In the Dermisphere

Introduction

All species are united in their possession of an outer layer—a covering that is often curious and many times nearly miraculous in the myriad ways it has evolved. As humans, skin is central to our identity, and its status helps define and shape our cultural environment. We tend to regard skin largely as a symbol, emblematic of a person's age, vitality, lifestyle, social status or beauty. Skin degradation or diseases are feared as much for their interference with this symbolism as for their threats to health, and their reminders of eventual mortality. Because they are immersed in the social meanings and consequences associated with skin, humans can become distracted from the influence of an equally meaningful biological perspective: that we and our skins define one organism in a remarkable garden of organisms, a deep and richly extended family of living things with which we share much in common, and from which our social views should, ultimately, be illuminated.

But we are special among the living, or so we like to think. Special in the sense of feeling *chosen*, one result of which is that we can be misled into assigning human meanings and impacts to otherwise independent phenomena. The ancients did this, wrongly interpreting the movement of stars, the vagaries of weather or occurrences of natural disasters as being human-centered. And today human-centrism persists, even in more enlightened societies, where the hue of human skin or the changes it undergoes through aging have real social reverberations, as well as the power to deflect behavior in certain directions. Never mind that skin color is a result of balancing melanin levels, UV exposure and vitamin D production over eons of evolution, or that an increasing number of wrinkles in our skin signals the inevitable interplay of genes and the environment over time. Such causes mostly reach the surface of human culture as effects transformed into social cues, status judgments and, too often, prejudices. Sometimes we get caught up in the sweep of social effect and impose the judgments on ourselves, as well as others. Of course when it comes to different species we don't care if the skin of one water buffalo is lighter or darker than the skin of another water buffalo, and we likely can't tell if the skin of one elephant is a few years more wrinkled than another its age, but

Art Center College of Design
cordially invites you to the opening for

In the Dermisphere

Friday / October 12, 2007 / 6–10 p.m.

Exhibition Dates:
October 12–December 21, 2007

Alyce de Roulet Williamson Gallery
Art Center College of Design
Hillside Campus
1700 Lida Street, Pasadena, CA 91103
626.396.2446

williamsongallery.net

Gallery Hours:
Tuesday through Sunday, Noon–5 p.m.
Friday, Noon–9 p.m.
Closed Mondays and Holidays

Art: Aziz + Cucher / Peter Liashkov / Bruce Nauman / Carlee Fernandez
Kent Anderson Butler / Tom Knechtel / Pat York
Artifact: Natural History Museum of Los Angeles County / Vahé Alaverdian
Huntington Library, Art Collections and Botanical Gardens
Animation: Albert William / Primal Pictures Limited, London
Figure Drawing: Students, Art Center College of Design

for fellow humans these qualities are reason enough to pronounce a broad array of judgments. Within our own realm, biological skin differences can grow to be socially momentous.

The art and artifacts in this exhibition all represent skin as an outer covering —the dermisphere. This dermisphere is commonplace, yet remarkable in its diversity. It is multicolored, malleable, cushioned, protective and thermostatic. In the dermisphere, the persistence of social perspectives is undermined by the influence of biological realities. In the dermisphere, we're not burdened by being chosen—we're just unique.

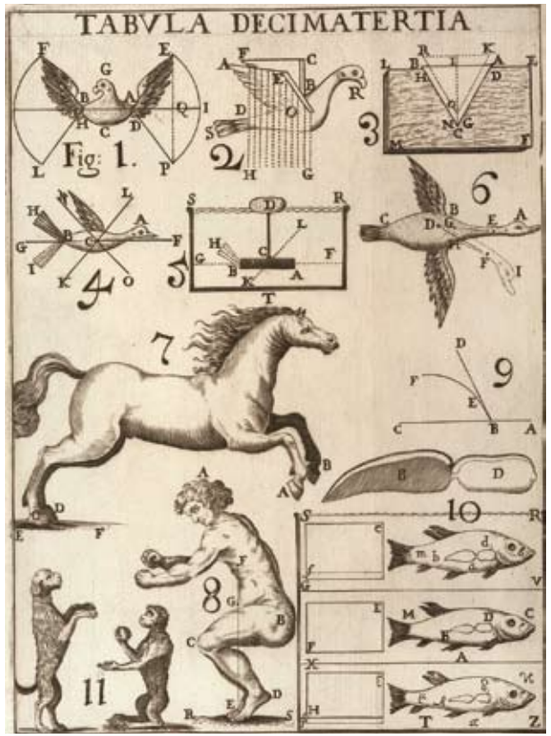
Stephen Nowlin
Director, Alyce de Roulet Williamson Gallery

ART & IDEAS | 2007
SKIN

In the Dermisphere is part of "SKIN: Art & Ideas 2007"
a Pasadena Festival, October 10–31, 2007
artideasfestival.org

Williamson Gallery exhibitions are made possible in part through the generous support of the Williamson Gallery Patrons and a grant from the Pasadena Art Alliance. In-kind assistance for *In the Dermisphere* is gratefully acknowledged from Primal Pictures Limited, London; and Epson America, Inc., Long Beach, California.

