

## Henry and Victor

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In the book, *Frankenstein*, by Mary Shelley, she referred to the monster's creator as Victor Frankenstein. This is the same name used for the character in the Hammer Studios' Frankenstein film franchise that started in 1957 with their release of, *The Curse of Frankenstein*. In the Universal Studios' film, *Frankenstein*, released in 1931, the good doctor's name is Henry Frankenstein. The main actor playing Victor in the Hammer films is Peter Cushing whereas the actor playing Henry in the Universal films is Colin Clive. Though the end results of Henry's and Victor's efforts were the same, namely the creation of a man from parts, how they went about the work at hand is quite different. So much so that it deserves a closer look. But first, some comparable background details.

[Note: this is not a contest of who is better, Henry or Victor, (nor a contest between Universal and Hammer) but rather an analysis of which approach could potentially be more fruitful resulting in the creation of the monster. Is it Henry or Victor who had the easier path?]

### Master Plan

Both Henry and Victor ultimately had the same plan, to create a human being from parts of dead or nearly dead bodies. Both are dedicated to their work so much that they can't see the consequences and all issues of proper ethics are quickly dismissed. In their case the end does justify the means, any means. Though the education, laboratories, and methods of both Henry and Victor are quite different their end results, namely the successful creation of a living being from body parts, are the same so their respective approaches must be considered validated. Though the two different approaches may be validated they are anything but equal. For validation issues it is important to have different methods give the same results which strengthens the two approaches. When the destination is the same it is the journey that is the difference.

### Education; Dr. Henry and Mr. Victor

There are major differences in the education of both Henry and Victor. In brief, Henry has a formal education through university and medical school with mentors (Waldman and Pretorius), whereas Victor was taught by a tutor (Krempe) from about the age of 15 to 18 and then self-taught, still with his tutor, apparently without the help of a university education. Dr. Henry has a diploma and Mr. Victor does not. And this brings up an interesting point in the education system. Given a well motivated student then which is better, a formal school

teacher-based education, or self-education home schooled by reading the books and conducting appropriate laboratory exercises and procedures to learn? Educators are currently debating this so the jury is still out. Each approach has merit and both are valid. Of course, the main difference is social interactions through a structured educational system, especially during the adolescent to mid-teenage years. And key here is a “well motivated” student, of which most are not and with proper guidance (i.e., teachers) the less motivated can do just as well in the long run.

Another important difference, and one that is often understated or just ignored, is under a formal education system the student importantly learns what not to do. A self-educated student may often stumble through the same mistakes without meaning to simply because there is no guide (i.e., teacher or mentor) to help. In this approach time, resources, and energy can be wasted. In this respect the presence, help, guidance, and wisdom of colleagues and mentors is invaluable. One can still be well focused under a formal training program (i.e., Henry) just as well as a self-taught, trade school-like setting (i.e., Victor). Since the end result of both Henry and Victor was the same then this suggests that the individual training of medical school diploma versus a self-educated home school, trade school-like environment are not much different. So, formal education vs home schooling, which is better?

We also know that Henry too was a well motivated student because during one exchange between Professor Waldman and Henry’s fiance, Elizabeth, Waldman says, in reference to Henry, that he has an “insane ambition”, recognizing the succeed-at-all-costs mentality.

It could be argued that since Henry received a formal university education whereas Victor was tutored and removed from a university setting the training of Henry is superior to Victor. Henry also had the tutelage of Dr. Waldman and possibly Dr. Pretorius. In his case this was excellent training and provided instant background details on Henry. Without the instant background education that Henry has a good part of the plot of Hammer’s, TCOF, deals with explaining Victor’s education since he did not have the formal training implied with Henry. Henry’s university-based education needs no explanation. And since Henry had to know a considerable amount of electrical engineering then he must have gotten this training while also at the university, perhaps as part of his general education background training for medical school.

One wonders how effective and efficient Victor would have been if he was university educated including medical school like Henry. Would Victor have spent his time resuscitating dogs if he was a trained physician like Henry? And if Victor was university trained then much of his lab equipment would not be necessary since there would not have been any need to have them. No doubt Victor (and his tutor) would not have made as many mistakes during the years of their training/learning if he had the proper guidance of a bonafide university

program since the teachers would have provided appropriate methods and procedures during the learning experience. As mentioned above, essentially learning what not to do. The major advantage Victor has is his Baron title and his wealth so he could afford mistakes during his learning experiences.

