a proliferation of bodies that do not strictly conform to the male/female distinction. I am proposing here the possibility of seeing the history of sex hormones as also involving disruptions to the binary understanding of bodies as either female or male. While such a binary may have seemed persistent, at least in the West, I suggest that it is important to note even minor or modest disruptions that have set this state of affairs into contestation. In what follows, I discuss three different cases in which such bodily effects on sex have become relevant.

Case 1: Explorations of hormone treatment with androgens and estrogens

During the 1960s, lively discussions appeared in Finnish medical journals about how estrogens and androgens could be used for diverse purposes. Similar discussions have also flourished elsewhere (Sengoopta 2006), but histories of sex hormones have not focused on whether they troubled the two-sex binary. These diverse purposes included, for example, treating men's atherosclerosis with estrogens (Burstein 1960), treating women's menopausal symptoms with either estrogens or androgens (Soiva 1961), and enhancing athletes' performance abilities (Mustala 1967). What was common for all these endeavors was that the formation of sex characteristics was not taken as the central effect of these hormones but rather an inconvenient side effect. For example, Josef Burstein reported that in a study on atherosclerosis, men's breast tissue was removed in order to combat the "side effect" of estrogens, which induced the growth of breasts (1960, 100).

What is pivotal is that there was a lot going on with the so-called sex hormones. From the perspective of these endeavors, even if the discussants were well aware that these hormones altered the so-called sex characteristics in different ways, these effects did not necessarily define what these hormonal phenomena *were*. In other words, these phenomena were not always assumed to *be* first and foremost sex hormones. However, in projects that focused on other aspects and enactments of these phenomena, "sex" still became relevant, especially when estrogens were seen as useful for treating men and androgens for treating women. In these cases, if these hormones were used in quantities that well superseded their usual amount in female or male bodies, they induced transformations to sex characteristics. Therefore, the effects on sex became unwanted side effects that needed to be combatted rather than effects that defined the substances.

In addition to surgically removing men's breast tissue in the case of estrogen treatment of men, physicians lowered the doses and terminated the treatment of menopausal women being treated with androgens before

any drastic changes appeared. Like a few other scholars before him (on these scholars, see, e.g., Sengoopta 2006), Finnish gynecologist Keijo Soiva praised the effects of androgens on menopausal women at the beginning of the 1960s because they seemed to be at least as effective but safer than estrogens. At this point, it is important to note that estrogens, sometimes with a hint of progesterone, are most common in our contemporary menopause treatment. In fact, it has been so common to use so-called female hormones in treating menopause that the history of the dissemination of menopausal and postmenopausal hormone treatment in Finland after the 1950s *defines* such treatment as “female hormone products” (Topo 1997, 5). Most other feminist accounts of menopause treatment assume as a starting point that hormone treatment equals the use of estrogen or both estrogen and progesterone (e.g., Houck 2006, 53; Roberts 2007, 114–22). This starting point, however, effaces medical discussions in which treatment with so-called female hormones has not been the only option.

Finnish gynecologist Soiva noted that androgens “have a remarkable anabolic effect that improves the general condition. They reduce frigidity and when using them, bleeding is not to be feared” (1961, 715–17).¹¹ He also noted the side effects of estrogens, which included sickness (nausea), diarrhea, allergic reactions, and severe bleeding, and that because of these side effects, estrogen treatment had to be paused after three weeks. However, he warned of long-term use of androgens in large amounts, because they could result in side effects such as virilization, lowering of the voice, and growth of the clitoris (718). The effects Soiva mentions all transform *characteristics* of bodies that are taken to reveal the sex of the body; they are not *health* risks per se.

Even though the health risks of estrogen products were already noted in 1961, as Soiva’s article demonstrates, the definitive blow to so-called hormone replacement treatment with estrogen came in 2002, with the premature termination of the world’s largest clinical trial, the Women’s Health Initiative study in the United States, because of the health risks of the treatment. Publication of Britain’s Million Women Study in 2003 added more fuel to the critique (Roberts 2007, 138). It is no news that the risks of hormone treatment for women have been tolerated for a long time (see, e.g., Oudshoorn 2003). One of the least discussed aspects of the history of menopause is that at the point when different hormone treatments were being explored, health risks apparently became more tolerable than

¹¹ Translations from Finnish and Swedish are my own.

the risks of blurring the boundaries of sex. Even if practically every history of menopause treatment recognizes the connection between hormone replacement therapy and the maintenance of femininity, which aging and the lessening of estrogen appeared to threaten, I suggest that it is also worth considering that androgens were tested and their effects discussed, at least within the confines of medical journals (for an account aimed at the public, see Rako 1999). Judging from Soiva's text, androgens seemed safer and at least as effective as estrogens. However, their side effects were deemed problematic—and I suspect that this was because they were regarded as a risk to the clear distinguishability and separability of the two sexes.

