

The Hairy Who Are Scary

By Mark C Glassy, Ph.D.
copyright©

Submitted for your approval

One of the defining characteristics of mammals is their hair. All in all hair is much more complicated than it appears and not all hairs are alike nor created equal. Animals, including humans, have many different types of hairs on their bodies. For humans hair is on most areas of the body with the most obvious, of course, being the head and facial hair. Areas completely devoid of hair are mucous membranes and areas called glabrous skin such as the tips of our fingers, palms of hands, lips, and soles of feet. For humans most hair is located on the ears, face, eyebrows, armpits, scalp, legs, and pubic region.

For our purposes we will be discussing hair that comes and goes, such as seen for example with werewolves, and not with creatures permanently hairy such as gorillas, Yeti, and Bigfoot. Those animals with hair that comes and goes we can call “monthlies” and those whose hair is permanent we can call “furballs”. This article is on monthlies.

Hairy info

Humans have about 5 million hair follicles on our bodies and *all* of these are formed by 22 weeks in a developing embryo. There are about 1 million hair follicles on the head, and about 100,000 are on the scalp. Follicles are never added during life so you are born with the most you will ever have so as body size increases during growth the density of the hair follicles in the skin decreases.

Of the 5000 or so species of mammals just a handful do not have any fur. Those without fur, including man, are elephants, hippopotamuses, rhinoceroses, pigs, walruses, and cetaceans like whales, not to mention naked mole rats. Most mammals have a light skin color covered with fur. Only horses and humans are capable of sweating over most of their bodies.

During the evolution of man, from furry creature of *Australopithecus afarensis* to near naked current *Homo sapiens*, hair went from being straight, as seen with just about all mammals, including apes and chimpanzees, to being curly and kinky. This type of hair protected the scalp and therefore the brain, from harmful UV rays from the high equatorial (African) sun. As man migrated to colder climates the ability to grow long, straight, densely packed hair provided a distinct evolutionary advantage and would be a distinct disadvantage in a hot climate

when compared to loosely packed, spongy, closely cropped hair. As a result, those near the equator have curly hair to protect from the sun's rays whereas those in colder climates have denser hair to keep the head warm.

Structure of hair

At first glance we all know what hair is like and how to deal with it. However, for this scary discussion we need to understand what hair is made of. Hair is a filamentous material primarily composed of the protein keratin that grows from follicles in the skin. These follicles in our skin produce the two most common types of hair called terminal and vellus hair. Mature, thick hair is called terminal, while the fine hair growing over the body surface, as on the forehead and abdomen, is called vellus. Simply stated, terminal hair is thick whereas vellus hair is thin and fine. Either way, hair is composed of two components, the bulb (what you see at the end of the hair shaft when pulled from skin) and the shaft, which is the part that extends above the skin (and what you comb and cut). The bulbs are embedded in the skin and regrow hair, via stem cells in the bulb, after the hair follicle has fallen out. The bulb contains the cells that produce the hair shaft so hair growth actually begins inside the hair follicle. Also, due to the rapid growth of hair the follicles have increased metabolic rates.

The hair shaft itself is composed of three parts, the medulla, the cortex, and the cuticle. The outside part, the cuticle, consists of several layers of thin, flat cells overlapping each other like roof shingles; the middle part, the cortex, contains the keratin bundles and helps provide rigidity to the hair shaft as well as water transport; the inner part, the medulla is a disorganized area that is not always present in each hair fiber. The cortex contains melanin, the pigment which gives rise to hair color. The hair cortex is produced by keratinization of cells in the hair bulb, and once keratinization has occurred, no amount of trimming or cutting or bleaching on the surface will have any effect on the rate or thickness of growth.

The shape of the follicle controls the shape of the cortex and its shape is determined by how straight or curly the hair is. Asian hair has a round fiber and is very straight whereas oval or irregularly shaped fibers are more wavy or curly as often seen with those of European and African descent. Each hair shaft is naturally covered with a single molecular layer of lipid, from the lubricating sebaceous glands near each hair bulb, that helps repel water. The diameter of each strand of human hair varies from 17 to 180 micrometers (0.00067 to 0.0071 inches). The only "living" portion of hair is the follicle itself since the hair strand, after keratinization, has no metabolic activity and as such is considered 'dead'.

The growth of hair is cyclic and proceeds through three distinct phases. The prolonged growth phase is called anagen and the short involution phase (hair follicle death) is called catagen when the hair follicle shortens and an anchored club hair is produced. The rest phase (hair shedding) is called telogen. If the anagen phase continues beyond normal then excessive hair growth will result.

All three phases can occur at the same time with one strand of hair being in the anagen phase with another being in the telogen phase. As mentioned, humans are born with approximately 100,000 hair follicles in the scalp. Each day, approximately 100 hairs are shed from the scalp and about the same number of follicles enter the growth phase (anagen). It is the duration of growth that determines the length and volume of hair. The growth and rest cycles are highly regulated by complex interactions between cells in the skin layers.

Hair on the body is called vellus hair, which is short, fine, and non-pigmented. These vellus hair follicles can become larger or smaller under systemic and other local influences that alter the length and time of growth (anagen) and the individual hair volume. Some androgens (androsterone and testosterone) do regulate vellus hair growth, primarily in the face (beard), chest, and limbs. Men have more body hair than women, and more testosterone, so men have more terminal hair, especially on the face, chest, back, and abdomen. Women have more vellus hair.

A third type of hair is called lanugo hair and is a very fine, soft, and unpigmented hair that is typically found on the bodies of newborn babies. Lanugo hair is the first hair to be produced by the fetal hair follicles that usually disappears shortly after birth. After lanugo hair is shed it is replaced by vellus hair.

The angle of growth of hair is coordinated in the same direction on various parts of the body. This is important because the hair angle on humans is different than on wolves so for a werewolf to exist his hair growth would probably have to change directions; not an easy thing to do and may explain some of the pain seen with various filmed transformations. The rate of growth and type of hair are unique for specific body areas. Hair on the scalp is programmed to grow long, whereas that on the arm is rarely longer than one to two centimeters.

What is hair?

In general, there are four basic types of hair: straight, wavy, curly, and kinky curly and these classifications are based on the shape of the hair fiber. Straight hair is the strongest and easily reflects light giving it a glossy appearance. Wavy hair has s-shaped curls down its length and tends to frizz and get split ends. Curly hair strand thickness varies from fine to coarse down the entire hair shaft. Kinky curly hair has the tightest curls, from fine to coarse, with s-shaped and z-shaped curls. As such this is the most fragile of hair types.