Victor says he “always had a brilliant intellect” and his teachers at school were not as sophisticated as he wanted so he took control of his own education. To get a tutor Victor uses subterfuge, lying about him being his father, so not to discourage prospective tutor candidates. Victor hires the tutor, Paul Krempe, to begin his formal schooling. Though Paul is a well qualified and knowledgeable teacher (“the Baron is quite familiar with my qualifications”, says Paul) he apparently does not have a higher degree of learning since nothing is heard about this. It should be noted that Paul is not a doctor. Though not within a formal place of higher learning Paul teaches Victor in the Baron’s home. When Paul first met Victor the Baron was 15 years old (Victor stated that his father has been dead for 10 years and he was the Baron for 5 years). So, Victor was 15 when he began down the road of being home schooled. During the contemporary era of the film a 15 year old student had already received most of his formal education pertaining to the fundamental skills of reading, writing, and arithmetic. Anything beyond that requires different skill sets as well as motivation.

During one teaching session Paul is seen at a chalk board with several chemical equations. The top two rows are organic chemistry reactions (involving carbon) whereas the bottom two rows are equations for making copper sulfate (primarily used as a herbicide, fungicide, and pesticide). The 6-sided chemical structure shown on the top row is benzene. Benzene was discovered in 1857 by August Kekule (1829-1896) and if the contemporary time of the film is ‘before’ 1857 then it is difficult to reconcile this timeline. Perhaps Victor was exceptionally prescient with a truly “brilliant intellect” and discovered this chemistry before Kekule!

Taken as a whole this teaching lesson, an organic chemistry reaction and an inorganic chemical reaction, does not make sense by mixing both of these moderate level chemical equations. (Sort of like talking politics and religion at the same time; best to keep them separate, like organic and inorganic chemistry.) It should be noted that in the context of the film Victor was around 16 to 17 years old during these learning exercises. These chemistry lessons are upper university level so to properly understand them Victor must have had significant pre-requisite studies to understand the fundamental nature of chemistry.

With the same chalk board we see Victor learning electronics using overly sophisticated circuit drawings for electrical systems that are way ahead of the time of the film’s era. Wiring diagrams are primarily a 20<sup>th</sup> Century invention and out of place in a 19<sup>th</sup> Century time setting for this film. Nevertheless, the scene demonstrates Victor’s command of the electronics world that will serve him later

during his resuscitation experiments. And just so you gentle readers know, Henry should also know this material in order to construct all of the electrical apparatus he has.

Victor's training and learning are akin to a vocational program or trade-school that is well focused instead of a broader education one that Henry would get at a university. So, technically, Victor is not a doctor, though as equally educated if not better educated, than those with a diploma. Victor was more obsessed to achieve his goal as soon as possible which is why he is maniacally focused on his precise education. Henry was more casual about it and not as obsessed with time as Victor. This perception difference does dictate and influence their behaviors. As Victor describes, "In two years (Victor would be 17 years old at this time) I learned all he (Paul) had to teach. We went on together. Probing into the unknown, investigating, recording, searching. Always searching. Until gradually the great sweep of our research began to assume a single direction. To this aim we finally turned all our energies. It took us years of unrelenting work to discover what we were seeking." "Years" could be up to 10 years, or more, which would then put Victor comparable to Henry's age of late 20s. (In one exchange between Henry's father during a wedding ceremony the elder Baron refers to a crown of flowers he presented to his wife, "30 years ago", so Henry can not be any older than 29, most likely 28.)

In a conversation with Paul, Victor states, "We've discovered the source of life itself. We've restored life when life was extinct. It's no longer sufficient to bring the dead back to life. We must create from the beginning. We must build up our own creature. Build it up from nothing. Limbs, organs, and then we must build...we must create a perfect human being." And this sets the stage and motivation for all that Victor does after that.

