Muscle Memory

I run my fingers along the calluses on the pads of my palms when I walk around the city or pause typing at my computer. It's a new nervous tick I've developed, feeling the mutant skin on the top of my palm with the edge of my thumb. The new skin is hard and cracks easily, and if I don't keep it up it starts to peel off and flake away. It's an extra layer of toughness that seems completely foreign to the othter parts of my body, or even my personality. I think of them as my cat paws, formed by grip on metal.

I heard that professional weightlifters have to cut their own calluses off regularly so they don't tear and bleed during competitions. Some do it themselves and others have it done. It's like getting one's nails done, part of the maintenance. To build up the skin-paw and then remove it, the body's micro-regeneration of shedding or producing skin under stress.

I started weightlifting in Vancouver at the suggestion of my boyfriend who had heard me complain about my shoulder pain for years. He knew a trainer who had group sessions in a garage nearby, and Monday night was women's night. So I started lifting weights with this kind man and his small group of trainees: a corporate manager, a librarian and a marketing executive who was 6 months pregnant. It was a relaxed atmosphere and these women who didn't look at all like bodybuilders were really strong. The gym was DIY and bare-bones, with some books on nutrition and a Debbie Harry poster.

I was especially impressed by the strength of my pregnant colleague. She wasn't doing squats anymore but could do cleans and deadlifts. She was probably 5'2" and could deadlift twice her body weight, including her fetus. She threw the rubber-rimmed Olympic plates on her bar down with total abandon. I watched her pull the bar off the ground, its steel line bending from the weight on its ends and pull it up to her waist in perfect form, just up to the edge of her round belly. She wore full but natural-looking make-up, her hair smoothly pulled back and huge round pearl earrings. She told me that weightlifting changed her life and given her confidence she had never felt, and she was not going to stop until she had to, to give birth. And then she would start again. She and our trainer were like conspirators, sharing articles about the benefits of weightlifting for pregnant women, debunking the common belief that she could endanger herself or her baby. She was even getting pressure from her in-laws to stop, they felt it wasn't proper.

This supportive women's group was hard to replicate when we left town, and in Germany I just signed up for the cheapest, and therefore cheesiest gym in town. I don't like it at all, the smell and the images and mirrors everywhere and the flexing. The weights are in the basement which has been decorated with vinyl prints of graffiti-covered back-alley brick walls, photos of muscular gleaming men shoveling coal into a fiery pit and randomly placed dividers of chain-link fence. "The Cage." Maybe it is meant to make you feel elemental, or provoke the sense that you are about to be jumped in a back alley and therefore need to summon your strength to fight, to induce your fight-or-flight mode. Vague danger, vague masculinity. I don't like the place but I like the focus it requires for me to ignore it, that it makes me shut out the external, like a horse with blinders on.

When I first started going I was always the only woman in the weightlifting basement, and men would come up to me wanting to give me some suggestion or correct my form. I don't think I needed to be corrected. One even told me I didn't need to work out. There has to be a better way to pick someone up at a gym than telling them they don't need to be there. But lately there are more women in the weight room, one or two others every time I go. Maybe, because I am getting stronger, the dudes don't approach me anymore. Or maybe it's because I invested

in a 20 EUR pair of blue-tooth headphones so that I can listen to music, not hear anyone else, and avoid all eye contact.

I do become more macho in this atmosphere; it's kind of embarrassing actually. I get really annoyed when I can't reach a target, and I feel tough when I am lifting more then the dude next to me. But mostly I try to cultivate total detachment and the blankest expression possible, listen to Huggy Bear and Nicki Minaj, and count down the sets. I alternate between sets of exercises, 5 set of 5 reps with 90 to 180 seconds between them, the time and pressure pre-programmed so I only need to focus on the feeling.
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I was never one for endurance sports; it takes too long to get relief. Weightlifting provides short intense spurts of pressure and release, pressure and release. It's the same every time, with a slight addition of weight; an exercise in summoning an intensity of will repeatedly, knowing it will be over soon. A regimen: the soreness of muscles is the reward, that extra sensation or ease you feel, surprised, when engaged in some other activity.