From an aesthetic viewpoint hair helps identify appearances and overall this is more important for females (gender identity) than males. From a practical viewpoint hair provides cover, protection, warmth, and also helps provide sensory information. Hair is the only body structure that is completely renewable without scarring. Hairstyles vary widely depending upon the culture and the historic period. A person's beliefs, social position, and attitude are often

expressed in their hairstyle (for example, dreadlocks). Healthy and youthful people have healthy hair. The color and texture of hair often indicates ethnic background. Facial hair is a sign of puberty in males whereas white or gray hair is a sign of age and wisdom as is male pattern baldness. Religious practices also influence hairstyles, especially in women, in that various religions during history have had a direct effect on how hair is worn and covered.

Excessive hair growth in women (and children) is called hirsutism and for men it is hypertrichosis. Though the exact reasons for excessive hair growth are currently unknown the underlying causes are hormonal and related to excessive testosterone, a male androgen hormone. It follows that since hair growth is hormonally related then hair removal or shedding must also be hormonally related. In relation to our film analysis the WEREWOLF WOMAN would be considered hirsute whereas THE WOLF MAN would have hypertrichosis episodes. Hirsute women do have hair on their backs, chests, arms, and faces.

In women hirsutism can be either congenital (from parents) or acquired during life. Exposure of women to excessive male hormones such as testosterone is the primary cause of acquired hirsutism that may also include acne, a deepening of the voice, irregular menstrual cycles, and an overall more muscular body shape. Hirsutism occurs in about 10% of women between 18 to 45 years of age.

Function of hair

For mammals hair serves many functions over and above warmth and protection and provides both thermal regulation (heat insulation), camouflage, signals, displays, warnings, mate stimulus, defensive and offensive strategies, as well as protection. Hair also has a sensory function that extends the sense of touch beyond the skin's surface as well as protecting the head from UV radiation. For humans, the hairs on our skin normally lie flat during hot conditions. The arrector pili muscle, those muscles that cause hairs to stand up, relaxes allowing the hair to lie flat and this prevents heat from being trapped by a layer of still air between the hairs. In other words, hair laying flat allows heat loss through convection. Also, when a human body is too cold the arrector pili muscles bound to hair follicles contract, called piloerection, making the hair strand stand up which then forms a heat-trapping effect immediately above the skin surface. The effects of piloerection are more commonly known as good old fashion goosebumps. Hair also provides a cooling effect as sweat evaporates from soaked strands. In other mammals, especially wolves, the fur fluffs up due to piloerection that helps to insulate the body from the cold. When a body is too warm the opposite occurs in that the arrector muscles make the hair follicle lay flat on the skin which helps heat to escape more readily.

Different types of hair on the body serve different functions. For example, eyebrow and eyelash hair provide mild protection to the eyes from the elements (dirt, rain, sweat). Eyebrow hairs are also involved in non-verbal communications

by displaying various emotions like anger, excitement, sadness, and surprise. For most mammals, eyebrow hair is much longer with whisker-like hairs that are mostly tactile sensors. When hair shafts move, either through touch or air, by displacement or vibration, nerve receptors within the skin sense this with eyelash hairs being especially sensitive to even the smallest movement.

Hair color and texture

Natural hair color is due to the amount and type of melanin cells present in the hair follicle. Melanin cells produce two types of color pigments inside the hair follicle that are packed into granules in each hair strand. One pigment, eumelanin is the dominant pigment for black, brown, and dark-blond hair. The other pigment, pheomelanin or erythromelanin, is the dominant pigment for red hair. Little to no pigmentation in the hair strand results in blond hair. Hair turns gray when the melanocytes in the basal layer of the hair matrix are greatly reduced in number and the melanin pigment production ceases. In general, dark hair contains more melanosomes (pigment producing cells) while light hair contains fewer.

For hair texture there are three basic types: fine, medium, and thick or coarse. Texture describes the thickness of each individual strand and not how it feels. Typically, fine hair is thinner than a piece of thread, medium hair is the same thickness, and coarse hair strands are thicker than a piece of thread. The most fragile strands are fine hair. They can be easily damaged since fine hair has only two layers, a cortex and a cuticle. Also, fine hair is difficult to style. Medium hair is the most common and can easily be styled. Structurally, medium hair may contain a medulla and as such is stronger and does not break easily. Thick or coarse hair is stronger because it contains all three hair layers and therefore better at resisting strand breakage.

Hair restoration

Most hair restoration details the removal of hair from one part of the scalp and transplanting it somewhere else instead of the actual regeneration of new hair growth. A recent study ("Microenvironmental reprogramming by three-dimensional culture enables dermal papilla cells to induce de novo human hair-follicle growth") published in the *Proceedings of the National Academy of Sciences* has provided much understanding of what it would take to generate new hair growth.

This method offers the possibility of inducing large numbers of hair follicles or rejuvenating existing hair follicles, starting with cells grown from just a few hundred donor hairs. It could make hair transplantation available to individuals with a limited number of follicles including those with female-pattern hair loss, scarring alopecia, and hair loss due to burns.

It is known that dermal papilla cells give rise to hair follicles so the cloning of hair

follicles using inductive dermal papilla cells has been around for some time. The above study showed that when these cells are aggregated together they give rise to new hair cells but if left as individual cells they do not. The implication is that clumps of hair cells together will be more efficient in new hair growth so this is something we must keep in mind during our favorite hairy film moments.

Some hair restoration procedures involve hair transplants from one area of the scalp to another. For this procedure it is important that enough donor hairs are available so some people such as those with baldness problems (and burn victims) most likely will not benefit. It should be noted that this transplant process does not create new hair and often does leave scars. These transplants contain dermal papilla cells for continued hair growth.

Hair loss

Alopecia is referred to as hair loss and in reference to the head is commonly called baldness (also male pattern baldness in men). Some types of alopecia can be caused by an autoimmune disorder and extreme forms result in the total loss of all hair from the body. Other causes of baldness include fungal infections, trauma (such as compulsive hair pulling), radiotherapy or chemotherapy, and nutritional deficiencies such as iron. Another method to control hair loss is the use of testosterone suppressor drugs to keep the overproduction of hair growth in check.

Another form of losing hair from the skin surface is called depilation and is the removal of the entire hair strand by either trimming, plucking, or shaving and usually involves terminal hair and not vellus or lanugo hair. Most hair removal is done with shaving but waxing is also a popular way to remove hair. A haircut is considered the removal of a significant amount of hair whereas a trim is mostly removing split ends while leaving the overall shape and look of the hair unchanged. So cutting hair removes more than a trim. Cut hair appears thicker because the tapered split end has been removed but in reality the thickness of the hair strand is unchanged after cutting.