For their supportive efforts and collaboration, we wish to extend our gratitude and sincere thanks to the staff of the departments of Mammalogy, Malacology and Ornithology, Natural History Museum of Los Angeles County; the staff of the Rare Books Department, Huntington Library, Art Collections and Botanical Gardens; Albert William, Research Associate, Indiana University School of Informatics; David Baltimore, Division of Biology, California Institute of Technology; Vahé Alaverdian; Acuna-Hansen Gallery, Los Angeles; Anthony Aziz and Sammy Cucher; Kent Anderson Butler; Carlee Fernandez; Jo and Peter Forman; Gemini G.E.L., Los Angeles; Tom Knechtel; Peter Liashkov; Bruce Nauman Studio; Marc Selwyn Fine Art, Los Angeles; Pat York/ Gmurzynska Gallery, Zurich; and Art Center faculty member Danny Galieote and his figure-drawing students.



Giovanni Borelli (1608–1679)
De Motu Animalium
Rome, 1680
Huntington Library, Art Collections and Botanical Gardens

Our Remarkable Skin

David Baltimore

For a design school, the intersection of art and science is fundamental; it is where design originates. In the Dermisphere *presents a context for analyzing existing perceptions and discovering new ways of contemplating issues—much like the process designers follow. Like the objects included in the exhibition, this essay by Nobel Prize-winning biologist David Baltimore surveys the science of skin, and encourages us to consider the deeper complexities that connect knowledge with aesthetics.*
—Richard Koshalek, President, Art Center College of Design

In our daily lives, we often deal with goods that arrive in packages. These goods come to us surrounded by a box that protects their contents and prevents them from spilling out. The package is the skin of the goods. Evolution has provided humans with a skin too, but one that is much more sophisticated than traditional packaging boxes. In fact, the skin that covers humans is one of the most complex organs of the body. Like a box, it serves to physically hold us together and protect us, but unlike a box, it is also an organ of sensation. And the protection afforded us by the skin is much more elaborate than anything in cardboard; the skin is in fact a key component of our immune systems. The skin, although strong, is not rigid: it flexibly coats us. It is not uniform; the skin of the palm is not like the skin of the eyelid or scalp. It is not just a skin; it holds many useful components like hairs, glands for the secretion of sweat and oils, and nails at the ends of our finger and toes. Most importantly, the skin holds the endings of nerves, allowing the body to sense its environment and be sensually stimulated itself.

Like all parts of the body, the skin is a collection of cells. These cells are so tiny that we are only aware of them when we see the skin through powerful microscopes that allow us to observe that there are multiple types of skin cells, each of which is endowed with unique properties. For instance, the

Bruce Nauman
Neck Pull, 2006
(photograph by Jack Fulton)
Epson UltraChrome K3 inkjet print, 20 x 28 inches
Courtesy of Gemini G.E.L. LLC, Los Angeles

main skin cell type elaborates proteins that are able to aggregate into very strong strands. These proteins, called keratins, are made in the cells, ultimately filling them and providing skin with strength and imperviousness. There are also cells that form the roots of the hair. Here, a modified keratin provides strength to the hair shaft. There are also nerve cells, glandular cells, cells of the immune system, cells that make up blood vessels, cells that give the skin pigment and others. In fact, the skin is really two layers, the epidermis on the outside and the dermis on the inside. Each has its own cell types, with the dermis connecting to the interior of the body.

So how does the skin get to be such a complex collection of cells? If we go back in embryonic life, we see that the skin is one of the earliest body tissues to appear. This makes sense; even an embryo needs the organization afforded by an outer layer. But, interestingly, as the embryo develops, this layer spins off many new cell types: the most dramatic are the nerve cells. Most of the nerves of the body started as skin cells; it is as if the skin, which is the site of much of our sensory reception, had wanted to connect the information it was receiving to a central processor and evolve cells that could transmit the signals to the brain. The nerves also connect our brains to our muscles, providing a link between sensation and action.

It is not only the sense of touch that comes from the skin. The ear and the eye are elaborations of the skin. And with the nerves also being skin-derived, the processing ability of information in the brain traces back to the embryo's skin.