#### Skills needed to get the job done

To master all the skills needed to bring dead tissues back to life for their creatures both Henry and Victor needed to know anatomy (muscles, bones, organs, tissues), biochemistry, bioelectricity, cardiology, neuroscience (brain anatomy, physiology, and surgery), physiology, surgery, not to mention running tests and lab maintenance issues, such as ordering supplies and maintaining functional equipment. Henry could easily have learned all of this during his formal schooling whereas Victor needed to cobble together what he and Paul could, no doubt making mistakes along the way, to achieve the same results. Both Henry and Victor knew that certain things worked and certain things did not work ("brain, totally useless", says Henry after Fritz cuts down a body from the gallows) without not really knowing the exact mechanism of why it worked or didn't work (such as tissue rejection, neurological synapses misfiring, DNA genetics, and immunology).

#### Raw Materials

Both Henry and Victor were Barons so they had their family fortune (Victor says, "Frankenstein fortune") to fund their education and research and to make their dreams come true. Victor paid for his tutor, all lab supplies, and equipment necessary during his many years of learning. Henry's family fortune paid for his education as well as equipping his lab, most likely much less than Victor spent on his. The main reason being Henry used what resources were available at his various schools to learn whereas Victor had to buy everything he needed. To build their labs Henry used an abandoned windmill whereas Victor used his home so there won't be any prying eyes from questioning villagers.

To make their creature both Henry and Victor needed some similar materials for their respective lab work. Both Henry's and Victor's labs have copious amounts of glassware, various liquids (in vivid color for TCOF; see below), lab apparatus, chemicals, tissue samples, body parts, and means and methods to keep human tissues 'healthy & alive'. In addition to this both Henry and Victor had large amounts of electrical apparatus, in keeping with the then thinking of using galvanic electricity as a means to "play God" and bring the dead to life.

Both Henry and Victor obtained their bodies ("frameworks") from gallows. It should be noted that when the bodies were cut down from the gallows, for both Henry and Victor, they fell several feet (about 6 feet for Henry and about 8 feet for Victor) which may have broken some bones and damaged tissues and organs. They both fell with a resounding thud. Until the body was 'alive' then broken bones would not heal. Damaged tissues and organs that could have easily ruptured from a fall, such as kidneys and spleen, would also not heal until the body was alive. Also, there could have been internal bleeding and/or neuromuscular issues (crushed spine?) that would not be seen until the body was brought to life. It is unknown how long the bodies have hung from the gallows but it must have been many days so some decay has set in. In the case of Victor's body it was hanging long enough (hanged "last week") that birds fed off the body's eyes. For Henry's body, when they came to get a man hanging from a gallows, Fritz, his assistant, comments, "Look. Its still here", suggesting the body had been left hanging for some time. When bodies hang for a while their spines become distended and this would need to be repaired. Lastly, how long did it take Henry and Victor to assemble their bodies? Most likely at least a few weeks and in the meantime the body parts, in particular the internal organs, could have been degrading requiring replacement(s) over time.

We know that at least 3 different body and body parts were used for Henry's creature: the body, the brain, and the two hands (based on the suture scars we see on each wrist; not sure if the hands are from the same person or two different people). Henry sent his assistant, Fritz, to do the dirty work to get a brain. Henry had his professional reputation at stake so he did not want to get directly involved in part acquisition should he get caught; not a problem with Fritz (however, you get what you pay for and in this case, Fritz got the wrong brain, albeit a criminal one).

For Victor he apparently used at least 4 different body and body parts consisting of the torso, a set of hands, eyes, and the brain. The hands came from a recently deceased sculptural artist whereas the eyes were obtained from a cadaver. Victor made two separate trips to get the hands and eyes. Victor did not have a professional reputation at stake like Henry so he was freer to engage in acquisitions without the fear of getting caught; he had his Baron title to fall back on should any 'questions' arise as to his actions. It is clear that Victor paid for some body parts, like the eyes, whereas Henry apparently did not pay for any of his parts but took to robbing graves. As Henry says just after exhuming a coffin from its grave, "Just resting. Waiting for a new life to come."