Overall, it is easier to understand how hair can grow to excess but very difficult to understand how hair can be absorbed when the moon is either gone or the hormonal levels taper down. It would be easier to say the excess hair is shed rather than absorbed or receded. That being said there would be a LOT of werewolf hair scattered about not to mention all that hair that sticks to a comb after its use. (Did Larry Talbot ever look at his hairbrush and wonder where all that excess hair came from?)

Skinny on skin

To properly discuss hair we must also talk about skin. After all, that is where the hair grows. Skin is the largest organ mammals have. Yes, skin is an organ. For adult humans the skin weighs an average of 4 kg and covers an area of

approximately two square meters. Its major function is to act as a barrier against the surrounding environment, the harsh and unforgiving outside world. Skin also serves as a shield to protect the delicate organs and tissues within our bodies. Skin is composed of three major layers of cells and tissues. The outermost layer is called the epidermis, and this serves three functions: it is a physical barrier, it protects against light (such as harmful radiation), and it is an immunologic organ (it helps fight off germs and bacteria). Subsequent layers, the dermis (or corium) and the subcutis, contain cells which perform specific functions that maintain the integrity and action of skin.

Each layer of skin has its own distinct specific cell types. The outermost layer, the epidermis, is composed of the basal cell layer, primarily consisting of keratinocytes, melanocytes, and merkel cells. The next layer is called the squamous cell layer and is composed of Langerhans cells and the desmosome-tonofilament complex. Then comes the granular cell layer, the horny cell layer, the stratum lucidum, and the oral mucosa. The epidermal appendages consist of eccrine glands, apocrine glands, hair follicles, arretores pilorum, sebaceous glands, and nails. The basement membrane zone contains ultrastructural components and chemical components. Yes, skin is quite complicated and well organized and maybe even a little scary. Nevertheless, that is where hair grows and both hair and skin are dependent upon each other. As goes the skin so goes the hair.

Importance of sweat glands

About 2.5 million years ago, during the evolution of man from ape, man began to lose body hair and at the same time developed sweat glands all over the skin thereby enabling man to perspire over most of their body which eliminated the need for excessive body hair, as well as eliminating the need for panting. So, body hair appearance changed around the same time sweat glands began appearing in man.

Mammals adjust body temperature, called thermoregulation, by sweating. Humans do not pant so they sweat to help cool down the body. Fur-bearing mammals do not sweat (with the exception of horses) so they pant to help blow off excessive heat. Wolves being mammals pant whereas humans sweat. So, when a human transforms into a werewolf he most likely would not sweat but, rather, pant to cool down. Or perhaps a combination of the two would get us a mildly perspiring and tongue-wagging beast. A sweaty werewolf would have matted down hair that could be uncomfortable. The change in body hair could affect the change in the number and function of sweat glands and certainly how body thermoregulation occurs.

For adult humans there are about two million sweat glands all over our bodies that are called eccrine glands whereas those in the armpits and loin are called apocrine glands. These glands produce watery fluids that help cool the body by

evaporation thereby releasing heat. All of these glands likewise produce a fatty secretion that helps lubricate the hair shaft that also helps to keep it from drying. Furthermore, sebaceous glands at each hair follicle produce an oil that also helps to lubricate the hair shaft.

Hypertrichosis

When terminal hair grows in areas that would normally have vellus hair this situation is called hypertrichosis (also called Ambras syndrome; excessive cases have also been referred to as “werewolf syndrome”). The excess hair growth, both length and density, in hypertrichosis cases may consist of any type of hair (lanugo, vellus, or terminal). The first reported case was in the late 16th Century and so far around 50 cases have been reported since then making this symptom rare indeed. Interestingly, those with hypertrichosis often have gingival (gum) disease and other dental problems.

Hypertrichosis hair is typically thick and pigmented and can be either generalized or localized on the body and either congenital or acquired. Those afflicted with this condition were often performers in sideshows at carnivals (for example, the bearded lady); many were considered freaks and promoted as having animal instincts. Congenital hypertrichosis, caused by a very rare genetic mutation, is inherited and present from birth; there is no known cure for this condition. It should be noted that those with this do not have any hair on glabrous tissues such as the palms of their hands, soles of their feet and on mucous membranes. This congenital form causes males to have excessive facial and upper body hair growth whereas females show less with hair distribution often being asymmetrical and non-uniform over the body. In addition to the generalized hypertrichosis there are also localized versions, one being “hairy elbow syndrome” in which excessive vellus hair grows on and around elbows. These localized areas have an increase in hair density and length.

Hypertrichosis acquired after birth is usually the result of the side effects of some drugs, cancer, and possible links to certain eating disorders. This form is characterized by rapid growth of lanugo hair, especially on the face (cheeks, upper lip, and chin), with other areas being the trunk and armpits (palms and soles are not affected) that have less. Also, some forms have multiple hairs growing out of the same follicle. To treat acquired hypertrichosis the underlying cause must be removed such as drugs, hormones...or perhaps the rays of the full moon.

When hypertrichosis occurs areas of the skin help transform the small vellus hair follicles into the larger terminal hair follicles. Though this normally occurs during adolescence, especially in males when underarm and groin vellus hair follicles transform into terminal hair, this switch can also occur in adults and involve areas of the skin that do not normally make terminal hair. When hypertrichosis occurs in a pattern formation on the skin this is usually a sign of an internal malignancy,

an irritation, or trauma. This hair is more dense and longer than normal terminal hair.

To control hypertrichosis hair removal is the easiest way to go and can either be temporary or permanent. Temporary hair removal can last from a few hours to a few weeks depending upon the method used. Some methods are cosmetic (trimming, shaving) that cuts the hair shaft at the skin level whereas others (electrology, waxing) remove the entire hair root and bulb that may last a few weeks. A popular method for hair removal is using laser technology but this does not work on hairs without any pigments, such as white hair. The laser targets the melanin dye in hair follicle (lower 1/3 of hair shaft) and white hair does not have any melanin.

Hypotrichosis

The loss or reduction of hair is called hypotrichosis and is typically seen when vellus hair grows in areas of the body that normally have terminal hair. This vellus hair is usually fine, short, brittle, and often lacks pigmentation. This hair loss condition mostly occurs after birth when normal hair is shed and replaced by vellus hair and, for some males, baldness may result by the age of 25. Some medications like minoxidil (oral or topical) help prevent hair loss and may even promote hair growth. Also, balding is when terminal hair switches to vellus hair.