Case 2: Anabolic steroids and sex transgressions in elite sports

Sports physiology had already developed by the 1940s, but after the Second World War, the technological enhancement of sport increased. International sports spectacles became part of “sportive nationalism” (Hoberman 2005, 249) and part of the Cold War's unarmed warfare, and therefore the success of athletes was taken to prove the superiority of an ideology. At this time, states on both sides of the Cold War divide began to invest in scientific coaching systems. Hormone products came into the picture in the 1952 Olympic Games when weight lifters from the Soviet Union began to use them. However, the West was not far behind, if at all. In the 1960s, anabolic steroids were already broadly in use on both sides of the Atlantic. Crucially, the development and broader distribution of visualizing technologies, especially television, resulted in a greater visibility of international sports events from the 1960s onward.¹² This also enhanced the provocation of the visible effects of steroid products.

In the 1960s, androgens were seen as useful in part because of their anabolic effects, which include the acceleration of protein synthesis. The effects regarded as useful included, for example, the capacity to build muscle strength and help a body to recover from stressful situations such as surgical operations—or from tough training and competitions in the case of sport. Here again, using anabolic effects required dealing with other—unwanted—effects on sex characteristics. The so-called anabolic steroids looked to some like a solution. Anabolic steroids are synthetic steroids not produced by human bodies. They are derived from androgenic sex hormones, but they are modified in order to get the most out of the anabolic effects, rather than inducing effects on sex characteristics.

¹² See Beamish and Ritchie (2006), Jokisipilä (2006), Dimeo (2007, 72–76), and Rantala (2011, 17–18).

Androgenic sex hormones were first considered useful mainly for women—men were assumed to have enough androgens on their own. However, ordinary androgens and their side effects could compromise the sex characteristics of women. The following comment by a Finnish sports physician from 1967 voices this concern and poses anabolic steroids as the solution: “Powerful virilizing qualities restrict the use of the ordinary androgens on women. Instead the so-called anabolic steroids, where the androgen effect has been reduced to 1/50–1/500 of the equivalent effect of androgens but where the anabolic effect is yet preserved unaltered, are predicted to have quite substantial usage among women athletes” (Mustala 1967, 691). The author acknowledges, though, that “androgenic side effects” have not completely disappeared: “However, it has to be stressed that in long-term use of anabolic steroids androgenic side effects will appear in women, mostly menstruation disorders and lowering of voice” (691). It can be argued that steroids became so provocative in the international sports scene, in part because of these side effects.

In sport, women’s athletic success and muscular bodies have coexisted uneasily with broader societal gender norms. An essence of sex difference has been sought and the gender binary controlled for roughly eighty years, with ever-changing technical means (Ritchie 2003; Wackwitz 2003; Rand 2013). The history of sport therefore has included an uneasy assemblage of nature’s creativity in forming variable bodies, the appearance of athletic women’s bodies in public, and the Western cultural determination to impose a clear boundary between female and male bodies. The history of anabolic steroids in sport ties in to both the issue of sex segregation, promoted first and foremost by sex tests, and the regulation of performance-enhancing substances, or doping. The assumption that “men” competing as women would enjoy an unfair advantage has prompted a history of sex testing focusing on women. Ad hoc testing was conducted at least from 1936 onward, and more systematically from the mid-1940s. The methods entailed visual and manual examinations, including the infamous “nude parades,” genital exams, evaluation of secondary sex characteristics (e.g., hair patterns), and chromosome tests from 1967 onward, until the overarching tests were abandoned before the 2000 Olympic Games (Ritchie 2003). The latest innovation to control the boundaries of sex, launched in 2011 and challenged in 2015 by the Indian sprinter Dutee Chand, not only regulated the exogenous use of steroids and other drugs but set limits on the amount of endogenous production of testosterone in women’s bodies (Karkazis et al. 2012). This policy was enacted after South African runner Caster Semenya won, by a considerable margin, the 800-meter race at the Berlin IAAF World

Championships. After her victory, her muscular appearance raised suspicions about her sex (Wells and Darnell 2014).

Anabolic steroids were first tested during the 1976 Olympic Games. Because of the known “virilizing” effects they had on women if they were used in large amounts, the regulation of sex became part of the antidoping endeavor. For example, the German Democratic Republic (also known as the former East Germany) entered the Olympic Games in 1972 and departed with a medal count of sixty-six, superseded only by the much larger countries of the United States and the Soviet Union. Sports enthusiasts paid special attention to East German women, and the Americans were dismayed that after the 1976 Montreal Games, when anabolic steroids were tested for the first time, none of the East German athletes were caught.¹³ Suspicions were raised, as voiced by US competitors, because the East German women athletes “[didn’t] look exactly like they’re girls” and because “the only way you can tell it’s a woman is by their bust” (in Hunt 2011, 58–59).

