Books

Birthday Suit

What you want to know about the organ that tells all

Review by Natalie Angier

SKIN:
A Natural History
By Nina G. Jablonski
University of California Press | $24.95

Not long ago I was backpacking through the majestic Sawtooth Mountains in Idaho, feeling fit and fine and in the first blush of peacock as I bounced downhill at the head of our party of four. But it is a short hop from swagger to stagger, and so it was that, just as I reached the trail's end, my foot caught in a tree root and I went flying toward the ground. With my 35-pound pack augmenting the forward momentum, I had no choice but to land flat on my belly and then crack my forehead against a rock for good measure.

Several weeks later, the aches and pains are long gone, but I still have bruises the size of lamb chops on all four limbs, and a hairline scar that looks like the hood ornament for a Mercedes Benz. "What happened to *you?*" people will ask, sounding both concerned and vaguely accusatory. "Is this your idea of going on *vacation?*"

The skin may or may not deserve its familiar billing as the "largest organ of the body." As Nina Jablonski points out, the deeply furrowed mucosal lining of the intestines has a greater total surface area than the skin, and the aggregate mass of the body's skeletal muscle outweighs that of the skin. But what surely remains beyond dispute is that the skin has the biggest mouth. It tells the world what a klutz you can be and it brays the "-something" of your age. When you are scared, the skin tips your hand by blanching suddenly; when you're angry, it reddens indiscriminately; when embarrassed, selectively. The complexion of a sick person may look sallow or gray or gluey, while that of a lifelong smoker or sunbather will have all the appeal of a Naugahyde barstool.

Our skin hints as well of our prelife, of who our ancestors were and from what biome they hailed. It informs our decision about which box we should check on official government forms and, all too often, which social circle we will join. Its relative melanic content can determine how closely we are watched by store clerks and state troopers, or even whether we are at risk of becoming a cinematic cliché: the National Organization for Albinism and Hypopigmentation recently issued a press release, reprinted in *Harper's* magazine, complaining of the frequency with which movies "featured an evil albino" as "a hackneyed plot device." Our skin may be thick or thin, we may feel comfortable in it or not, but we can never jump out of it, for this most public of body tissues is also the source of our deepest privacy, of our organismal autonomy. The skin serves as the great divide between self and nonself, us

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and other. It is, in fact, an essential component of the body's immune system, a complex mechanical and biochemical barrier to all the ambient pathogens and bloodsuckers and mouthparts that would dearly love to disassemble us and make us their own. By keeping the outside out and the inner sanctum safe and antiseptic, the skin grants us the luxury of a rich interior life, a hidden chamber where we may feel, accurately or not, that our real self resides, the realm of the mind and its capitalized I. Life is a beauty that we may well call skin-deep; but skin, it turns out, is no trivial thing.

In *Skin,* her fascinating, nuanced, often exhilarating, and for the most part crisply written new book, Nina Jablonski, the head of the anthropology department at Pennsylvania State University, urges us to consider our skin as we have never, even in our pubertal angst, pored over it before. She delves into the architecture, behavior, and evolution of skin and explains how it differs among the diverse phylogenies of the animal kingdom. Dolphin skin, for example, is stippled with tiny fingerlike ridges that allow water to flow evenly over its body, reducing any drag that might hinder the mammal's hasty pace or balletic grace; the skin of a hippopotamus oozes an extraordinary sort of pinkish, viscous fluid called "red sweat" that serves as a natural sunscreen. The author describes revolutionary events in the natural history of skin, most notably when animals made the transition from life afloat in the buffering amniotic sac of the sea to a much harsher life on land, where the sun threatened dessication from above and the ground promised laceration from below. The solution to the joint threat of drying out and scuffing up was the origin of the stratum corneum, which Jablonski calls "probably the single most important step in the evolution of tetrapod skin." The stratum corneum is the uppermost layer of our skin, consisting of "a relatively thin sheet of dead, flattened cells with a smooth, fairly tough, and water-resistant surface." We survive the rigors of life, in other words, by grace of a slight glazing of death.

Beneath the stratum corneum, however, our skin is very much alive and perpetually giving birth to new skin cells to replace the ones that we shed by the millions with every stumble, shower, or shave. The stratum corneum crowns the epidermis, the thin, four-layered outer portion of the skin that is composed predominantly of keratinocytes—squat, squarish, stretchable cells, all embedded in a bouncy, gelatinous matrix. Below the epidermis is the comparatively thicker dermis, where we find dense wefts of fibroblast cells that generate collagen and elastin, the famed connective-tissue proteins that gamely hold our bodies together and faces in place for half a century or so, until they finally get tired and tell us to take all future complaints to a board-certified plastic surgeon. In the dermis we also encounter a wilderness of blood vessels, nerve tissue, sweat glands, hair follicles, and little piloerector muscles that in most mammals serve the important function of puffing up the pelt for the sake of added warmth or a more threatening appearance, but that in us do little more than give goose bumps. Human skin, epi and dermal tissue together, measures only about two millimeters deep—barely the width of two dimes. Skin thickness varies considerably, however, and some people have hides as much as four dimes high. Like Tencel and certain high-quality polyesters, these lucky individuals are unusually resistant to wrinkling.