Lycanthropy

Lycanthropy has its origins primarily in 16th Century Europe, though it can be dated as far back as the ancient Romans. According to Roman mythology, the god Jupiter transformed the cruel, cannibalistic King Lycaon of Arcadia into a wolf (Lycos is Greek for wolf – and where we get the word lycanthropy from – and lycorexia means the craving for raw meat.) Curiously, during the 16th Century all reported cases of lycanthropy occurred primarily within the peasant class in low lying areas of Europe that were under 500 feet above sea level whereas regions above 500 feet have no reported cases. As a rule, peasants could not afford wheat bread, which was saved for the upper class, and therefore had to eat cheaper rye-based bread. Unfortunately, rye grains were contaminated with ergot fungus, and when the peasants harvested the grain the ergot fungus came along with it. (Ergot does not contaminate wheat so the upper class was never exposed to it.) Ergot contains natural hallucinogens (like LSD) that, when consumed in quantity with bread, induce psychotic episodes. The peasants who had a lot of the ergot fungus in their system were subsequently very susceptible to outside influences. And since werewolves were popular at the time the power of suggestion convinced many of the peasants in the low lying regions that their communities were rampant with werewolves (therefore, much of our favorite werewolf lore originated through the use of mind-altering drugs.)

THE FILMS

The following baker's dozen films are good representative examples of the types of hair changes seen in some of our favorite scary films. The breakdown is nine films with werewolves, one hairy Hyde, one throwback, and two apes. These hairy who are scary, from classic full moon ray-induced hair growth, to biochemical induction, to hormonal and glandular alterations, all provide a fascinating look at some of our favorite hairy monsters. However, a curious observation comes to light when looking at these films in total. It should be noted that in just about all of these films our hairy heroes do not have any moustaches in their hairy state. Hair seemly grows everywhere, even in places it wasn't meant to, but somehow hair on the upper lip has no role and is a no show in these films.

DR. JEKYLL & MR. HYDE (1932)

A pre-code horror film that earned starring actor Frederic March an Academy Award for Best Actor. There are 5 hair transformations in this film. The first transformation of Jekyll to Hyde results in simian looks with hair growth on his brow (hairier eyebrows) and the side of his face with some on his hands as well as canine-like teeth. Subsequent transformations show a Hyde with bushier head hair and more on the brow, face, and hands. In the film the first two Hyde transformations are induced by drinking a formulated concoction whereas later transformations are spontaneous implying a hormonal basis for the changes. Since these reversals back to Jekyll are spontaneous this suggests the effects of the concoction are temporary. Irrespective of the reason all the changes are hormonal based and since hormones can be induced then the subsequent results can also be induced.

It should be noted that some hair strands on Hyde were shorter than before the transformations from Jekyll. Also, as Jekyll some hair strands were wavy but as Hyde all head hair appears to be straight. The third transformation was spontaneous resulting in thicker forehead hair, longer strands of his facial hair (long vellus hair?), and bushier eyebrows. Hyde reverts back to Jekyll after drinking another concoction (same as before or perhaps some sort of antidote?). The 4th and 5th transformations were spontaneous and Hyde gets progressively hairier with more pronounced features during each one. After the 5th transformation Hyde was shot and while dying he reverts back to Jekyll. Of note is that there were no moustaches during any of the transformations. So, some vellus hair, on the brow, face, and hands, was able to convert to terminal under a chemically induced hormonal burst that reverted after some time. Also, wavy and curly hair reverted to straight hair and back again. Ultimately, it was mental anguish that catalyzed the subsequent hormone signals which resulted in the hair transformations.

THE WEREWOLF OF LONDON (1935)

Though we see two werewolves in this film they appear to be essentially alike.

The first, Dr. Yogami, who as a werewolf has a widow's peak brow, long bushy sideburns, bushy eyebrows, as well as hairy hands. A key plot device is the plant *Mariphasa lumina lupina* and stem fluid from a blossom is what is needed; apparently not much is required to (ahem) stem the change to werewolf. As Yogami says, "not a cure, an antidote", so the fluid is needed each full moon. One blossom per human each night of the full moon is required.

In researching werewolves Glendon opens a book and reads an entry: '*De Lycanthrophobia* (transvection from man to werewolf)'. As written in the entry, "The essence of the Mariphasa blossom squeezed into the wrist through the thorn at the base of the stem is the only preventive known to man. Unless this rare flower is used the werewolf must kill at least one human being each night of the full moon or become permanently afflicted." (In support of this there is a scene where stem juice is put on the back of the wrist and the hair subsequently disappears.) The key phrase in the above entry is "squeezed into" meaning the fluid must break the skin surface and enter the blood stream, muscle tissue, skin tissue, as well as localized hair bulbs and follicles. The immediate effect is a cessation of hair growth and therefore stopping the transvection into a werewolf. Since it appears that just a small amount of the fluid enters the broken skin it must be very potent to counteract the hormone induced terminal hair transformations. To work the stem juice is essentially a hormone-suppressing substance that changes hair growth from anagen to catagen.

The transformation scene showing the effect with Dr. Glendon was successfully executed with rapid cuts of the actor superimposed walking behind columns with each cut showing a hairier and hairier beast. The terminal hair growth was selective and most prominent on his hands and face. In particular a widow's peak brow, very long sideburns, bushy eyebrows, hair on his lower lip (called a mouche or 'soul patch'; note: no moustache visible) and hairy hands are the obvious changes. How much hair is on his chest, back, and legs is unknown and based upon how he looked in his tight fitting clothes apparently not much, if any, hair grew on these areas. Overall, Glendon shows selective terminal hair growth.

There are 5 transformation (or transvection) scenes of Glendon in this film. The first is when he exposes his hand under the moon ray lamp and hair begins to grow on the back of his hand. For the second transformation we see the hands transform first, followed by an extended widow's peak of head hair on his brow, sideburns then lengthen and thicken, and the eyebrows also lengthen and thicken. For the 3rd transformation we see the head change first then the hands. For the 4th transformation Glendon is at a secluded place and while laying down to rest the moon's rays come through a window transforming him. The 5th and final transformation occurs while Glendon and Yogami are fighting in the lab. The stress of the fighting in addition to the rays of the moon lamp caused the transformation. After Glendon was shot as a werewolf he reverts back to human form as he died and all the hair essentially vanishes.

