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## What Is CRISPR, and Why Is It Scaring Some People? (comments by Mark R. Leeper):

A while back I heard a science podcast discussing the most important science stories of the year. It said that the most important science story probably was CRISPR, but most people had heard little about it. I had read about CRISPR and was vaguely aware it was a process or tool that allowed the editing of DNA. But after that I heard little about it. I was skeptical that it was so important. Now the Radiolab Podcast did an episode about CRISPR, so I decided to dig into it a little more.

CRISPR seems to be a very efficient way to modify genes. How does it work?

Apparently in a benign bacteria's DNA one finds places in which there is a stretch of the same DNA pattern repeated over and over. The question is why would a piece of DNA coding have to appear many times in the same DNA. What is more the repeated piece of DNA was identifiably a stretch that appears in bad virus DNA. One would think that this DNA is an enemy of the bacteria, but this was not the whole virus. It was just a small stretch that also appeared in the enemy virus. This was thought to probably have something to do with a defense mechanism, but what?

Well, it was discovered was sort of like a wanted poster posted many places in the bacteria DNA. The bacteria cell was using this short string to identify bad viruses and it knows how to destroy them. It is like in Hitchcock's THE THIRTY-NINE STEPS the hero is told he could recognize the villain because the bad guy was missing a finger. The main character did not know who his enemy was, but he knew to look for a man with a missing finger.

Now this is amazing. If the bacteria recognizes that its DNA matches one of these stretches, it is bad for the cell. The cell mobilizes enzymes that breaks its bonds on the double helix leaving a gap, nearby DNA materials, presumably more benign material, replace the bad sequence. Here the defense mechanism was used to ward off viruses, but there is no need to wait for a bad virus. Scientists can decide what gene they want in the DNA and use this device to remove the unwanted DNA and replace it with wanted DNA. This technique can be used for a broad range of edits. If you can specify what you want to edit in the genome you can fairly easily make what edits you want.

The official name for stretch with the repeated DNA "Clustered Regularly Interspaced Short Palindromic Repeats." And if you think that is awkward to say they abbreviate it CRISPR. That they can just pronounce "crisper" like a bin in your refrigerator.

It was realized that this is a nice, natural way to edit DNA. Some editing had been done in the past with a low success rate. CRISPR approaches are more efficient and precise than the standard technology. CRISPR does nothing new. It is just a better, faster, cheaper way to do genetic modification and manipulation using a much more natural method. In fact it is so much better that the question has turned from "Can we effectively do genetic modification?" to "What happens when it becomes frighteningly easy to do genetic editing." This human-planned DNA will be constructed in one human, but that human's progeny will be passing on that DNA to future generations.

Suppose a certain genetic modification is in the short term good, but in the long term disastrous. This artificial mutation could easily be spread by being passed from one generation to the next. We could be changing the genetic makeup of humans from this point forward. [-mrl]

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#### **DIG TWO GRAVES** (film review by Mark R. Leeper):

**CAPSULE:** Teenager Jake is wracked with guilt about her part in the accidental death of her brother Sean. She believes she would do just about anything to get him back. Then three mysterious figures appear to her with an offer to restore her brother back to being alive. But for this seemingly impossible service they want to exact a price. DIG TWO GRAVES was written and directed by Hunter Adams, based on his own story. His film is moody and affecting, but less than totally coherent, and the style of the film puts too many obstacles in the viewer's path. Rating: +1 (-4 to +4) or 6/10

DIG TWO GRAVES is set in 1977, though it flashes back to events of 1947. Samantha Isler plays Jake, a teenager living in a rough mountain community. Jake has a heavy weight crushing her emotionally. She had wanted proof she was brave enough to jump off the side of a quarry into the water below. Her older brother had offered to dive with her. She goes with him but in the last instant lets go of his hand. She stands on the edge while her brother drops into the water never to be heard from again. Now Jake blames herself for her brother Sean's death. She knows there is nothing she can do to bring back Sean. But then she talks to three men, strange on several levels, who claim they can bring the dead boy back to life. They inform her, "He is not really dead. He is just hard to find." Jake has to decide if she can trust these men to deliver. Trying to give Jake support is her grandfather (in a strong performance by Ted Levine, who played the kidnapper/killer in THE SILENCE OF THE LAMBS), now the local sheriff and whom the flashbacks tell us might know more than a little about the current events.