Some sport researchers regard the positive anabolic steroid test of the Canadian hundred-meter-run gold medalist Ben Johnson at the 1988 Seoul Olympic Games as a kickoff to the subsequent growth of the antidoping regime (see, e.g., Hunt 2011, 80–84). It cannot be dismissed, however, that sex trouble was an indistinguishable part of the doping discussion, especially in relation to anabolic steroids (Beamish and Ritchie 2006, 40–44; Dimeo 2007, 85–86). Johnson’s muscular body also drew attention in the Finnish media. According to one newspaper article, a Finnish member of the Medical Commission of the European National Olympic Committees stated that Johnson’s muscular body cannot be taken to indicate his use of anabolic steroids: “Men can develop their muscles with fair means. . . . If a woman cannot be recognized as a woman judging by the body from behind, suspicions increase. Similarly a great deal of hair in the back and shoulders indicates a lot.”¹⁴ The visibility of the anabolic steroid effects was crucial, and these effects seemed to fuel sex trouble in sports publicity. A comment by an American steroids expert, who at the time was a physician crew chief of the US Olympic Committee Drug Education Program, illustrates this: “For the future Olympic Games, the widespread use of anabolic steroids and other synthetic anabolic hormones, especially in women ath-

¹³ On steroid use in East Germany and the United States, see Franke and Berendonk (1997), Ungerleider (2001), and Hoberman (2005).

¹⁴ Antti Virolainen, “Professori Herman Adlercreutz: Tämä on vasta jäävuoren huippu” (Professor Herman Adlercreutz: This is just the tip of the iceberg), Tuesday, September 27, 1988. No name of the publication; clip from the Archive of the Ministry of Foreign Affairs, signum 32.87, enclosed folder: EN antidoping agreement.

letes, will tend to alter these games into a circus, with the spectators scurrying around to get a peek at the freaks” (Taylor 1985, 36).

The Finnish public response at times followed Cold War lines, where Western nations questioned the credibility and fair play of women athletes from the Eastern Bloc if they had masculine-looking bodies.¹⁵ However, instead of only concerning women’s bodies, the disruption involved the bodily transgressions of the boundaries between female and male. Concern over the health effects of steroids on women were intertwined with curious remarks about persons whose bodies did not match either pole of the gender binary. A comment concerning a fellow contestant at the Mexico City Games of 1968 by athlete and researcher Brigitte Berendonk, who later revealed details of the East German doping regime, is telling: “She was huge. She had massive shoulders and arms. Her body had transformed since the last time we competed. She was clearly a she-man” (cited in Ungerleider 2001, 146; see also Hunt 2011, 53). Critics of anabolic steroids have certainly been sympathetic toward women athletes who used them without knowing about their effects. At the same time, such comments have conveyed contempt and disregard for bodies that do not match the cultural ideal of a gendered human.

This is also illustrated by an article in a Swedish evening newspaper that discussed Finnish physiology professor Kaarlo Hartiala’s antidoping work. The introduction to the article reads: “They become short in growth, short-armed, hairy—and explosively strong! Finnish sports physiologist Kaarlo Hartiala warns about what happens to male athletes who won’t stop using hormones.” This introduction is followed by the headline, in large letters: “Star athletes are soon going to look like gorillas!” (Ericsson 1977, 48). Later, when this piece of Swedish news attracted attention in Finland, Hartiala tried to explain to a Finnish newspaper that he had not mentioned gorillas in the interview (Salmenkylä 1977). Anabolic steroids, however, have continued to evoke monstrous imagery such as a gendered caricature of an athlete with both “female” and “male” characteristics (breasts and a beard) as well as animalistic or devilish characteristics such as horns.¹⁶ Such imagery highlights not only the gendered aspects of anabolic steroids but also the boundary making at stake, in which both human/animal and female/male boundaries seem to become precarious. The provocation in steroid use therefore concerned not only risks to health or fair play per se but also alarm

¹⁵ See, e.g., Ilkka (1974). For an analysis of this Western view elsewhere, see Wiederkehr (2010).

¹⁶ The caricature, drawn by Jukka Nissinen, appeared in the November 2, 1985, issue of *Helsingin Sanomat* (Helsinki times) on p. 25.

about the provocation to the strictly binary-sexed understanding of the human.

Case 3: Legal gender recognition and the regulation of bodily changes

In the examples above I have discussed attempts to use so-called sex hormones for purposes not directly related to “sex.” I conclude this article with an example in which the attempt to mold sex characteristics with hormone treatments has been purposeful rather than an inadvertent and unwanted side effect. However, in this example these treatments have also been seen as risks to society and in need of legislative restriction. This example concerns legislation governing gender reassignment in Finland in 2003. This legislation was a relative latecomer in the Nordic and European context, given that legislation on the issue arose, for example, in Sweden in 1972, in Italy in 1982, and in the Netherlands in 1985.¹⁷ The Finnish legislation was a result of decades of trans* activism, the aim of which was to make the treatment more equally available for all of those in need.¹⁸

However, there was another concern at the Medical Board of Health related to the preparation of this legislation. In 1987, this state body initiated a working group to prepare for legislation on gender recognition of transsexual persons. In cooperation, officials from the Ministry of Social Affairs and Health and the Medical Board of Health produced a first draft of a bill on the subject. However, this proposal never moved forward after its circulation for comments.¹⁹ In May 2001, a member of parliament who had previously worked for the Medical Board of Health spoke at the preliminary debate on the government bill: “A great problem was that there was a bunch of doctors who would start treating people who said they were transsexuals, for example, with hormone treatment, and their sex characteristics changed. . . . Women’s voices, for example, deepened, a beard started to grow, former men started to get breasts, etc. . . . Because of this we in the Medical Board of Health considered that somehow this should be organized, should be regulated, that this cannot be private entrepreneurship where everybody starts to treat these patients as they

¹⁷ HE 56/2001: Hallituksen esitys Eduskunnalle laiksi sukupuolen vahvistamisesta eräissä tapauksissa ja eräiksi siihen liittyviksi laeiksi (Government bill on the Act on Legal Recognition of Gender in Some Cases and Related Acts) 56/2001. <http://www.finlex.fi/fi/esitykset/he/2001/20010056.fidp3751296>.