In one exchange, Victor says, "I need some raw materials for my work", and sets out and gets a pair of eyes from the "Municipal Charnal House" (which in reality are actually cow eyes). During this scene he carries his small black 'doctor's bag' which is quite beaten and well worn, not fitting to a Baron who is "quite rich". In this case Victor is pretending to be a doctor as he goes about his business of getting the eyes. With his maniacal-focused agenda it is understandable that Victor wishes to play doctor. However, to go all out in the part he should have used a newer doctor's bag.

#### The Atmosphere is Electric

For their creations, Henry needed inclement weather (lightning storm) whereas Victor did not. Victor could conduct his experiments without worrying about the weather. Nevertheless, both Victor and Henry used galvanic responses to revive and revitalize their creatures. It is unknown the amount of voltage that ultimately went to either of the creatures and to better explain this requires some further background information.

Lightning occurs when there is a charge buildup in the atmosphere. This charge buildup comes from the charge in water droplets. The more the charged water droplets the bigger the cloud and ultimately the larger buildup of charge. So much so that the surface of the earth has a cloud-induced opposite charge. Ions flow through the air between the two charge sources and form a path of least resistance and when enough ions flow then lightning is created.

Thanks to Benjamin Franklin (1706-1790) we know that lightning is electricity. Fundamentally, electricity is the flow of charge and the current is the amount of charge that flows through a specific area in one second. Voltage is the work done to create the charge. It is known that the voltage of lightning varies with both altitude and the thickness of the bolt. These variables are due to the fact that the earth and cloud are capacitors, which are devices to store charge. When the distance between earth and cloud increases (higher clouds and/or valleys of earth) then the voltage needed to produce the lightning needs to increase. In other words, the distance between the ground and the lightning cloud determines the amount of voltage, the shorter the distance the smaller the voltage and the

longer the distance the larger the voltage needed. All in all, the variation in lightning bolts typically goes between 10 million to 120 million volts. It is unknown how much voltage was acquired by Henry, though he did comment at one point that, "This storm will be magnificent! All the electrical secrets of Heaven." Even so, Henry most likely had various generators and capacitors that could have modified the charge in any number of ways before it made it to the neck bolts on the creature. The platform holding the creature was elevated to help minimize the distance between the cloud and the lightning rod source so some of the power of the voltage may have been naturally diminished due to this shorter distance.

Since Henry's windmill lab is located in the high altitude Switzerland Alps then he would have been quite close to the storm clouds. Therefore, the closer the earth to the clouds means lesser voltage from lightning since less distance to travel, probably near the lower 10 to 50 million volts range. Even so, Henry's generators and capacitors should have been able to handle the charge and mute it before entering his creature.

For Victor's batteries it is unknown if he had them connected in series or parallel. My guess is they were in series to maximize their voltage. When connecting in parallel you are doubling the capacity of the battery (amperage) without changing the voltage. Since these batteries were from the 19<sup>th</sup> Century their capacity was most likely minimal so to increase the voltage Victor probably connected them in series.

#### Assistants in each film

In the 1931 film Henry had Fritz, an assistant, and in the 1957 film Victor had Peter, a tutor. Victor had the better helper since the 'tutor' fundamentally understood what was going on whereas Fritz was a simple 'gofer' lab assistant and, more or less, did what he was told. Peter understood the theory behind what Victor was doing and could make contributions along the way as an equal. Fritz, however, most likely understood very little of the theory so his contributions were of a completely different nature, more subservient than equal. Furthermore, on the darker side, Fritz had no problems with ignoring the law or dealing with uncomfortable ethical issues whereas Peter clearly did. Victor simply paid his way through everything. In a letter to his fiancée, Elizabeth, Henry writes, "Only with my assistant here in my laboratory", suggesting he has no one else so all the key work was done by Henry himself with Fritz doing the menial work.

Though Peter later objected on ethical grounds about Victor's work they did team up together when it counted to complete the work of the creature. On the other hand, Henry had such command of his work that he was able to do most of what he needed on his own and that Fritz seemed a combination of assistant, butler, and slave.

