



The Horizon Newsletter

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Marilyn Monroe: Mental Health in the Modeling Industry

By: Sruthi Anne

From the surface, things can always look glamorous. It's like models are perfect and their lives are perfect, they earn lots of cash and acquire free things for just standing there taking pictures and looking good. In reality, people don't realize how unhappy, how uncomfortable, and how dangerous a model can feel in their life.

Marilyn Monroe was a famous model and actress. Norma Gene Mortensen (Marilyn Monroe's birth name) was born on June 1, 1926 in Los Angeles, California. Her mother Gladys Baker couldn't take care of her so she left Monroe with another couple within the time period after her birth. Throughout her childhood Monroe would reside in a spread of foster homes and at one point she was in an orphanage. Some people believe that Martin Edward Mortensen was Monroe's father, but her father's identity is unknown. She also used the family name Baker at different points in her life. During her early years Monroe was described as being shy and intelligent. Her mother visited her often and they even lived together for a bit in 1933 once Gladys bought a house. In 1934 though, her mother was hospitalized with paraphrenia. Gladys would be in and out of psychiatric hospitals for the rest of Monroe's life. Norma Jean Baker frolicked with various families and at one point endured abuse of a sexual and emotional nature before being placed in an orphanage.

Until marrying a person named James Dougherty on June 19, 1942, Monroe would become a model after working for a few times in his factory. Her husband wasn't

supportive of this career and Monroe was uninterested in the marriage, therefore the couple divorced in 1946. She was able to land a short-term contract with 20th Century Fox and this is often why she changed her name to Monroe. But her big break would be available in 1950, when she signed a seven year contract with 20th Century Fox. She was still struggling financially at this time during her career and she had relationships with a variety of men, many of them within the industry.

In 1954, Monroe had more problems with 20th Century Fox and decided to form her production company. She had the liberty in picking her roles and therefore the production company agreed to pay her 100 thousand dollars per film. At this time, Monroe was battling some different problems; she was having insomnia and was using barbiturates to sleep, and she was feeling insecure. She was really unsure about her own acting talent, so she entered therapy to deal with these issues specifically psychoanalytic therapy which is predicated on the work of psychoanalysts. This therapy really centers around the idea of a conscious mind and an unconscious mind. She also had plenty of difficulties on set, including arriving late and being generally disruptive in filming. She not only suffered from chronic insomnia, but it's reported she had mood swings as well. Some people even describe her as being hysterical. Monroe had an extrauterine pregnancy and she spent a while within the hospital after she overdosed on barbiturates in 1958.

Monroe was eventually diagnosed with an addictive paranoid borderline personality and manic depressive or bipolar personality. She traveled to Japan, weariness disrupted her sleep, and then she got into the cycle where she needed the sedatives to travel to be able to sleep. On the other hand she used stimulants, so she can be active enough to work. There is a lot of pressure on an actress to bring an incredible amount of energy and enthusiasm to bring to the set. This pressure really took a toll on Marilyn Monroe so she became stuck during this horrible cycle and additionally to her mood ability, she just couldn't get a decent night's sleep when exhaustion substance use and mood regulation problems combine - it's a recipe for disaster. It's an interesting pattern because it's one we also see with Elvis Presley and Michael Jackson (chronic insomnia). On August 4, 1962, Monroe died at 36 years old from an overdose of barbiturates at her home in Los Angeles. Her death was ruled a probable suicide, although several conspiracy theories have been proposed in the years after her death.

Sources:

<https://halfway2hannah.com/2018/07/19/marilyn-monroe-what-you-didnt-know-about-her-journey-with-mental-illness/>

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AlphaFold: DeepMind's Solution to the Protein Folding Problem

By: Shrihan Dadi

Proteins, like cells, are essential building blocks for life. They are made up of organic compounds called amino acids. There are 20 amino acids, 9 of which are essential, and the order of these amino acids in a linear sequence determines how a protein folds. The problem is that these proteins have extremely unique 3D structures and swapping out one amino acid for another can result in a completely different structure.