¹⁸ This process has been analyzed in detail by Jan Wickman (2006, 2008).

¹⁹ HE 56/2001, 5.

wish.”²⁰ From the perspective of this state agency, then, treatments were to be controlled. What is significant is that in many other cases, the risks of hormone treatments have come to be seen through a neoliberalist consumer discourse that regards a person as responsible for making choices about her or his own health and about the risks of any treatment. This is the case, for example, in the treatment of menopause.²¹ However, medical gender-reassignment treatments were not allowed to be performed under the banner of “private entrepreneurship” to the same extent.²² In the Finnish case, the welfare state took on the task of regulating the treatments and their risks. An important point here, as the quotation above suggests, is that having an ambiguously sexed body was perceived as a risk.

According to the 2003 legislation, gender-reassignment treatments are to be conducted in special health care units in two public hospitals. The cost of the treatments, if one manages to acquire approval, is therefore much lower than in the United States, which relies on private medical care. However, the process for procuring treatment in Finland is also more systematically controlled nationwide.²³ In order to correct legal gender status, a person must be over eighteen and a Finnish citizen or resident. The involvement of medicine is crucial, since correcting legal gender status also requires a medical statement declaring that the person believes that they permanently belong to a gender other than the one assigned at birth, that the person lives in the role of this gender, and that the person has been sterilized or for some other reason is unable to reproduce.²⁴

Hormone treatment is not directly regulated by the law, but it is implied in that gender-reassignment hormone treatment is accepted as proof of sterilization. In addition, living in the role of and “passing” as the desired identity is assumed to entail receiving hormone treatment. A Social Affairs and Health Ministry decree regulates the organization of gender-reassignment treatment. According to the so-called Trans Decree, a multiprofessional working group led by a psychiatrist is responsible for the

²⁰ See PTK 50/2001 vp, 14. Minutes of the preliminary debate in the Finnish parliament on the government bill on the Act on Legal Recognition of Gender in Some Cases and Related Acts (<https://www.eduskunta.fi/FI/vaski/sivut/trip.aspx?triptype=ValtiopaivaAsiakirjat&docid=PTK+50/2001+ke+p+10>). For an account of trans* history in Finland and the treatments during the time period considered (the 1980s), see Suhonen (2007).

²¹ See, e.g., Murtagh and Hepworth (2003).

²² PTK 50/2001 vp, 14.

²³ For an account of the US situation, see, e.g., Bettcher (2014).

²⁴ Trans Act 563/2002: Laki transseksuaalin sukupuolen vahvistamisesta (Act on Legal Recognition of the Gender of Transsexuals) 563/2002 (<http://www.finlex.fi/fi/laki/alkup/2002/20020563>).

organization of gender-reassignment treatment in each hospital. Hormone treatment can begin after “sufficient psychiatric examination has found that the preconditions of hormone treatment are fulfilled.”²⁵ The treatment first includes a research period of a minimum of six months, after which the diagnosis is made. Thereafter, the person is expected to begin the so-called real-life test, which is required to show that the person lives in his or her sex role.

Since only two special units exist (in a country of approximately 5 million), getting sex-reassignment treatment is also a matter of getting along with the available doctors. Freedom to choose the treatment and doctor, and bypassing the public health care system, most often entails a trip abroad and reliance on private markets, which requires wealth not attainable by most Finnish trans* persons.²⁶ A significant difficulty is that hormone treatments are begun only at the start of the so-called real-life test, even though the treatments need more time to be effective in order for the person to pass. In other words, proving to the system that one qualifies in one’s sex role is difficult if one has not begun treatment earlier. Therefore, many transsexual persons try to get hormone treatment from private health care before undergoing the process, but this is not necessarily an easy task.

In Finland, diagnoses are made according to the *International Statistical Classification of Diseases and Related Health Problems*, published by the World Health Organization. The version in use includes a diagnosis for both transsexuals and transgender persons. A challenge from a transgender perspective is acquiring treatments when, as an end result, the person’s body does not match either pole of the gender binary (Trasek 2015). Transgender persons have not fit easily into the FtM or MtF “trans narrative” maintained by the Finnish expert discourse and the treatment practices (Tainio 2014, 23–24, 35, 41).