#### Contemporary Science

The science known at the time of a film's production often dictates certain plot elements. Contemporary with a film's production, what science is known to scientists is quite different from what science is known by the public. The classic Universal films are from the 1930s-1940s whereas Hammer films are from the late 1950s through the early 1970s so this is almost a generation later. Much science has advanced during these years and what was known to scientists has filtered down and became known to the public. Even so, the scenes depicted in Universal films very much resemble the Victorian era depicted in the Hammer films; both films take place in the Swiss Alps area. The sophistication in electrical equipment and in the various lab sets makes the Universal film seem more contemporary than the Victorian Hammer sets, even though the nature of the black & white film makes it seem inferior. The Universal lab sets seem overall to be more useful and functional than those from the Hammer films. The Universal lab sets seem to emphasize functionality whereas the Hammer lab sets, though somewhat functional, are very much influenced by one primary element, namely color. The Hammer set dressers used as much color as possible, mostly as a novelty and make them more appealing to the audience. This difference between Universal's black & white films, seeming to be 'inferior', to Hammer's bright color films is more due to color than in any real sense.

#### Henry's Laboratory

To compare the two approaches of Henry and Victor we need to analyze what each had to work with and what was potentially known, scientifically, at the time. And what they had to work with is shown in their respective laboratories and on their lab benches. Therefore, we need to analyze their separate labs to understand the effectiveness of their bench bling in being able to create their monsters. Was it mostly skill or mostly luck that got them their results?

These lab sets, where the science action takes place, are interesting windows within the film production to analyze and understand a significant amount of biology. One important question is whether the various lab sets were themselves pertinent to the work at hand as presented in the films. Were the lab sets adequate for the work or was this bench bling just for show without any real purpose other than it looks cool on a lab bench in a film? What is on these lab benches does provide much insight about the type and nature of the supposedly offered science in these films.

Most of the bench bling in Henry's lab is electrical in nature. The various apparatus are designed to not only capture bolts of lightning but to also transform this into useful energy. So, Henry's world was one of galvanism and surgery. Some of the glassware in use was for making various reagents and solutions, most likely to use for his body parts. Henry was not in this lab as many years as Victor was in his so there is not the accumulated items of years of previous work. Henry's lab was established for the sole purpose of making the creature whereas Victor's lab was used for years (a decade?) with many experiments performed prior to the making of his creature.

After Henry brought the creature to life he was done with the major pieces of equipment so he had them covered with large white sheets to help protect the delicate pieces. Nowhere in Victor's lab is anything covered due to lack of use. All of Victor's pieces he accumulated over the years were left available, whether they were in use or not, all of which added to the clutter.

#### Victor's laboratory

Over an approximately 10 year period Victor and Paul built up quite a substantial, well-equipped lab for its time. Present are copious glassware, solutions, test tubes aplenty, fluids, chemicals, gas cylinders, pumps, and various instruments and apparatus. As mentioned above there is also an acid bath to get rid of unnecessary body parts; just bones are left. A lot of organic chemistry glassware like evaporation columns, and evaporators, pieces needed to characterize small organic molecules are visible. Also visible are various books, shelves, a human skeleton (where did young Victor get the skeleton?), and some large ehrlenmeyer flasks with attached separatory funnels (used for clarifying liquids). Some of the large flasks have large funnels on top that are used for filtration, for which the immediate use for the work at hand is unknown. Victor and Paul built their own battery generator to power their machines and some of this is seen in their lab. Tygon tubing, meaning clear flexible plastic tubing, is seen connecting various pieces of glassware. Such tubing is a 20<sup>th</sup> Century invention and clearly not contemporary with the film's setting of approximately mid-to-late 19<sup>th</sup> Century. Mid-19<sup>th</sup> Century tubing was opaque and either black or a reddish-brown, which are seen elsewhere in the lab. Present on the walls of Victor's lab are varioius anatomy charts of one form or another, all contemporary with the understanding at the time. All in all, for the making of Victor's creature much of the bench bling seen in the film is not needed for the work at hand and just serves as eye candy clutter.

It should be noted that visible is a graduated cylinder for measuring volumes of liquids; such graduated cylinders are not 19<sup>th</sup> Century design and are out of place in Victor's lab. Furthermore, some of the glassware, such as some of the beakers, are Pyrex, a 20<sup>th</sup> Century invention (pyrex glassware was invented in 1908 and is a low-thermal expansion borosilicate glass designed to withstand high temperatures to cold temperatures without cracking or breaking; sort of like tempered glass). Also of interest is the absence of visible notebooks in Victor's lab. Some of the sophisticated and elaborate glassware, such as distillation columns, appear not to be necessary. However, it should also be noted that Victor received some chemical education from Paul so this glassware could be leftovers from that work and not indicative of current work. Afterall, many items in his lab may have been there for years and no longer in use.