Generally speaking, proteins have 4 levels of structure: primary, secondary, tertiary, and quaternary. The primary structure of a protein is the sequence of amino acids. This sequence determines the backbone of the protein and what folds it will start to take. The secondary structure of a protein is the patterns that result from the amino acids folding. The two most common structures are alpha helices (helices of amino acids) and beta sheets (directed planar sheets of amino acids). The tertiary structure of a protein is the 3D structure it starts to take as the alpha helices and beta sheets come together: side chains connect the protein to prevent it from losing its 3D structure. Some proteins consist of more than one amino acid chain, so the quaternary structure dictates how these chains come together.

But why is shape so important to study and analyze? Like many other things in biology, a protein's shape is closely linked with its function. The shape of an enzyme, for example, determines what kinds of substrates can fit in it. Once scientists figure out the shape of a protein, they can directly deduce information about its function.

Back to the problem. Even with a sequence of amino acids, it is extremely difficult to predict the structure of a protein. As mentioned previously, there are several layers of complexity, and each structure becomes more and more expansive as there are more options for folding and shaping. In fact, in 1969, Cyrus Levinthal estimated that there are over 10^{300} possible conformations for a protein. That's over 3 googol shapes!

With a problem of this magnitude, novel techniques had to be considered. Scientists and biologists have been struggling with this problem for over 50 years, and they have only been able to model proteins at low accuracies: the distance between the amino acids on their models and the actual proteins was quite large.

Google's DeepMind team tackled this problem using AI (Artificial Intelligence). Specifically, they used deep learning techniques in an attention-based neural network system called AlphaFold that trained over millions of examples (the system was trained to find patterns between an amino acid sequence and the 3D structure).

Effectively, AlphaFold was able to predict protein structures with a median accuracy of 92.4 GDT. To give some context, the world's leading scientists were only able to achieve accuracies of up to 40 GDT.

AlphaFold is just another example of how the power of AI and deep learning can be harnessed to achieve breakthroughs in not only science but many other fields. Google's DeepMind team has already used AI to tackle previous problems and challenges, such as winning a game of Go or Chess, but this is the first time that AI has achieved a significant breakthrough in the field of science.

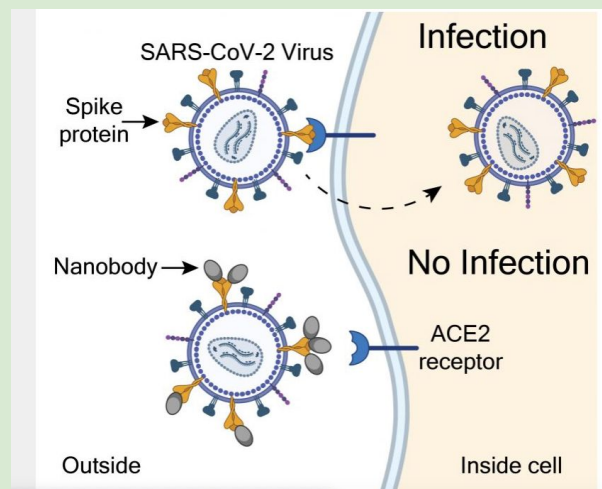
Source:

<https://deepmind.com/blog/article/alphafold-a-solution-to-a-50-year-old-grand-challenge-in-biology>

Possible New Antibodies Found in Llama for COVID-19

By: Harvik Kolla

NIH scientists showed that nanobodies isolated from a llama may prevent COVID-19 infections. National Institutes of Health researchers have isolated a set of tiny antibodies, or “nanobodies” against SARS-CoV-2 that were produced by a llama named Cormac. A nanobody is a type of antibody produced naturally by the immune systems of camels, llamas, and alpacas. The study was led by a pair of neuroscientists, Thomas J. Esparza, B.S., and David L. Brody, M.D., Ph.D., who both work in a brain imaging lab at the NIH's National Institute of Neurological Disorders. These proteins are about a tenth the weight of most human antibodies, and are very useful. These antibodies play a critical role in the immune system's defenses by recognizing proteins on viruses, bacteria, and other invaders, also known as antigens.