This situation is not unique to Finland. In a provocative spirit, feminist scholar Beatriz Preciado has even suggested, with regard to the difficulty of getting hormone treatments in different parts of the world, that “freely circulating and collectively used testosterone is dynamite for the heterosexual regime” (2013, 230). What Preciado implies is that health

²⁵ Trans Decree 1053/2002: Sosiaali- ja terveystieteiden ministeriön asetus sukupuolen muuttamiseen tähtävään tutkimukseen ja hoidon järjestämisestä sekä lääketieteellisestä selvityksestä transseksuaalin sukupuolen vahvistamista varten (Social Affairs and Health Ministry decree on the organization of gender-reassignment examination and treatment and the medical report for the legal recognition of the gender of transsexuals) 1053/2002 (<http://www.finlex.fi/fi/laki/alkup/2002/20021053>).

²⁶ For an account of the difficulties trans* persons face when attempting to earn an average income, see Huuska (2002).

care practices in many Western countries allow gender-reassignment treatments more readily to persons who identify as either women or men. In the case of Finland, the Medical Board of Health's initial concern was precisely to regulate the treatments so that they would not result in ambiguously sexed bodies, enabled, in particular, by hormone treatments. Even if the initial proposal changed in the long legislative process, the spirit of the law and the practices of the treatment still enforce the binary of sex. Such regulatory practices speak to the tension related to hormone treatments: while sex hormone products have enabled the considerable fluidity of sex and increased the production of bodies that do not fit within the binary of female and male, societal restrictions, from doping regulations to gender-reassignment legislation, work to inhibit the sex trouble that lurks behind the free use of steroids.

Concluding remarks

In principle, from the perspective of sex transformations, the history of sex hormones can be read in two major ways. First, the emphasis can be put on the constant return of the norm, the reiteration of binary sex via legislation and other social regulations. However, I wish to follow the other possibility and stress the constant challenge and societal negotiation that sex hormones have brought about during the past century. From this perspective, it seems that over and over again, sex hormones' potential—to enable the chemical modification of sex—has inspired and mobilized ever new groups of humans to act. In some cases, such as in the history of menopause treatment, sex transformations with steroids seem not to have involved much public scandal. In other cases, various uses of steroid products have fueled a public proliferation of bodies that have challenged and provoked the binary of two sexes. In addition to an account of medical discussion about menopause treatment in the 1960s, I have explored two cases, elite sports and gender-reassignment legislation.

I hope that this exploration will inspire, first, a revisitation to the history of sex hormones, which could open up questions about tensions within and challenges to the binary of two sexes. I suggest that the history of sex hormones has consisted of various medical and societal struggles over the sex binary. These struggles have resulted from a tension between the many-faceted potential of so-called sex hormones and the possibilities of science in using this potential versus attempts to hold on to the binary of sex. Along with the critique of pharmaceutical companies and the medicalization of different spheres of life, it is important to see how steroid chemistry and hormone treatments have been part of this recurring challenge. Moreover, in

addition to the necessary focus on the health risks of hormone products, it is important to recognize that steroids have been seen as risky not only because of health reasons but also because they have helped to produce bodies that have not fit this binary.

Second, I hope that this exploration will raise discussion about the relation between political science and material feminisms. While politics has been referred to in a few cases within material feminist texts, there are very few accounts that attempt to relate material feminist understandings of the activities of matter to political science understandings and definitions of politics. A notable exception is Jane Bennett, whose work I have been inspired by but whose account of politics, in my opinion, needs to be slightly revised regarding steroids. I argue that in the case of steroids, it makes more sense to understand politics as disruption and provocation rather than to connect the definition of politics to nonhuman subjectivity, as Bennett and Myra Hird seem to do. This is because arguing for the subjectivity of nonhuman phenomena risks endless debate about whether (and in which sense) these different “matters” really “act” and whether such action is merely imposed by human meaning making.²⁷ In recent feminist studies, an opposition has even been created between poststructuralist and material feminist approaches, in which material feminists call for an acknowledgment of the agency of various nonhuman matters, and poststructuralist feminists criticize these calls. I find such polarizing opposition to be problematic and unnecessary.²⁸

I suggest that, if we are to understand sex hormones as enactments that relate to the politics of sex, then arguments within recent science studies will be of help. These include, in particular, Annemarie Mol’s contention that no matter ever acts by itself, in the sense that it never acts *alone*: “it may well be that matter acts, but what it is able to *do* inevitably depends on adjacent matter that it may do something *with*” (2013, 380). Aligning with this perspective, I contend that steroid provocations are not acts by steroid molecules “alone.” Instead of independent molecules, steroid actions are, using Karen Barad’s terminology, “phenomena,” and steroids are nonindependent “parts” of apparatuses that include various nonhuman and human materialities and actions (Barad 2007; see also Irni 2013c).

Humans certainly play a critical role in producing steroid provocations: without scientists, synthetic hormone products such as anabolic steroids would not exist; without a demanding sports public and sportive nation-

²⁷ Examples about this debate include Barad (2003), Ahmed (2008), Davis (2009), Kirby (2011), and Sullivan (2012).