Movements of cells in the early embryo lead to a folding inside of a patch of skin, which then makes up our guts. So we have an inside skin as well as an outside skin. And the inside skin forms a series of pouches that turn into our organs. So most of the body's abilities can be traced back to the skin.

Although the skin is an early embryonic tissue, the skin we have around us today is not the same skin that the embryo had. First, skin changes as we mature and age. The smooth skin of the baby becomes rougher with time; the thick skin of the adolescent thins as the adult ages. The skin on

one's body is actually highly differentiated: the skin of the fingers or the arms or the torso or the scalp or the bottoms of the feet is different, in thickness, number of hairs and quantity of secretion glands. If you work hard with your hands you develop calluses, indicating that the properties of the skin can alter depending on how you treat it.

But most importantly, your skin is not static. The cells it has today are not the cells it will have next month. Because skin cells suffer such wear and tear, the body has arranged to shed them continually and make new ones in their place. The skin is turning over on a weekly basis; each day we shed some. If we don't bathe regularly, it builds up and the "dirt" removed by soaping is largely dead skin cells.

So where do new skin cells come from? It can't be from the old skin cells; when they fill up with keratin they actually die and can't give rise to new cells. The answer is that there is a specialized cell, well below the surface of the skin, that can divide, and its progeny can divide, and these newly arising cells now migrate to the surface as they fill with keratin. That specialized cell is called a stem cell. When skin stem cells divide, one of the products remains as a stem cell and can divide further, while the other gives rise to a population of cells, all of which develop keratin and die. We say that a stem cell is self-renewing because it can indefinitely divide and make new, mature cells as well as a daughter stem cell. Stem cells have been much in the news recently because they can give rise to many different types of progeny cells. The stem cells that provide us with skin—like others that make blood or liver—are called adult stem cells and have a limited potential for the types of progeny they can spawn. There are also embryonic stem cells, found only in the early embryo, any one of which can give rise to all of the body's tissues. Because human embryonic stem cells can today only be made by destroying embryos, their derivation has been very controversial.

Not all of the cell types in the skin come directly from the embryonic skin. One in particular, the melanocyte, migrates into the skin from a ridge of cells along the embryonic backbone. The cells on that ridge derive from the skin, but were separated off early in embryonic life and

Peter Liashkov
Lovers, 2004
Acrylic, powdered pigment, pencil, pastel on synskin, 90 x 48 inches
Collection of the Artist

Tom Knechtel
Snohomish, 2006
Pastel on paper, 30.25 x 21 inches
Collection of Jo and Peter Forman

Carlee Fernandez
Bear Legs Study, Bear Head and Arms Study (diptych), 2004
C-Prints, 20 x 16 inches each
Courtesy of the Artist and Acuna-Hansen Gallery, Los Angeles

Kent Anderson Butler
Creative Soul #2, 2007
Digital Photographic Print, 30 x 40 inches
Courtesy of the Artist

are called neural crest cells. Melanocytes are but one type of cell derived from the stem cell of the neural crest. Melanocytes migrate into the skin and produce melanin, the brown pigment of skin, which is deposited into the skin cells. Black Africans have the same number of melanocytes as Caucasians, but they have much more skin pigment than Caucasians because their melanocytes make more of it. Melanin protects the skin cells against the deleterious effects of the sun's ultraviolet rays.

Human skin is but one type of skin found among animals. Evolution has varied the nature of skin to suit the needs of the particular animal. Many animals have much more hair than humans and therefore many more hair shafts in their skin. And the hair has various textures and various colors. Feathered birds and scaled reptiles have other types of skin specialization. The thick skins of animals, like the rhinoceros, are yet another type of covering. The endless variety of skin types makes skin a fascinating study in evolutionary variation.

In her book *Skin: A Natural History*, anthropologist Nina Jablonski has called skin "a defensive shield, a gatekeeper and a personal zoo." We have seen how it forms a defensive layer and how it is the sensory gatekeeper, but what's this about a zoo? Our skins and the skins of animals harbor a myriad of bacteria, yeast, mites, lice and other creatures that make up this zoo. Many live off of the dead cells and the secretions we produce. Some get quite smelly and are a great boon to the soap and skin care industries. Skin is truly a zoo.

The members of our personal zoo are mostly passengers, but occasionally they cause disease. Skin infections can be nasty and even disfiguring. Acne, that bane of adolescence, is brought on by hormonal changes. Skin can also suffer diseases that originate in the skin cells themselves. Moles and the like are examples, while warts, which are due to local overgrowth of skin, are really benign tumors stimulated to grow by a virus. Skin is also subject to malignant cancer—basal cell carcinomas that usually stay localized long enough for us to totally remove them. The more dangerous melanomas originate in melanocytes, which, being naturally invasive cells, often find their way around the body before they are excised.