Since these nanobodies are easier to produce, cheaper, and more efficient to engineer, many doctors started to use these for research in medical fields. Since the pandemic broke, several researchers have produced llama nanobodies against the SARS-CoV-2 spike protein that may be effective at preventing infections. “The SARS-CoV-2 spike protein acts like a key. It does this by opening the door to infections when it binds to a protein called the angiotensin converting enzyme 2 (ACE2) receptor,

found on the surface of some cells,” said Mr. Esparza, the lead author of the study. “We developed a method that would isolate nanobodies that block infections by covering the teeth of the spike protein that bind to and unlock the ACE2 receptor.”

To test this, the researchers tested over 160 versions of Cormac over a month with a modified version of the SARS virus. After testing, they found 13 nanobodies that may be strong candidates for the COVID 19. The main difference with these nanobodies is that they can be aerosolized and inhaled to coat the lungs.

More testing needs to be done, but using Llama nanobodies is very promisable and can prove to be a formidable foe for the Covid-19 Virus.

Life would be impossible without Greenhouses

By: Arya Bharti

For most of the earth's life greenhouse gases have played an important role in keeping the planet habitable and warm. It was these very gasses that first allowed life to emerge on our planet, however for the past few centuries greenhouse gases have been the forefront of media headlines forecasting impending doom and destruction. So what changed? The simple answer is Humanity, to be more specific, the way humanity generates energy. For the better part of the past two centuries humanity has used wonder energy sources such as coal and oil to power an unpreidentime time of ingenuity and mondernation. The problem with this is that coal and other fossil fuels release huge amounts of carbon dioxide and other greenhouse gases into the atmosphere. Excess amounts of greenhouse gasses warms the atmosphere and earth beyond the needed amount which can cause shifting weather patterns that threaten food production or rising sea levels that increase the risk of catastrophic flooding. The impacts of climate change are global in scope and unprecedented in scale. Climate change is now the most likely cause of extinction for humanity in the next century. Humanity has begun to take steps to solve this problem such as the Paris agreement and Kyoto protocol. Personally I take climate change very seriously and believe it to be the most important problem to tackle in our time. When the United States pulled out of the Paris Agreement I felt as if my country had let me down. We were willing to boost our economy rather than to secure a future for coming generations on our planet.

A Restoration of Democracy

By: Aaryan Kumar

December is most notable around the world for one simple idea, Christmas. All around the world, Christians get excited and put up lights, exchange gifts, and have a great time. But for Spain in 1976, it was celebrated for a radically different reason, it meant the return of democracy, and the death of a European Fascist Dictatorship that managed to survive the Second World War. Following the victory of the Popular Front, a leftist organization in Spain, in Spanish Elections, Right-Wing officers in the Army led a coup in Morocco and declared war on the Spanish Government. The rebels were supported by Nazi Germany and Fascist Italy while the government was supplied by the Soviet Union. After 3 brutal and bloody years of Civil War, the right-wing military rebels overthrew the government and declared victory, and were recognized internationally as the victors. Despite the support he received from the Axis Powers, Franco decided to keep Spain neutral instead of joining the war on the Axis side, reasoning that Spain was devastated from the Civil War. He refused to allow Axis troops to enter the country and invade Gibraltar, although he did give the Axis supplies and let Spanish Volunteers fight on the Eastern Front. When the tide began to shift against the Axis, Franco refused to join the Allies in declaring War on Germany and allowed former fascist figures, such as German Commando Otto Skerenzy, to flee to relative safety in Spain. Because of these actions, Franco was isolated from all the interaction that came into Western Europe immediately following WW2. This changed, however, when the US took a softer stance against Franco, fearing friendship between Spain and the USSR. Upon Franco's death in 1975, the Spanish reverted to democracy and were welcomed back into Western Europe. The moral we should take away from this historical point is that even when democracies face crisis, whether it be an external one, such as a war, or an internal one, such as disease, democracy will either weather the storm or be knocked off and return again.