FRANKENSTEIN MEETS THE WOLF MAN (1943)

For many Baby Boomers and Monster Kids the film, THE WOLF MAN (1941), is the one, Lon Chaney, Jr.'s "baby". However, the actual transformation scenes in that film were minimal with a reverse transformation of Wolf Man back to Talbot being the only real filmed effect. In the Universal Studio film series these classic werewolf transformation scenes were magically created by makeup master Jack Pierce who set the standard of excellence from which all other werewolf films are judged. And of all the Chaney werewolf films the best transformation from Larry Talbot to Wolf Man can be found in the film, FRANKENSTEIN MEETS THE WOLF MAN. Though other werewolf film transformations may be technically superior the overall effectiveness along with the uniqueness of Pierce's makeup makes this film the best of the series.

The first view of the Wolf Man in FMTWM is during the opening scene of the film where two grave robbers disturb Talbot's grave and after opening the coffin the rays of the full moon cause the transformation. At this stage all we see is the end result of the fully converted Wolf Man. For the second transformation Talbot is laying on a hospital bed and for this transformation we see his sideburns lengthen and hair appear on his lower chin. His eyebrows lengthen and blend into the brow hair as it too grows down to the bridge of his nose. Though there is no moustache or mouche there does appear to be a bit of hair on the outer area of his upper lip. Overall, as Talbot his hair is straight whereas as the Wolf Man his hair is a curly to a kinky curly variety. Also, as Talbot his hair is a uniform medium brown color whereas as the Wolf Man he has some gray hairs suggesting pigment loss in some hair fibers. While in the hospital Talbot is wearing pajamas but after he transforms and is out on the street he is wearing different clothes so he must have changed to street clothes just after his transformation to a werewolf. As the Wolf Man Larry Talbot's legs and feet are covered with terminal hair. Both the number of hairs and the length of those hairs are significant. As the fully transformed Wolf Man his hair is cropped and trimmed.

For his third transformation the sequence of hair changes appear to be the same as before. We later see him back to a normal Talbot so for this to happen would require some significant hair follicle activity in reverse for terminal hair to change to vellus hair not to mention the shortening of some terminal hair, the unkinking other hair shafts, and making new pigments to change gray hair to brown hair color. The fourth transformation occurs while Talbot is strapped to a lab table and our first view of this is in mid-transformation so there is hair on his face, brow, and chin that all grows into the full-furred Wolf Man for his smack down battle with the Monster.

UNDYING MONSTER (1942)

This is a case where psychological mental angst was used to make the

transformations and as such there is no organic basis to the effects. Therefore what mental trigger caused Hammond to imagine he was a werewolf? This is not as unreasonable as it sounds since many psychological episodes are emotional, which are hormone driven, so with a proper psychological influence many hormones can be produced in response that can in turn make physical changes to the body such as the conversion of vellus hair to terminal hair.

Though there is just one it appears that there are two werewolves in this film. Our first brief glimpse of the werewolf is at 56 min into the film. The 'first' one seen is in shadow form or backlit and appears to have wispy hair with bushy head hair, beard, and bushy hand hair whereas the second view of the supposedly same actor (Hammond) has his entire face covered with short, close-cropped, thick, and furry hair on his face as well as hands. This case looked more like a hypertrichosis disease instead of the more prominent "wolf" facial hair features seen in other genre films. Amusingly, the main actor (Hammond) sported a moustache in the film and it is still visible under all the werewolf hair growth. His hands have long, wispy hairs. After he is shot dead he reverts back to human form so his hair activity would be in catagen phase.

In an amusing bit of cinema 'proof' a spectra analysis is performed on a hair sample from Hammond and the conclusion is the hair is identical to wolf hair. All in all quite a remarkable observation and conclusion and only done in the world of SF cinema.

THE APE MAN (1943)

This film is an interesting Bela Lugosi vehicle who, as Dr. James Brewster, gland expert, develops a formula based on ape fluid that he tries on himself. His colleague, Dr. George Randall comments, "We made the experiment and unfortunately it was a great success." This is quite an extraordinary comment with the word, "unfortunately", adding a bit of macabre humor. (In my research career I have never felt unfortunate over any successful experiment.) An ape fluid injected into Brewster causes the change that appears to be permanent. Due to the injection the hair effects are self-inflicted. The terminal hair growth on Brewster resembles that of a chimpanzee. There is hair down the brow, up the cheeks, chest (seen through an open shirt), and on the forearms with no moustache, no mouche, and no hair on the back of his hands. Overall, the hair growth is confined, localized, and straight.

For an antidote, Brewster says, "Human spinal fluid injected into me. The only way to counteract the ape fluid injection...(the spinal serum will) cure completely and permanently." Randall responds, "(The fluid) must be taken from a living person. And the taking means instant death" (actually, it doesn't). In the film both the removal and injection are at the lower spine. As it turns out the first injection of human spinal fluid was only temporary with no hair loss that soon wore off. The human spinal fluid "won't keep" says Brewster suggesting it can't

be stored so it must be used right after obtaining it. As events move on Brewster kills several people and obtains their spinal fluid. The container of fluid shown appears to have around 300ml, "half a dozen injections" says Brewster. (So, 300ml at 6 injections is 50ml per injection; too large a volume to inject directly into the spine. Such an injection could cause severe pain and perhaps even a partial paralysis.) It is noted that throughout the entire film the excess terminal hair on ape-Brewster never goes away.

Since human spinal fluid is needed to counteract the ape effects this would indicate a hormonal basis. Therefore, removing the hormonal influence should itself help counteract the effects but since the hair growth appears to be permanent, i.e., genetic, then a hormone treatment may not work. So the hormonal effects of the serum caused a permanent though selective change in Brewster's vellus to terminal hair.

CAPTIVE WILD WOMAN (1943)

Dr. Sigmund Walters (John Carradine), a famous endocrinologist, uses gland extracts to change a gorilla to a human. As Walters says, "Glands can transform physical matter into any size, shape, or appearance." To demonstrate to the audience that Walters knows his stuff we get a glimpse of a (fictitious) scientific journal, "*Medicine and Surgery*" (published monthly) with the special feature shown on the cover table of contents: "'GLANDS and Their Secretions' by Dr. Sigmund Walters (endocrinologist)". While reading some of the article we learn that Walters invented (fictitious) vitamin E2 that "determines the physical characteristics of all forms of animal life" and that Walters also made "three attempts at racial improvements" (sounds scarily like Gestapo work). Walters' goal is the "Transformation of an animal into a human being." As such, there is quite a bit of hair activity from ape to human and back and forth.