The first on-screen experiment we see of Victor's and Paul's is bringing a dog back to life that has been immersed in water. It is presumed the dog "died" by drowning and also, presumably, wasn't dead long before they began the

resuscitation procedure. A key component of this revival is removing fluid from the dog's lungs; this part of the procedure was not seen. The question is not really being able to revive a dead dog but, rather, how are the dog's cognitive abilities upon revival? Did the dog suffer any brain damage? This is a direct function of how long the dog was 'dead' so if the dog was dead for just a few minutes then all could be OK. If the dog was dead for more than 15 minutes then brain damage would occur.

As mentioned, Victor has a large tank of fluid to hold the creature. For the most part the creature is seen floating in the fluid filled tank (first without a head and then, later, with a head). It is not sure if the fluid is only water or water mixed with other chemicals, like salts, minerals, and vitamins. However, since the fluid is cloudy then some chemicals were dissolved in the water. This is important for two reasons: one is to provide nutrients to the creature and, second, to provide enough "impurities" in the water to better serve as conductors of electricity (see below). Most likely this fluid was room temperature and not warmed up. It is known that water and electricity do not mix well. Pure water is not conductive but, rather, it is the impurities in water, such as salts, ions, and particles that allow the conduction of electricity. The body of Victor's creature was immersed in a water tank with bare wires attached to metal plates seen in the water. When the generator batteries are started then electricity flows through the wires and into the water with the creature. This could be like putting an electrical device, like a radio, into a bathtub, causing an electrical short which could cause the death of the unfortunate bather. In Victor's case, the electrical jolt sent to wires into the water and into the creature provided enough voltage to bring life to the lifeless creature. Curiously, after the tank had drained we see in the corner of the tank what appears to be a glass evaporator tube used to separate small organic molecules. Water (hot or cold) flows through the vessel that condenses gas/fluid that goes through the helical glass tube inside the vessel, and this function, completely immersed in the tank, is unknown.

The first we see of Victor's creature is when he is standing with his face covered with bandages raising the question of how could he see to get out of the tank, walk, stand upright, and after removing his facial bandages, immediately begin to choke Victor?

On the benches of Victor's lab are many glass vessels containing a variety of colored liquids, from red to blues to greens and yellows. In real labs throughout the world about 95% of ALL liquids are clear. A few buffers may have slight color but nothing like the rainbow of colors seen in Victor's lab. All of these multi-colored liquids are "Hammer colors" and are just for show in a color film with no bearing in reality. (Sorry to burst your bubble but all those colored liquids in films, not just Hammer films, are all just for show, meaning they are fake.)

Incandescent light

In real time there is a generation difference between FRANKENSTEIN'S 1931 and TCOF's 1958 (27 years) and during those years much has changed in biomedicine. Interestingly, what is in the films does not reflect this generational difference. In many respects both films more or less take place during the same era, at least pre-20<sup>th</sup> Century. We can tell this by certain items in their labs that helps us make relatively accurate estimations of when the film's action takes place. One significant item is what appears to be an incandescent light bulb. The electrical devices Victor uses as batteries have glowing filaments, the key element of a light bulb. What appears to be a 'standard light bulb', meaning years after the discovery of the light bulb, is seen over a desk of Henry in his lab. Henry is seen turning off the bulb ("Let's turn out the light", says Henry) just before the Monster makes his first appearance by backing into the lab. The light bulb was invented in 1879 so the action with Victor must take place after that. Most likely, the action with Henry takes place even later than that based on the type of light bulb used. The opening paragraph to the TCOF film states, "More than a hundred years ago, in a mountain village in Switzerland..." and since the film was made in 1957 this makes the contemporary setting at least before 1857. This is difficult to reconcile with the invention of the incandescent light bulb being at least 20 years after this (not to mention the tygon tubing, the graduated glass cylinder, and the Kekule chemistry lesson mentioned above).