²⁸ For a critical analysis of this opposition, see Irni (2013a, 2013b).

alism, a need for medically assisted athletic performances would not exist; without binary imaginaries of sex, there would not be any public provocation or legislative projects dictating sex even if ambiguously sexed bodies were to proliferate. All the same, humans did not achieve these steroid provocations alone. As we are repeatedly reminded by recent material feminist accounts, like other matter, steroid molecules could not be modified exactly as scientists pleased.²⁹ One of the reasons why steroids were able to provoke the binary imaginary of sex was that a perfect anabolic steroid could not be manufactured. Effects on sex, so to speak, persisted, meaning that activating growth and other effects on “nonsexual” body parts could not be distinguished from the effects on body parts perceived as sex characteristics. Even if a sports doctor in 1960s Finland suggested that only 1/500 of the androgen effect remained, it still entailed a risk to the binary of sex.

The scope of the regulations provoked by these little molecules and their various usages remains a subject for further research. Not just any substance, however, could have such an effect on the regulation of sex: steroids’ ability to enact transformations to visual appearances of sex has been pivotal. If we wish to claim a significance of sex hormones within feminist and queer politics, their significance lies, at least in part, in their potential to disrupt the binary of sex, to produce sexes that do not conform, and to inspire usages that do not always align with the majority understanding of the purposes of these hormone products. In the efforts to regulate steroid use in ever new ways, more is at stake than the power of regulation per se. The history of sex is also a history of repeated provocations, in which the specific enactments of the phenomena called sex hormones have been indispensable. Rather than self-evident, the binary of two sexes has been repeatedly challenged, and the hormonal modifiability of bodies is a vital process that has enabled such challenges. From this perspective, it is possible to explore the history of sex as a history of steroid provocations.

Gender Studies Program
University of Turku

References

- Ahmed, Sara. 2008. “Open Forum, Imaginary Prohibitions: Some Preliminary Remarks on the Founding Gestures of the ‘New Materialism.’” *European Journal of Women’s Studies* 15(1):23–39.
- Alaimo, Stacy, and Susan Hekman, eds. 2008. *Material Feminisms*. Bloomington: Indiana University Press.

²⁹ See, e.g., Birke (2003), Barad (2007), Davis (2009), and Bennett (2010).

- Barad, Karen. 2003. "Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter." *Signs: Journal of Women in Culture and Society* 28(3):801–31.
- . 2007. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Durham, NC: Duke University Press.
- Beamish, Rob, and Ian Ritchie. 2006. *Fastest, Highest, Strongest: A Critique of High-Performance Sport*. New York: Routledge.
- Bennett, Jane. 2010. *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.
- Bettcher, Talia Mae. 2014. "Trapped in the Wrong Theory: Rethinking Trans Oppression and Resistance." *Signs* 39(2):383–406.
- Birke, Lynda. 2003. "Shaping Biology: Feminism and the Idea of 'the Biological.'" In *Debating Biology: Sociological Reflections on Health, Medicine and Society*, ed. Simon J. Williams, Lynda Birke, and Gillian A. Bendelow, 39–52. London: Routledge.
- Burstein, Josef. 1960. "Hormoner och ateroskleros" [Hormones and atherosclerosis]. *Finska läkarsällskapets handlingar* [Papers of the Finnish Medical Association] 120(1):96–104.
- Butler, Judith. 1990. *Gender Trouble: Feminism and the Subversion of Identity*. London: Routledge.
- Davis, Noela. 2009. "New Materialism and Feminism's Anti-biologism: A Response to Sara Ahmed." *European Journal of Women's Studies* 16(1):67–80.
- Dimeo, Paul. 2007. *A History of Drug Use in Sport, 1876–1976: Beyond Good and Evil*. London: Routledge.
- Edkins, Jenny. 1999. *Poststructuralism and International Relations: Bringing the Political Back In*. Boulder, CO: Rienner.
- Ericsson, Lars. 1977. "Idrottsstjärnorna kommer snart att se ut som gorillor!" [Star athletes are soon going to look like gorillas!]. *Se* [See], January: 6–7, 48.
- Fausto-Sterling, Anne. 2000. *Sexing the Body: Gender Politics and the Construction of Sexuality*. New York: Basic.
- Franke, Werner W., and Brigitte Berendonk. 1997. "Hormonal Doping and Androgenization of Athletes: A Secret Program of the German Democratic Republic Government." *Clinical Chemistry* 43(7):1262–79.
- Freud, John. 1936. "Over Geslachtshormonen" [On sex hormones]. *Chemisch Weekblad* [Chemical weekly] 33(4)3:1–14.
- Halberstam, Judith. 1998. *Female Masculinity*. Durham, NC: Duke University Press.
- Haraway, Donna. 2008. *When Species Meet*. Minneapolis: University of Minnesota Press.
- Hird, Myra J. 2009. *The Origins of Sociable Life: Evolution after Science Studies*. Basingstoke: Macmillan.
- . 2013. "Waste, Landfills, and an Environmental Ethic of Vulnerability." *Ethics and the Environment* 18(1):105–24.
- Hoberman, John. 2005. *Testosterone Dreams: Rejuvenation, Aphrodisia, Doping*. Berkeley: University of California Press.