There is a theory that it isn't how many reps you do, but how much time your muscles spend under tension. So if you did one rep extremely slowly, rather than 10 quickly you could have a similar effect. It could be the cumulative duration of the body under duress rather than repetition of movement.

It makes me think about how someone once explained to me how a photographic exposure works: it's like filling up a bucket with a hose, and determined by how high you turn on the faucet. You can either open the shutter for a longer period, with a smaller aperture (a dribble), or for a shorter period with a larger aperture (full blast). With either more time or more intensity, the bucket is eventually filled. The results of the exposure will vary, because of other factors like the tone of the light or the movement of the subject or camera. The focus differs, and different traits become more or less visible.
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The workout happens as a calculated balance between damage and the regenerative potential of that damage. It's about setting up the situation for stress, and giving yourself a temporary dose of pain, feeling things constrict. To get close to injury, in order to prevent it an unknown point in time or in a part of your body you will never see, something on the cellular level.

The energy that muscles use to perform work is generated within each muscle cell. The conventional wisdom is that muscle is formed by micro-tears in its tissue, which simulates muscle cells to repair and grow. This along with protein synthesis, and many other processes I don't really understand, results in muscle growth. The growth actually happens when you rest, as repair.

When you start lifting weights, you make gains quickly. Mostly you aren't building muscle, but learning how to activate your nervous system. Groups of muscle cells combine into fibers, which combine into motor units, and group by the thousands to form each muscle. The brain sends a signal to a motor unit to contract; in the absence of a signal the muscle relaxes, slack. Your body gets better at activating these connections, and you improve quickly as your nervous system becomes more efficient and you activate more of what you already have.

The difference between a trained and untrained person is the efficiency with which they can activate their nervous systems. If both are lifting the heaviest weight they are capable of lifting, it actually takes the trained person longer to recover because they are using more of their capability, frying more of their muscle, and causing more damage.

Heavier weights tax the nervous system more, lighter weights are used for endurance and training the metabolic system. Most weightlifters try to strike a balance, but bodybuilders, who are most concerned with the sculpting of their forms, use methods that focus on increasing muscle size at the expense of maximal strength gains. There are always many processes happening at once.
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It is an essentially excessive activity, to choose to intentionally stress the body to the point of its breakdown. In urban life, the gym recreates the effects on the body of moving boulders around, carrying sacks of potatoes, chopping wood, running from lions, or whatever it was our ancestors did before we developed the plush convenience of our cities. The unconscious groans and gasps that emerge at the bottom of a lift seem to confirm this. Now it's an antidote to the position of our bodies at desks, in front of screens where everything comes in to us by effortlessly tapping our fingers.

I've had many conversations wherein someone has the idea that the energy crisis could be solved if only the human exertion which happens in gyms could be harnessed; if all of that energy going out, that sweat in the service of individual health and appearance could only be bottled to power our grids. Solve global warming out of our determination and endurance alone, using our individual internal combustion engines, and we would even get fit in the process. But the renewable energy of our cells doesn't leave the body, it can't be extracted like oil or coal.

The film *Pumping Iron II: The Women* (1985) opens with a sunrise sequence of a hydro-electric dam and art-deco power plant in the Nevada hills. The camera scans pumping generators, then moves to power lines which branch out into the barren landscape. Lightning flashes in the distance. The light turns from purple to orange, and Las Vegas glimmers from afar. A bird's eye view fades in of highway commuters on their way into the city, their taillights red in the early morning light.

The camera enters the city, pauses on abstract details of flashing neon on The Strip, then fades into the interior of a tanning bed bathed in ultraviolet light. It focuses first on a rotating hand, veins exaggerated in the blue light, then moves up the arm and across a prone female body. The woman adjusts her protective goggles and close-ups of her muscular form are montaged with shots of the flashing neon outside. The networks of power and electricity converge on the body at rest, charging itself like a battery.