#### Wimshurst generator

The Wimshurst machine is an electrostatic generator, a machine for generating high voltages, developed between 1880 and 1883 by British inventor James Wimshurst (1832–1903). It has a distinctive appearance with two large contra-rotating discs, glass or plastic, mounted in a vertical plane, two crossed bars with metallic brushes, and a spark gap formed by two metal spheres. In the early Hammer Frankenstein films the generator is hand cranked whereas in the later films of the series the generator is activated by a switch.

In just about every Hammer Frankenstein film a Wimshurst generator is seen. There is a time problem with the action in *Curse of Frankenstein* happening sometime during the early to mid 1850s and the invention of the Wimshurst generator in the early 1880s, a thirty year gap.

#### Brain surgery 101

A key element for both Henry and Victor is the brain of their creatures. Both Henry and Victor understood the value of an intact brain and knew this was key to their success. And both used 'stolen brains'. It should also be noted that both brains were 'damaged'; Henry's was mentally damaged, a criminal brain, and Victor's, which came from an admired colleague, was physically damaged from a gunshot (see below). Victor wanted an already existing brain, an already developed brain because, as he says, "My creature will be born with a lifetime of knowledge." The brain Victor 'chose' came from the highly esteemed Professor Bernstein. Henry's brain came from a lifetime of crime. [Note: current thinking in the neurosciences does not support the concept that gross, physical anatomical

changes in brain structure are due to the person's life-style and behaviors. Therefore, contrary to what the good Professor Waldman says, a normal brain and a criminal brain would look physically alike. A century ago the 'science' of phrenology, or the study of bumps on the skull, was an indication of the sort and type of brain it held, a concept that Prof Waldman supports. Phrenology analysis was quickly outlawed since it had no bearing in reality.]

The creature escapes, roams the countryside, and Victor's tutor/assistant, Peter, shot the creature in the head (through the right eye) damaging the brain. As Victor says, "Life has gone from its body", and they subsequently bury the body. To bring this creature back to life Victor became an expert on brain surgery ("I've started on brain surgery", says Victor) and repairs the damaged brain from the shot-in-the-head creature. This is quite a remarkable concept of being a self-educated "expert in brain surgery". On whom did he practice other than the creature? Did Victor learn brain surgery from books or did he consult with professors at a nearby university? Furthermore, how long did the creature with the damaged brain 'rest' (both buried and in Victor's lab again) until Victor became a brain surgery expert? While Victor was cramming for brain surgery the creature and his damaged brain were decaying possibly causing more damage. The creature would need to be preserved somehow while Victor was learning his brain surgery craft. How long was this?

Nevertheless, after corrective brain surgery Victor's creature lives again. However, since there was no mention of a new brain to replace the gun shot damaged brain we can only assume that Victor "repaired" what was left of the creature's brain. Due to the gun shot to the right side of the head then this part of the brain, the right hemisphere, was damaged, possibly leaving a large piece missing. Since we do see the creature responding to minimal commands then some part of his brain was working, albeit in a less than perfect manner. However, it should be noted that this creature, v2.0 if you will, still has neuromuscular issues and is not in full command of body movements. At best, his walking and trying to sit demonstrate more of a muscular issue than a brain issue. With a good portion of his brain missing then the creature would have to re-learn many behaviours and actions.

Henry never had this problem since the brain he used was intact and apparently fully functional, albeit a criminal one. Henry most likely received his brain surgery training while in medical school so he was more prepared than Victor for the necessary work.

#### Damaged brains

Paul and Victor have a brief altercation after the Baron removes Bernstein's brain, the one Victor has chosen for his creature. In the scuffle the jar containing the just extracted brain is broken with many shards of glass embedding in the brain. Back in his lab Victor removes bits of broken glass from the exposed brain (totally lacking all sterility concerns) making one wonder what brain neurons were

severed by the glass shards. This brain is then transplanted into the head of his creature.