Whatever its relative breadth, Jablonski argues, our skin has played a surprisingly meaty role in making us human, and for a surprising number of reasons. To begin with, she explains, human skin is unusually sweaty. Sweating offers the body an excellent way of cooling off, and many mammals take advantage of the mechanism to dispel internal heat stores that threaten the smooth performance of their cells and organs. In sweating, an animal secretes droplets of fluid that can then evaporate from the surface of the body, pulling heat away as they dissolve into the air. Useful though sweating can be for a mammal that has overexerted itself in the course of dodging a predator or pursuing a meal, however, excessive heat loss is also a threat to its well-being. Most mammals, after all, are nocturnal and rarely active during the hottest parts of the day. Hence they sweat sparingly, by means of what's called an apocrine sweat gland, which

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secretes a milky, viscous fluid that dissipates at a comparatively stately rate.

We humans, by contrast, are extremely efficient sweaters. Our skin is exceptionally rich in so-called eccrine sweat glands, which release generous amounts of thin, watery fluid that evaporates rapidly on exposure to air. The relatively few apocrine glands we have are confined largely to the groin, armpits, and external ear, where, writes Jablonski, "they produce secretions in response to stress and sexual stimulation." Other nonhuman primates, including our close cousins, the chimpanzees, also possess more eccrine than apocrine glands overall, but we are the emperors of eccrine and possibly the most prodigious sweat machines who ever lived. On a hot day in the desert, a person will secrete at least a quart of eccrine sweat per hour, which is five to 10 times the yield that can be managed by the apocrine equipment of your average fully furred mammal. Why do we perspire so tirelessly? As Jablonski sees it, members of the genus Homo, which emerged from more apelike ancestors about two million years ago, needed to sweat for two reasons. "The first was the rise in their activity levels, especially during daylight hours when most other animals must retreat to the shade," she writes. "The second was a significant increase in average brain size." For all its benefits, a brain is a delicate organ, and it gets balky and delirious in the heat, as anybody with a high fever will attest. The bigger the brain, the more we must drain.

The proliferation of eccrine sweat glands and their lubricious product demanded another radical dermal overhaul, according to Jablonski. We had to lose our body hair. Many hypotheses have been offered over the years to explain our nakedness, from the notion that early humans were semiaquatic, and so became somewhat dolphinlike in skin morphology, to sexual selection scenarios in which hairlessness was favored to better highlight appealing body parts like breasts, buttocks, and biceps. But Jablonski argues persuasively that "the only explanation for the evolution of hairlessness that is consistent with available fossil, anatomical, and environmental evidence centers on the importance of sweat." Abundant body hair impedes the evaporation of sweat. For an eccrine-based cooling system to operate at peak efficiency, the fur had to go or, rather, shrink to nearly negligible dimensions across most of the body.

Ah, but with the shrugging off of our fleece arose a new need—the need for protection against the insidious ultraviolet rays of the sun that fur once supplied. As it happens, the skin of most mammals, including nonhuman primates, is very pale, and whatever pigmention it has is confined to embedded fur follicles. In parallel with losing body hair to facilitate sweating, then, our ancestors in equatorial Africa were under selective pressure to evolve compensatory dark skin. Only on migrating to northern latitudes, where sunshine is comparatively feeble, did humans re-evolve an apishly pallid skin tone, the better to absorb sufficient UV radiation for the body to manufacture vitamin D. Indeed, Jablonski, who has studied the genetics of skin pigmentation, proposes that dark skin and light skin have evolved multiple times throughout human prehistory, as populations have trotted from one global coordinate to another and adopted a variety of diets as they roamed. Among the Eskimo-Aleut peoples of the Arctic, for example, relatively dark skin can coexist with dark days because the Eskimo-Aleut menu abounds in vitamin D–rich foods like seal, fish, and caribou.

In all her discussions of the aesthetics of human skin, Jablonski is refreshingly sensible and straightforward. Addressing the question of why women's skin tends to be lighter than men's, Jablonski dismisses the elaborate theories promulgated by devotees of evolutionary psychology, who, viewing virtually every feature of the female body as designed to solicit male "investment," have suggested that lighter skin makes women look like babies in need of protection. Jablonski proposes instead that women are lighter-complected because they *make* babies, and therefore have a higher demand for vitamin D.

Her book is not without its warts. Jablonski is far too fond of jargon and clutters her story with frequent insertions of technical terms that she explains and then never uses again. Do we really need to know that skin-shedding in

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snakes is called *ecdysis* or that dermatologists refer to freckles as *ephelides?* Moreover, the final chapters of the book, in which Jablonski spins through a broad range of skin conditions and skin manipulations—pimples, rosacea, shingles, cosmetics, tatoos—have a dutiful, survey-course feel.

Still, these are small quibbles about a first-rate book. May you read it with pleasure and by the sweat of your brow.

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