Pumping Iron II: The Women was made after the success of *Pumping Iron* (1977), a documentary about the Venice Beach bodybuilding scene starring Arnold Schwarzenegger which popularized the sport. In it, the future governor of California describes the orgasmic "Pump" he gets while working out, makes an argument that bodybuilders are artists who sculpt themselves, and smokes joints in his "Arnold is Numero Uno" t-shirt.

The plot of *Pumping Iron II: The Women* doesn't focus on a singular personality, but on a group of competitors and the opposing views of contest judges as to what a female bodybuilding competition should promote. The crux of the conflict is what to value and reward: traditional femininity or muscle mass. This is before the widespread use of steroids in women's bodybuilding, but the fear of extreme bodily modification and possible gender slippage looms over the narrative. As the women describe their routines and self-presentation it is clear how thin the line of acceptability is, and they talk openly about balancing the appearance of their bulging muscles with make-up and hairstyle, how they think about female beauty and when they know to stop doing certain exercises to avoid getting too big. From IMDB:

Now, experience PUMPING IRON II: THE WOMEN, a film that is changing the way the world views the female physique-creating "a new definition of the female form."

Join four women as they prepare for the 1983 Caesars Palace World Cup the almost manly, super-muscular Bev Francis, Rachel's toughest competition; and newcomers Lori Bowen and Carla Dunlap. Four women who have devoted their lives to the pursuit of their conception of the "perfect" female form, spending grueling hours torturing themselves on Nautilus machines and browning themselves under tanning lamps. Learn their personal struggles and public triumphs that make up their unique world as they struggle both with their bodies' limitations and the world's limitations on what that body ought to look like. If muscles make a man "masculine," what do they make a woman?
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In researching how muscle actually grows, I come across science that I either failed to learn in 10th grade biology, or have selectively forgotten in the years since. Inside muscle cells (and most cells) are mitochondria, which generate the energy to power the cell. Scientists believe mitochondria were once free-living organisms, similar to bacteria. At some point a mitochondria was engulfed by another ancient cell which then evolved to become more complex life forms. They are described as the "powerhouse of the cell" and are involved in signaling, cellular differentiation, cell death, and control of the cell cycle and cell growth. The health of mitochondria is implicated in many human diseases. High intensity exercise like weightlifting increases the efficiency of mitochondria in muscle cells and stimulates them to multiply, which they do asexually by cloning.

Mitochondria have their own DNA, separate from nuclear DNA. In most species, including haumans, mitochondrial DNA is inherited solely from the mother and barring rare mutations in germ cells, is identical between a mother and her offspring. While both male and female children have their mother's mitochondrial DNA, it is passed on only through females, and so can be used to directly trace matrilineal lines.

There is a theory in human genetics, first proposed in the 1980's, which has been named "Mitochondrial Eve" by the media, sometimes referred to as the "Lucky Mother" by researchers. She is the matrilineal most common recent ancestor of all currently living humans, in an unbroken line, on their mother's side. Mitochondrial DNA was passed to us by our mothers, which they received from their mothers, and so on, back until all lines converge on one woman, who is estimated to have lived approximately 100,000–200,000 years ago. She wasn't the first human female as her biblical namesake would imply; she bears the title because the mitochondria in every human cell alive today were at some point her mitochondria.

She most likely lived in East Africa, when Homo sapiens sapiens (anatomically modern humans) were developing as a population distinct from other human sub-species. Research into mitochondrial DNA has been used to support and prove the African origin of humans and trace migration into the rest of the world through various mutations over time.

Mitochondrial DNA doesn't determine your hair or eye color. It contains codes for making proteins and instructions for carrying out the work of the mitochondria, like energy generation, cellular regulation and muscle growth. It is common data passed down, somehow traceable to a single woman despite the incredible complexity of human evolution over hundreds of thousands of years.

As information in your cells, this DNA inherited from your mother, grandmother, and so on, is embedded in your mitochondria, which produce energy and multiply as you strain your body. Like the calluses that grow as records of exertion, to strengthen and protect the skin, the muscular system becomes more resilient when stressed. A matrilineal form of memory on the cellular level instructs it, an immense record kept in the body.

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