This is a film with a strong sense of setting location, though it is not clear what the location is. It takes place in hill country of someplace in the Midwest. If it helps locate the setting the film was shot in Marion, Illinois. And perhaps it borrowed some of its texture from WINTER'S BONE.

One problem for the viewer is that it is very hard to pick up on what is going on. That is partially intended from the story. But much of the dialog is spoken with a Hill Country accent that is hard to penetrate. To make matters worse, most of the film, particularly the early parts when the characters are introduced take place in the night without too much lighting. A few people discuss the situation and they look a lot alike. We seem to meet mostly men in full beards. Perhaps the best feature of the film is the moody camerawork by Eric Maddison, catching the haunting setting.

I rate DIG TWO GRAVES a +1 on the -4 to +4 scale or 6/10. DIG TWO GRAVES will get a release in theaters & on demand 3/24.

Film Credits: <http://www.imdb.com/title/tt2633076/combined>

What others are saying: [https://www.rottentomatoes.com/m/dig\\_two\\_graves\\_2017](https://www.rottentomatoes.com/m/dig_two_graves_2017)

[-mrl]

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#### **Selecting Words** (letters of comment by Lee Beaumont and Philip Chee):

In response to [Mark's comments on selecting words](#) in the 03/17/17 issue of the MT VOID, Lee Beaumont writes:

I faced a vocabulary challenge this week that perhaps you can help me with. See: [https://en.wikiversity.org/wiki/Exploring\\_Worldviews#Vocabulary](https://en.wikiversity.org/wiki/Exploring_Worldviews#Vocabulary)

If you can suggest any improvements to what I wrote there I will appreciate it. [-lrb]

Mark replied: I think you are more eloquent than I am. I am not sure what sort of thing you are looking for. I will say you

might want to categorize the words as to their intended target. When I assume, I assume for myself. Nobody else is involved when I make an assumption. On the other hand I propose to someone else. (You might add "suggest" which like "propose.") Most of the words you choose are reflexive. Nobody else need be involved. But I do not suggest or propose something to myself. I can write an hypothesis that is for my purposes only or that I can expect someone else to assume, so that could be for me and/or for someone else. [-mrl]

Philip Chee writes:

The best Twain quote on the subject is probably in an 1888 letter to George Bainton:

"The difference between the \*almost\* right word and the \*right\* word is really a large matter. 'tis the difference between the lightning bug and the lightning." [-pt]

**THE LIFE AND GROWTH OF LANGUAGE and Chinese** (letters of comment by Philip Chee, Steve Coltrin, and Radovan Garabik):

In response to [Evelyn's review of THE LIFE AND GROWTH OF LANGUAGE](#) in the 03/17/17 issue of the MT VOID, Philip Chee writes:

[Re Whitney's claim that Chinese has only about 1500 words]

A Chinese university graduate is expected to recognize approximately 8000 Han characters. A Japanese university graduate is expected to recognize approximately 6000 characters.

Normal dictionaries probably contain 10k to 20k characters. The unihan codepage has ~40k characters but many of them are obsolete forms.

I suspect that the misunderstanding that "Chinese has only about 1500 words" comes from the fact that Chinese (and Japanese) authorities require the recognition of minimum ~2000 characters to qualify as basic literacy.