A female patient presents to Walters who is diagnosed with a "follicular cyst which induces the secretion of an unusual amount of sex hormones" (read: estrogens). Seizing the opportunity Walters injects her glands (ovaries?) into the gorilla, Cheela, and we quickly see her hand lose hair (shed? absorbed?) and become human like. Therefore, Cheela's terminal hair was transformed into vellus hair. Once completely physically transformed to a human, now known as Paula Dupree (played by Aquanetta), though hairless, she still has her animal instincts. In one instance a jealousy induced hormonal rage changed Paula back to Cheela suggesting an emotional/hormonal link to the transformations. For the transformation the skin first darkens on her face, hands, chin, neck, and midriff followed by slowly growing terminal hair (this growth rate seems more reasonable). In the transformations we see long wispy hair (long vellus hair?) on her legs and feet. Her eyebrows are also different. Her final looks with her hair combed back and facial hair makes her resemble Zira from PLANET OF THE APES (in reality it's the other way around).

Most hormone-induced effects are temporary and to support this Walters says, "Terrific emotion would destroy the new gland growths", so such an outburst would cause a reversion of the effects. For the transformations, Walters, in addition to the gland extracts (i.e., implantation of ovaries), transfuses about 50cc of the woman's blood into Cheela. Then later another 80cc of whole blood is transfused into Cheela/Paula. To sustain the human effects Walters has "grafted glands from a living woman into your body." As the hormonal effects wear off the hair on Cheela's hands disappears (recedes?). Though male hormones like testosterone are responsible for hair growth, in the case of Cheela/Paula, the hormones are estrogen based so there must be a different hair follicle response for her. One interpretation is testosterone changes vellus hair to terminal hair whereas estrogen changes terminal hair to vellus hair.

THE WEREWOLF (1956)

The lycanthropy in this film is due to an experiment that went wrong which resulted in a genetic alteration and not due to the traditional "bitten by a fellow werewolf" scenario. Since the werewolf, Duncan Marsh, (played by Steve Ritch) is the result of science gone wrong it may explain why there is selective body hair transformations, including seeing the werewolf during daylight, and not the full body hair seen in other films. For Marsh, selective body hair transformations (clumps of hair?) are seen on areas such as his face, hands, wrists, nose, chest hair and ears. While a werewolf Marsh's left foot was caught in a bear trap (similar to Larry Talbot in THE WOLF MAN) and his trouser leg ripped showing no hair on his shin and lower leg again showing selective terminal hair growth. The hair seen is relatively sparse and not especially thick, unlike the Talbot werewolf. At one time the Marsh werewolf has hairy feet and not so at other times so even his transformations are selective.

As explained in the film, Marsh was in an auto accident and taken to two doctors, Forrest and Chambers. Chambers "treated" Marsh with an experimental serum (gave him a "full inoculation") obtained from a wolf mutant who died of radiation. After realizing the horrendous results of their experiment on Marsh, Forrest comments, "What have you done?" Chambers replies, "Done? Accomplished is a better word...that wolf man is the proof. Radiation creates mutants. People will become monsters and no longer human." The understated fear is radiation fallout from nuclear bombs would create mutants, a popular concept in the mid 1950s. The doctor's goal was to immunize humans by a slow series of inoculations to protect against radiation poisoning and Marsh was the first test subject that obviously failed. It is the radiated mutated wolf blood that causes Marsh's transformations so as a result some of the wolf's radiation-mutated DNA was incorporated into Marsh's DNA thereby causing the selective transformations.

Marsh has a wedding ring that seemingly comes and goes while a werewolf. For his first transformation we see his hairy hands and the ring is there but later in

the film his transformed hand is seen without the ring. Furthermore, his perpetual '5'O'clock' beard shadow comes and goes with transformations. Almost unique in this genre is that the Marsh werewolf has a moustache that is long and curved along his cheek in an almost handlebar-like form.

Since the moon does not cause Marsh's transformations he is controlled by his emotions. His first transformation into a werewolf occurred during an emotional fight. Subsequent transformations into the werewolf were also caused by emotional outbursts, some lasting for more than 12 hours. Under the emotional threat of being shot Marsh transforms into the werewolf and we see facial hair appear on his cheeks, eyebrows, he gets a widow's peak brow, chest hair, hairy ears, nose, and a moustache. All in all there are fewer hairs on his face than his thick beard hairs would suggest. Those facial and hand hairs seen are long and pseudo-wispy. Marsh also transformed into the werewolf once while sleeping in a jail cell indicating the spontaneity of the transformations. After being shot to death the werewolf transformed back to Marsh, only this time he was clean shaven with no 5'O'clock shadow.

MONSTER ON THE CAMPUS (1958)

The premise of this film is that primitive DNA, via coelacanth serum, will revert a more advanced species into a more primitive form, in essence, a "throwback". At first, coelacanth serum transforms a German shepherd dog into a throwback with longer teeth and meaner disposition (it is noted that there is no difference in hair growth on the dog). The professor (Arthur Franz) breaks the skin on his hand by accidentally scraping it against coelacanth teeth thereby introducing the more primitive coelacanth DNA into his body. Then the Professor immerses his cut hand in the fluid from the same container the fish was transported in thereby further introducing whatever was from the fish directly into his bloodstream.

The first transformations were not rapid and took some time to take effect. For the scene at the cabin the professor changes within seconds into the monster after a self-injection of coelacanth serum. The effective transformation scene of the professor turning into the throwback Neanderthal in the cabin is done with lab-dissolves showing a hairier and hairier head. Vellus hair turns into terminal hair on the face, brow, chest, and hand, though no moustache hair is seen. The hairier throwback Neanderthal was chosen to suggest more primitive characteristics and more hair was effective in achieving this goal. Apparently, it does not take much to catalyze a transformation since in one scene some coelacanth blood dripped into the professor's pipe and after inhaling some smoke of the burning serum he transformed into the throwback. (It should be noted that the heat of burning of the serum in a pipe does not alter the serum's effects; heat would denature most biomolecules making them useless.) Since the serum effects came via pipe smoke it can then be considered an inhalant and therefore must be absorbed through the lungs. After being shot dead the professor reverts back to human form and the hair is absorbed/recedes back into the body.

THE CURSE OF THE WEREWOLF (1961)

What separates this werewolf from all the others is the presence of hair on the glabrous skin of his hands. Early in the film a young adolescent Leon clearly shows growth of hair on the glabrous skin on the palm of his hand and later, as an adult, we see another clear view of hair growing on the palms and fingers of his hands.