- Houck, Judith. 2006. *Hot and Bothered: Women, Medicine, and Menopause in Modern America*. Cambridge, MA: Harvard University Press.
- Hunt, Thomas. 2011. *Drug Games: The International Olympic Committee and the Politics of Doping, 1960–2008*. Austin: University of Texas Press.
- Huuska, Maarit. 2002. “Transihmiset—sukupuoleltaan moninaiset työelämässä” [Trans persons—gender diversity in working life]. In *Seksuaali- ja sukupuoli-vähemmistöt työelämässä* [Sexual and gender minorities in working life], ed. Jukka Lehtonen, 31–40. Helsinki: STAKES.
- Ilkka, Tapani. 1974. “Väitteet eivät yllätä, Svenssonihan tietää . . .” [Allegations don’t surprise, surely Svensson knows . . .]. *Ilta-Sanomat*, August 24, 28.
- Irni, Sari. 2013a. “Kun jälkistrukturalismi kohtaa luonnontieteistä inspiroituneen uusmaterialismin: Herkän luennan harjoitus” [When poststructuralism meets natural science-inspired new materialism: An exercise in sensitive reading]. *Naistutkimus-Kvinnoforskning* [Women’s studies] 26(4):5–16.
- . 2013b. “The Politics of Materiality: Affective Encounters in a Transdisciplinary Debate.” *European Journal of Women’s Studies* 20(4):347–60.
- . 2013c. “Sex, Power and Ontology: Exploring the Performativity of Hormones.” *NORA: Nordic Journal of Feminist and Gender Research* 21(1):41–56.
- Jokisipilä, Markku. 2006. “Maple Leaf, Hammer, and Sickle: International Ice Hockey during the Cold War.” *Sport History Review* 37(1):36–53.
- Karkazis, Katrina, Rebecca Jordan-Young, Georgiann Davis, and Silvia Camporesi. 2012. “Out of Bounds? A Critique of the New Policies on Hyperandrogenism in Elite Female Athletes.” *American Journal of Bioethics* 12(7):3–16.
- Kirby, Vicki. 2011. *Quantum Anthropologies: Life at Large*. Durham, NC: Duke University Press.
- Marks, Lara. 2010. *Sexual Chemistry: A History of the Contraceptive Pill*. New Haven, CT: Yale University Press.
- Marres, Noortje. 2013. “Why Political Ontology Must Be Experimentalized: On Eco-Show Homes as Devices of Participation.” *Social Studies of Science* 43(3): 417–43.
- Mol, Annemarie. 2013. “Mind Your Plate! The Ontonorms of Dutch Dieting.” *Social Studies of Science* 43(3):379–96.
- Murtagh, Madeleine J., and Julie Hepworth. 2003. “Menopause as a Long-Term Risk to Health: Implications of General Practitioner Accounts of Prevention for Women’s Choice and Decision-Making.” *Sociology of Health and Illness* 25(2):185–207.
- Mustala, Olli. 1967. “Lääkeaineet urheilijoiden suorituskyvyn parantajina” [Pharmaceuticals improving the performance of athletes]. *Suomen Lääkärilehti* [Finnish medical journal] 1967(22):690–95.
- Oudshoorn, Nelly. 1994. *Beyond the Natural Body: An Archeology of Sex Hormones*. London: Routledge.
- . 2003. *The Male Pill: A Biography of a Technology in the Making*. Durham, NC: Duke University Press.