We know that both the brains of Henry's and Victor's creatures were functional because all six levels of cognitive processing (remembering, understanding, applying, analyzing, evaluating, and creating) are seen by both creatures. Therefore, both brain transplants, albeit one with a criminal brain and the other with a good chunk of the brain missing, do indeed appear to be successful based on their behaviors and responses. Please remember that obvious gait movement issues, like difficulty in walking, are separate from cognitive issues. Many confuse the flailing arms and legs to be a damaged brain problem, which it is not, instead of the real issue of neuromuscular abnormalities, which they are.

What they need but we don't see

Though what we see in both Henry's and Victor's labs is sufficient for them to do their work there must be separate rooms for supplementary items and materials to support the lab experiments. We do get to see some of this with Victor since he has a back room with a large acid bath vat to dispose of unwanted body parts, leaving only the bones behind. Henry, who must have had some unwanted body parts, had nothing like this so where did he dispose those? For Henry the only separate room we see is the one the Monster is kept in. There must be supply rooms as well as other electrical generators, separate from those dealing with lightning. Where were these kept? Victor used batteries powered by the glass circular generator that ran the batteries and no support work is seen for this extensive apparatus. What powers the generator? Also, Henry has a light source over a desk that must have a power generator somewhere, separate from the apparatus he used to bring his creature to life.

For the final dissection of the creature Professor Waldman had prepared a table with all the tools necessary for such a procedure. These tools had to have been stored somewhere so there must be additional storage space at Henry's lab. Furthermore, Henry made a lot of buffers and solutions so he must have had a constant water supply. Where did he get the water? For one wide angle scene of the windmill (an obvious miniature) no visible water source is seen. (note: stretching things a bit we do see a waterfall adjacent to the windmill in the film, FRANKENSTEIN MEETS THE WOLF MAN, but that is digging deep into the film franchise and may not be fair since we are limiting our discussion here to just FRANKENSTEIN.)

In Victor's lab there was a large amount of fluid seen. The tank used to immerse the dog was (rapidly) drained and where did the fluid go? Furthermore, there is the large tank the creature was kept in that had many liters of fluid (maybe 500 liters) that was also drained and where did this volume go? Victor must have had a sophisticated drainage system in his house that we do not see.

Utility of Laboratories

Henry's lab was more streamlined and more pragmatic since his work was well focused. Victor's lab evolved over the years to eventually focus on the creation of the monster so there were many intermediate steps along the way and this is reflected in the copious amount of bench bling (lab debris?) that does not seem to have a direct bearing on the work at hand. Victor perhaps spent about 10 years in his lab whereas Henry most likely spent maybe a year in his. And due to years of accumulation Victor has quite a lot of apparatus and other lab related items that if needed immediately he could use. Henry had to order or make something if it was needed urgently which could cause delays.

### Sterility issues

The biggest problem in the work in both Henry's and Victor's labs is the lack of sterility. Not only in their procedures but also in the items used such as quite dirty cloths, rags, bandages, and other covering items, not to mention surgical knives, and scalpels, etc. The removing of Professor Burnstein's brain and placing it in a non-sterile jar with some, most likely, non-sterile fluid would have caused irreparable tissue damage. In addition, the hands Victor obtained (from a sculptor) were wrapped in rags that totally lacked any degree of sterility that could seriously change the tissue structure and make it impossible to effectively transplant. Also, in keeping bodies open and exposed to ambient air meant some degree of putrefaction has set in. This decay process needed to be slowed down considerably or stopped.

When Prof Waldman was going to perform the final dissection on Henry's creature the surgical instruments seen could have been sterilized. Such sterilization of metal and glass instruments are typically done with an autoclave, a device for creating high temperatures and pressures to sterilize items. No autoclave is seen in Henry's lab so if he had one, where was it kept?

### Summary/Conclusions

Though both Henry and Victor were successful in creating their monsters how they got there were by completely different paths. Henry chose the more traditional route of a formal education whereas Victor was more independent and became his own teacher without the rigorous trappings of a formal education. Since each were successful then each approach must be considered validated. However, the path Victor chose was unnecessarily more expensive, time consuming, and laborious since he was on his own. Victor's lab was more cluttered with items not directly pertaining to the making of his creature due to the years of prior experimental learning. Henry's lab was streamlined for the task of monster creating making his approach more efficient. So which approach is better? Perhaps you should decide.

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