In werewolf form his eyebrows disappear and excessive hair grows on his chest, hands, arms, and his sideburns lengthen. No moustache hair is visible. It is unknown about hair on his legs and feet as an adult werewolf since he wore tight pants and boots. As a young adult it took a lengthy exposure to the full moon to cause the transformation of Leon (in other werewolf films the transformation occurs as soon as the full moon is seen). Perhaps an adolescent prepubescent Leon did not have enough testosterone in his body to make an effective transformation to change all the vellus hair to terminal hair. Like Larry Talbot in *THE WOLF MAN* we see Leon's legs/feet change first and, just like Larry Talbot, Leon then changes pants and puts on a shirt after the transformation. Though slow to start, once started, the full transformation rapidly occurs. Leon has sideburns as an adult that remain so after reverting back to human form suggesting selective vellus to terminal hair transformations. For the last transformation hair first grows on Leon's glabrous skin on the palms of his hands then as patches on his back and chest. Then his eyebrows disappear and finally hair grows on his face.

THE BEAST MUST DIE (1974)

Though this film is more of a detective mystery to guess "Who is the werewolf?" than a true horror film we nevertheless see a transformation. For most of the film the werewolf seen is actually a real wolf so, as such, the hair transformations would be different from the more traditional human-wolf hybrids.

(Spoiler alert) The first (and last) werewolf seen is Jan. Jan bites Caroline Newcliffe who later becomes a werewolf. During her transformation her hands change first and become hirsute hairier (looks like terminal hair and not excessive vellus hair). Then she is instantly in wolf form. As a wolf her hair is shaggy, puffed up, and not matted down as normal, suggesting her piloerector muscles are fully tensed. As a man Jan has a moustache and as the wolf there is no hair on the upper wolf snout. The only actual transformation we see is a reverse one of Jan as a werewolf, after being shot dead, reverting back to his human form (thereby solving the 'mystery'). The hair recedes and his moustache reappears demonstrating remarkably selective hair activity.

WEREWOLF WOMAN (1976)

This film features a blond female who, in a trance while dancing under a full moon, transforms into the werewolf woman. As the hirsute horror the woman

has extensive blond hair all over her body (chest, back, legs, arms) that appears to be thin like vellus hair and not thicker terminal hair. Also, she has no hair on her cheeks, brow, and chin. In addition to her werewolf body hair she has dense unibrow hair that merges down on the bridge of her nose. Remarkably, her blond head hair is unchanged (long and wavy with 'body') and her glabrous skin has no hair. Not surprisingly, as a werewolf she has no moustache, no mouche, nor hair on her under forearm area from the wrist to the underarm though hair is on top of the forearm and upper arm, though not as thick as on her torso and legs. Also, as a werewolf she has no underarm hair as well as no hair on the bottom of her feet. With all that blond hair she therefore has no pigmentation in the shafts of each hair strand cortex.

THE HOWLING (1981)

This film features a colony of werewolves from old to youthful, both male and female (it is amusing that old werewolves complain of teeth problems). In this film there are also two female werewolf transformations that include facial hair, chest hair, and head hair changes. The male werewolves in the film have long, thick terminal hair all over bodies whereas the females have wispy hair. Overall, it appears that emotions seem to control transformations more than the effects of a full moon. In one scene, Eddie transforms during the day, inside a house, and in "wolf" form (neither wolf nor human) the hair is long, thick, and wispy and not neatly laid down on the body as a real wolf and represents a true hybrid form. In this case, Eddie has no moustache hair. In another scene, a forearm was cut off from a werewolf and the severed arm has long wispy hair with no hair on the glabrous skin of his hands.

Bill Neill (Christopher Stone) does have a moustache (small, well-trimmed) and when he transforms into a werewolf he develops long wispy hair on his neck and body in patches. It is noted that his moustache more or less stays the same and he does not have a mouche. The female he is with, Marsha, during her transformation to a hirsute werewolf also shows long wispy hair on her face, neck, arms, and upper chest. She has longer hair on her forearms and the backs of her hands.

Karen White (Dee Wallace) transforms into a hirsute werewolf at end of the film. She has long blondish hair all over her face including her upper and lower lip. Overall, she looked more like a cat face than a wolf face. Apparently, her transformation is also 'mentally' induced since she was indoors and away from a full moon.

AN AMERICAN WEREWOLF IN LONDON (1981)

The highlight of this film is the technical tour de force in the on-camera transformation scene. You can feel the pain of the transformation as vellus hair transforms into terminal hair. Not only the density of the hair increases but also the length and breadth of each strand is thickened.

For the first lengthy transformation scene of David Kessler (David Naughton) we see long wispy thick strands of hair first on the back of his hand then the same down the length of his spine, forearms, then upper chest, neck, and lower legs. Remarkably, the hairs are seen to visibly lengthen and they become thicker and denser. Also, the hair on his head becomes shaggier. His facial hair is the last to appear with modest sideburns. Then upper hair on the chest and arms is thicker and longer with little on his lower trunk and legs. All the early hair growth is black and after much of it filled in some of it was gray indicating modest pigment loss.

For David's second transformation the hair around his face is 'rimmed' like a mane though no moustache or mouche are seen. After he was shot dead he reverts back to human form and immediately loses (absorbed/receded?) all of his wolf hair.

Do werewolves get split ends?

As you now know human bodies are covered with many types of hair. Though the hair root is essentially the same the hair follicle that grows out of it can vary depending upon a number of factors, both genetic and those acquired by life styles. Excessive hair growth is relatively easy to understand but what is difficult is how hair recedes and gets reabsorbed instead of shed. Hair absorption would require radical biochemical and metabolic processes to occur that would give off heat thereby making the skin surface warm to the touch. Nevertheless, in our favorite scary hairy films we do indeed see hair literally grow and absorb rapidly so we must come up with an explanation. Perhaps the hair gets wound up on a spinner under the skin, similar to spaghetti noodles wrapped around a fork, that unfurls under the proper hormonal influence and reels in when the stimulus is gone. Though the speed at which hair comes and goes is a fantasy hair can nevertheless come and go but at a much slower rate. In reality, instead of being reabsorbed hair is simply shed and the bulb regrows a new hair follicle. And genes and skin health are an integral part of how the scary become hairy.

Since humans do not develop more hair follicles after birth then all they have is all that can be used for the various transformations in our favorite hairy films. So a newborn baby and a giant would have the same number of hair follicles on their body. It is nice to know that even werewolves do not have hair growth on glabrous skin (fingertips, lips, palms of hands, and soles of feet), with the singular exception of Leon in TCOTW.