- Preciado, Beatriz. 2013. *Testo Junkie: Sex, Drugs, and Biopolitics in the Pharmacopornographic Era*. Translated by Bruce Benderson. New York: Feminist Press.
- Rako, Susan. 1999. *The Hormone of Desire: The Truth about Testosterone, Sexuality, and Menopause*. New York: Three Rivers.
- Rancière, Jacques. 1999. *Disagreement: Politics and Philosophy*. Translated by Julie Rose. Minneapolis: University of Minnesota Press.
- . 2013. *The Politics of Aesthetics: The Distribution of the Sensible*. Translated by Gabriel Rockhill. London: Bloomsbury.
- Rand, Erica. 2013. “Court and Sparkle: Kye Allums, Johnny Weir, and Raced Problems in Gender Authenticity.” *GLQ: Journal of Lesbian and Gay Studies* 19(4):435–63.
- Rantala, Kalle. 2011. “Keinoja kaihtamatta’: Huippu-urheilun modernisoituminen 1900-luvulta nykypäivään ja Suomen Olympiakomitea osana muutosta” [“By hook or by crook”: The modernization of high performance sport from the twentieth century to the present and the Finnish Olympic Committee as part of the change]. MA thesis, University of Eastern Finland.
- Ritchie, Ian. 2003. “Sex Tested, Gender Verified: Controlling Female Sexuality in the Age of Containment.” *Sport History Reviews* 34(1):80–98.
- Roberts, Celia. 2007. *Messengers of Sex: Hormones, Biomedicine and Feminism*. Cambridge: Cambridge University Press.
- Salmenkylä, Matti. 1977. “Hartiala oikaisee Se-lehteä: Urheilugorilloista ei pidä puhua” [Hartiala corrects *See Magazine*: One should not talk about sport gorillas]. *Iltä-Sanomat*, February 7, 19.
- Satzinger, Helga. 2012. “The Politics of Gender Concepts in Genetics and Hormone Research in Germany, 1900–1940.” *Gender and History* 24(3):735–54.
- Sengoopta, Chandak. 2006. *The Most Secret Quintessence of Life: Sex, Glands, and Hormones, 1850–1950*. Chicago: University of Chicago Press.
- Soiva, Keijo. 1961. “Klimakterium ja sen hoito” [Climacterium and its treatment]. *Suomen Lääkärilehti* [Finnish Medical Journal], no. 13: 699–721.
- Suhonen, M. 2007. “Transsukupuolisuuden näkymätön historia” [An invisible history of trans*]. In *Sateenkaari-Suomi: Seksuaali- ja sukupuolivähemmistöjen historiaa* [Rainbow Finland: Histories of sexual and gender minorities], ed. Kati Mustola and Johanna Pakkanen, 53–65. Helsinki: Like.
- Sullivan, Nikki. 2012. “The Somatechnics of Perception and the Matter of the Non/human: A Critical Response to New Materialism.” *European Journal of Women’s Studies* 19(3):299–313.
- Tainio, Luca. 2014. “Naiseuden, mieheyden ja trans*sukupuolisuuden diskursiivinen rakentuminen sukupuolenkorjausprosessia koskevassa asiantuntijapuheessa” [The construction of women, men and trans* in expert discourse on sex reassignment process]. MA thesis, University of Tampere.
- Tamminen, Sakari. 2012. “Tieteentutkimuksesta yhteiskunnan uudenlaiseen kokoonpanoon: Latourilainen kosmopoliittikka ja yhdessä elämisen vaikeus” [From

- science studies to a new societal collective: Latourian cosmopolitics and the difficulty of living together]. *Tiede and Edistys* [Science and progress], no. 2: 117–41.
- Taylor, William. 1985. *Hormonal Manipulation: A New Era of Monstrous Athletes*. Jefferson, NC: McFarland.
- Topo, Päivi. 1997. “Dissemination of Climacteric and Postmenopausal Hormone Therapy in Finland: An Example of the Social Shaping of a Medical Technology.” Research Report no. 78. STAKES, Helsinki.
- Trasek (Finnish Association for Transgender and Intersex Rights). 2015. “Sukupuolenkorjaus” [Sex reassignment]. <http://trasek.fi/perustietoa/sukupuolenkorjaus/>.
- Ungerleider, Steven. 2001. *Faust’s Gold: Inside the German Doping Machine*. New York: Dunne.
- Vaittinen, Tiina. 2014. “The Power of the Vulnerable Body: A New Political Understanding of Care.” *International Feminist Journal of Politics* 17(1):100–118.
- Vehviläinen, Marja. 2014. “Syömisen politiikka arjessa” [Everyday politics of eating]. In *Muokattu elämä: Teknotiede, sukupuoli ja materiaalisuus* [Molded life: Technoscience, gender, and materiality], ed. Sari Irni, Mianna Meskus, and Venla Oikonen, 305–41. Tampere: Vastapaino.
- Wackwitz, Laura. 2003. “Verifying the Myth: Olympic Sex Testing and the Category ‘Woman.’” *Women’s Studies International Forum* 26(6):553–60.
- Wells, Sandy, and Simon C. Darnell. 2014. “Caster Semenya, Gender Verification and the Politics of Fairness in an Online Track and Field Community.” *Sociology of Sport Journal* 31(1):44–65.
- Wickman, Jan. 2006. “Lagen, medicinen och definitionen av kön: Byte av juridiskt kön som hälsovårdsåtgärd” [The law, medicine and the definition of sex/gender: Change of legal gender as a health care measure]. In *Det sunda livets tränga ramar: Essäer om det socialt konstruerade könet* [The narrow limits of a sound life: Essays on socially constructed gender], ed. Sirpa Wrede and Elina Oinas, 169–91. SSKH Skrifter 22. Helsinki: Swedish School of Social Science, University of Helsinki.
- . 2008. “Hur handlingsmiljön formar activism: Transgenderdiskurser I Finland och USA på 1990-talet” [How the opportunity structure shapes activism: Transgender discourses in Finland and the United States in the 1990s]. In *Social samhörighet och religion* [Social cohesion and religion], ed. Lise Kanckos and Ralf Kauranen, 281–99. Åbo: Åbo Akademi University Press.
- Wiederkehr, Stefan. 2010. “‘If Jarmila Kratochvilova Is the Future of Women’s Sports, I’m Not Sure I’m Ready for It’: Media, Gender and the Cold War.” In *Euphoria and Exhaustion: Modern Sport in Soviet Culture and Society*, ed. Nikolaus Katzer, Sandra Budy, Alexandra Köhring, and Manfred Zeller, 315–35. Frankfurt: Campus.