[And re compound words:] And of course the way to create new words in Chinese (and Japanese) is to create four character "idioms" or compounds (I am unsure of the correct translation of this term into English). [-pc]

Steve Coltrin responds:

'Four character idiom' works fine; 'four character compound' is slightly more applicable as, at least in Japanese, the meaning of a lot of them is perfectly straightforward, rather than a reference to warring clans of medieval Japan or some such. [-sc]

And Radovan Garabik adds:

The situation is a bit complicated--most Chinese (Mandarin) "words" consist of two syllables. One syllable is usually one character, but there are exceptions.

"Word" is in quotes, because it is not as clearly delimited as in European languages--usually, each syllable (=morpheme) keeps its standalone meaning, and often (but by no means universally) the meaning "leaks" into the meaning of the word. And of course, "words" are written without spaces between them. It's kind of similar to asking if in English "boy friend" or "boyfriend" is one word or a phrase consisting of two words. A Chinese speaker does not intuitively think about the language in terms of words, but in terms of zi (syllable/morpheme/character).

There are about 800 unique syllables in Mandarin (more, but about 800 is used in normal speech). Almost all of them (if not all) have standalone meaning, and many of them are homophones and are written differently (with different meanings).

So you can learn 800 syllables, and the meaning for each of them, but you would not understand almost anything--for that, you need to learn bi- and poly- syllabic words.

If you want to read, you need to learn at least most frequent characters (thousands of them), many of them are pronounced the same.

[The reference to the definition of basic literacy] of course assumes the reader is a (native) speaker and knows the meaning of polysyllabic words. [-rg]

**This Week's Reading** (book comments by Evelyn C. Leeper):

THE MAN FROM MARS: RAY PALMER'S AMAZING PULP JOURNEY by Fred Nadis (ISBN 978-0-399-16054-7) is a biography of one of the important science fiction editors, but one who is usually over-looked. John W. Campbell, Jr., is considered the dominating editor of the late 1930s until the early 1970s, and everyone else seems to end up as a footnote. Other editors from the 1930s and 1940s are almost completely forgotten, and even those of the 1950s are rarely remembered, with Frederik Pohl, H. L. Gold, and Edward Ferman being the few exceptions. (Campbell's dominance was so complete that if one is asked to name an editor of ASTOUNDING/ANALOG, it is inevitably Campbell, even though Stanley Schmidt was editor a year longer than Campbell.)

But I digress.

Palmer edited AMAZING STORIES from 1938 through 1949, then founded FATE MAGAZINE (which he edited until 1955), and followed this with a series of other magazines dealing with the paranormal. These were a predictable outgrowth of what Palmer is probably best known for: the promotion of the "Shaver Mystery". Nadis cannot seem to decide whether Palmer actually believed Shaver's claims, or any of the myriad other "reports" of flying saucers, telepathy, conspiracy theories, or secret races controlling humans, whether he was just looking for a good yarn, or whether he was just trying to make money.

Alas, many of the conspiracy theories and stories of secret races that Palmer "promoted" were basically racist and anti-Semitic. It is not clear whether Palmer realized this, especially given that he tended to be very unprejudiced in what he would publish. He published Ray Bradbury's "Way in the Middle of the Air" (about African-Americans leaving a Southern town en masse to colonize Mars) in his OTHER WORLDS in 1950 when no one else would take it. (It became part of THE MARTIAN CHRONICLES, but was dropped from 1997, 2001, and 2006 reprints!) He also published Theodore Sturgeon's science fiction portrayal of homosexuality, "A World Well Lost", in UNIVERSE SCIENCE FICTION in 1953 after Campbell not only rejected it, but contacted every other editor to ask them to reject it as well. So Palmer was not in general a narrow-minded bigot.

Palmer's history is fascinating, and there is a lot of detail about the era. For example, I was surprised to hear that editors of the 1930s and 1940s apparently gave away the originals of the cover paintings for their magazines. At some point, luckily, artists put their collective foot down and retained the rights to the original paintings. As for Palmer's motivations, you will have to read the book and decide for yourself. [-ecl]

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Quote of the Week:

He seems  
To have seen better days, as who has not  
Who has seen yesterday?

--George Gordon, Lord Byron

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