Hair Club for Werewolves

At least for werewolves how can the rays of a full moon bring about the change of vellus hair to terminal hair? One possible explanation is that the moon's albedo slightly alters the wavelength of light that in turn excites, in some people, the overproduction of hormones, especially testosterone that, all in all, is a

sensory effect that induces excessive hair growth. Once the full moon is gone the person reverts back to normal since the stimulus for the hormone is no longer present. It is unclear if this means the terminal hair is shed, recedes, or is absorbed back into the hair bulb.

So, inquiring minds want to know, would a debilitary work on our monthly werewolves? Would the Wolf Man use a 'No-No' device to remove hair? During a full moon would a bald man lycanthrope re-grow head vellus hair to terminal hair and after the full moon is gone the terminal hair switches back to vellus hair and he's bald again? And would those werewolf women need extra help in their hair care? Would they mousse? Lastly, would an elderly man or woman who dyes their hair as a human have the dye restored when they reverted back to human form after being a werewolf?

Summary

It is interesting to analyze the various types of hair seen in some of our favorite scary films. Hair can come and go and either grows from where it already is or grows anew from places it wasn't meant to grow. Also, terminal hair (thick) can readily change to vellus (thin) hair and back and forth and forth and back again and again over and over. To help explain the results we see in these films those unfortunate hairy few have a rapid and massive production of androgen hormones that generate both new hair growth and vellus to terminal hair switching. After the hormone levels subsided then the affected hair reverts back to normal requiring some poorly understood biochemical effects. So, when you next see your favorite hirsute hypertrichosis transformation scene of vellus to terminal hair switching you can now better appreciate what all goes on both under and on their skin. A scary world indeed.

Thanks for reading. It's back to the lab for me. Stay healthy and eat right.

Captions for photos

1 – Dr Jekyll & Mr Hyde. Profile shot early on of the first Hyde transformation. His head hair has shortened with bushier eyebrows and thickening of vellus hair on his jaw line.

2 – Dr Jekyll & Mr Hyde. A spontaneous transformation with the brow hair and facial hair being the most dramatic with increased vellus hair on his face and chin.

3 – Dr Jekyll & Mr Hyde. The last transformation with all the hair changes in place. Some of the vellus hair has changed to terminal hair.

4 – Werewolf of London. Dr. Yogami as a werewolf with a widow's peak brow hair and busy eyebrows.

5 – Werewolf of London. Side profile of Glendon as the werewolf. Note the

presence of a mouche (“soul patch”), widow’s peak brow, and lengthy sideburns. The hair in his hand is thick and matted.

6 – FMTWM. Larry Talbot laying on his hospital bed during the early part of the transformation. The terminal hair in his jaw line starts first.

7 – FMTWM. Talbot during mid-transformation with additional terminal hair beginning to fill in.

8 – FMTWM. About an 80% completed transformation of Larry Talbot as the Wolf Man.

9 – FMTWM. The completed Wolf Man with all his terminal hair including lengths of grayish hair that are deleted of pigment. The hair on the Wolf Man is overall wavy and coarse whereas the hair on Larry Talbot is smooth and straight.

10 – Undying Monster. The werewolf with his short terminal hair more resembling a case of hypertrichosis than a real cinema werewolf. His moustache is still visible with all his other facial hair so that did not change at all during his transformation.

11 – The Ape Man. An image of Bela Lugosi that more resembles an Amish reader of *Scary Monsters* magazine and not someone with selective terminal hair on his brow, cheeks, chest, and arms brought about by an injection of ape spinal fluid.

12 – Captive Wild Woman. The hand of “Cheela” the ape during the beginning of her transformation into Paula. The terminal hair is disappearing.

13 – Captive Wild Woman. Mid-transformation of the hand with the finger hair gone and wrist hair beginning to recede.

14 – Captive Wild Woman. Paula’s hand with all the terminal hair completely changed to vellus hair.

15 – Captive Wild Woman. A hybrid of both Cheela the ape and Paula the female that resembles Zira from PLANET OF THE APES. The facial terminal hair seen appears to be thin and wispy.

16 – Werewolf. The beginning of the transformation of Marsh into the werewolf. His on-again-off-again 5’O’clock shadow appears to be on in this scene.

17 – Werewolf. During the early transformation the facial terminal hair is beginning to appear all over his face without any particular order.

18 – Werewolf. Mid-transformation showing short wispy terminal hair that, at this stage, somewhat resembles the werewolf in THE UNDYING MONSTER.

19 – Werewolf. Marsh as the werewolf with his relatively sparse terminal hair that looks like long vellus hair. Note the unusual presence of a moustache.

20 – Werewolf. The hands of the werewolf showing the somewhat uniformly thick and long terminal hair growth with none on his glabrous skin.

21 – MOTC. A composite shot of the transformation of the good Professor into the Neanderthal throwback. The vellus to terminal hair transformation is selective with no moustache.

22 – TCOTW. The only example in werewolf cinema where hair is seen growing on glabrous skin. Note that the back of his hand does not have any hair growth.

23 – TCOTW. During the early transformation of Leon into the werewolf showing selective terminal hair growth on his chest.

24 – TCOTW. Mid-transformation showing the lengthening of his sideburns, coarsening of his hair, and his disappearing eyebrows.

25 – TCOTW. The werewolf in all his glory with his trademarked three blood drools down his mouth. His mane of hair has turned a gray color indicating a loss of hair pigment during the transformation. No eyebrow or moustache hair.

26 – Beast Must Die. An early view of the female about to transform into a werewolf showing the vellus to terminal hair transformation on the back of her hand and fingers.

27 – Werewolf Woman. For the werewolf woman her head hair essentially remains unchanged while new vellus to terminal hair has sprouted on her brow and nose.

28 – Werewolf Woman. The fully transformed werewolf woman with her blonde hair over her body except on glabrous skin as well as under the arms and armpits.

29 – Howling. An early transformation view of a vellus to terminal hair growth on his face and chest with no change in his moustache or his head hair.

30 – Howling. An early transformation of a female showing selective terminal hair growth.

31 – Howling. A female's hand fully transformed showing the long wispy hair that extends up her arm.

32 – Howling. An early transformation showing the selective blonde terminal hair growth on the side of her jaw that extends down her neck.

33 – Howling. Final transformation of the female that appears to more resemble a cat than a wolf with the long wispy hair that seems to have been coifed.

34 – AAWIL. An early transformation view of David as the terminal hair selectively grows on his spine and body.

35 – AAWIL. Mid-transformation of David with his terminal hair becoming more prominent with more around his upper chest and neck area.

36 – AAWIL. Though terminal hair on his chest and neck have significantly lengthened as well as turning gray his facial hair is sparse at this near end stage of his transformation.