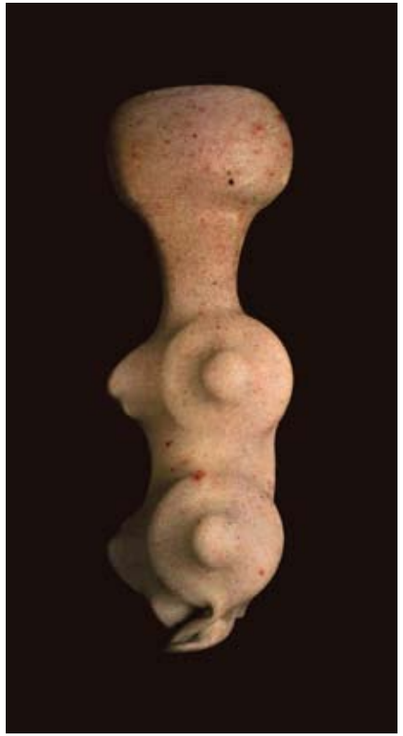
One property of skin is most impressive: its self-healing ability. A cut, puncture or scratch is rapidly healed because the surrounding skin cells migrate in and fill the gap. If the wound is large, the upper skin cells may need help from the cells below. In this case, a scar forms; it is made of different cells than the usual skin and may never disappear. It is a good thing that the skin can heal because any opening of the barrier is a potential site of infection; that's why we put a bandage over a wound, to act as a temporary barrier to infection.

Let us step back now and view the skin from a distance. Looked at this way, our skin defines us as human beings—it is what we recognize in each other. A beautiful person has pleasing bone structure and body organization, but what we see is the skin. It is no wonder that many people spend an enormous amount of time and money on their skin. Our skins are the most telling indicator of our age: trying to hide the effects of age on the skin is a major concern of those who hope to seem younger. Skin also conveys emotion, when its blood vessels engorge and produce a blush.

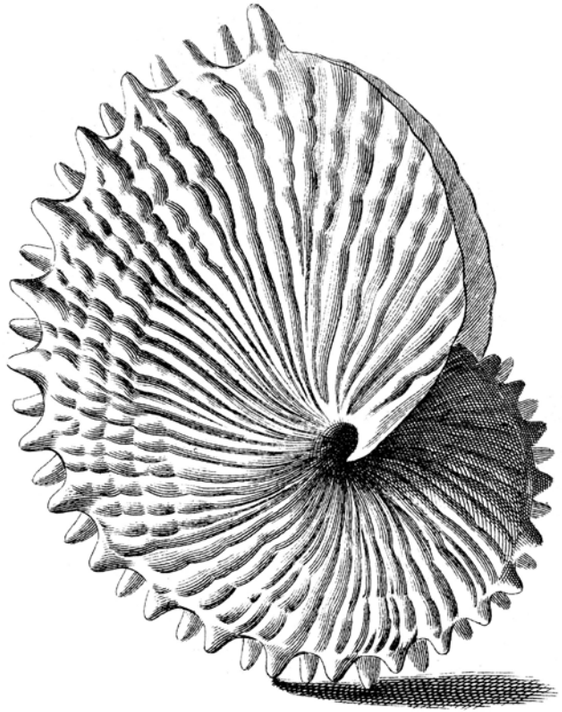
Which takes us to art, so much of which concerns depictions of human skin. The blush of the skin can suggest the thoughts of the mind; the color or condition of the skin can suggest class or race. The artist must focus on the skin because that is the window humans present to the world. The story told by our skins is uniquely human—animals have much less about them written in their skins. The relative sparseness of our hair and thinness of our skins makes our emotions, age and exposure to the elements particularly evident. It is as if in humans, evolution has pared the skin down to a thin and very visible layer so that we may communicate much about our lives. For humans, the skin is a wondrous two-way communication system.

David Baltimore is the Robert Andrews Millikan Professor of Biology and President Emeritus at California Institute of Technology. He is a 1975 recipient of the Nobel Prize for Physiology or Medicine for the discovery of reverse transcriptase, which transcribes RNA into DNA. In 1999 he was awarded America's most prestigious science honor, the National Medal of Science.

Pat York
Heart to Heart, 2000
Epson Stylus Pro 11880 inkjet print, 60 x 40 inches
Courtesy of Gmurzynska Gallery, Zurich



Aziz + Cucher
Chimera #2, 1998
C-Print, 60 x 30 inches
Courtesy of the Artists



Carl Linnaeus
Argonauta nodosa, 1758

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