

Carl Sagan still a high-wire act



From **BEN DOBBIN**
in Ithaca, New York

IF SPACE aliens ever show up for real, don't expect them to even begin to resemble the middling monstrosities on *Star Trek*. "Time for us to revise our views of repulsive," says Carl Sagan, among the most energetic and eloquent of star gazers.

The sheer grandeur of the cosmos and the riddle about whether humankind shares some distant crossroads or voyages alone have bewitched this Russian garment worker's son since childhood.

"My experience is that kids are natural-born scientists. First of all, they ask the deep scientific questions: Why is the moon round? Why is the sky blue?

round? Why is the sky blue? What's a dream? Why do we have toes? What's the birthday of the world?

"By the time they get into high school, they hardly ever ask questions like that. My conclusion is that everybody starts out as an enthusiastic potential scientist and then has the science beaten out of them by society."

Sagan said his parents ("who didn't know anything about science") not only nurtured his sense of wonder, they instilled a healthy scepticism. That mixture, he said, is the key to being a scientist.

Combined with mental agility and a flair for elucidation, it begins to explain his success in astrophysics, as researcher and populariser.

The author of *Cosmos*, one of the most-watched series in the history of American television, and *The Dragons of Eden*, which won him a Pulitzer Prize in 1978, he scans the future of space exploration in his 29th book, a recently published *Cosmos* sequel.

Pale Blue Dot visualises mankind "100, 200, 300 years from now and why it is, in fact, central for our survival that we be in space", he says. Not just whizzing around in spacecraft. Actually settling other worlds.

Sagan himself, who just turned

60, is still performing on the high-wire. Between lectures and symposiums and robotic missions, which

siums and robotic missions, which he has been helping design for the National Aeronautics and Space Administration since the late 1950s, he is turning his novel *Contact* into a Hollywood script and writing another novel, this one a love story, with his wife, Ann Druyan.

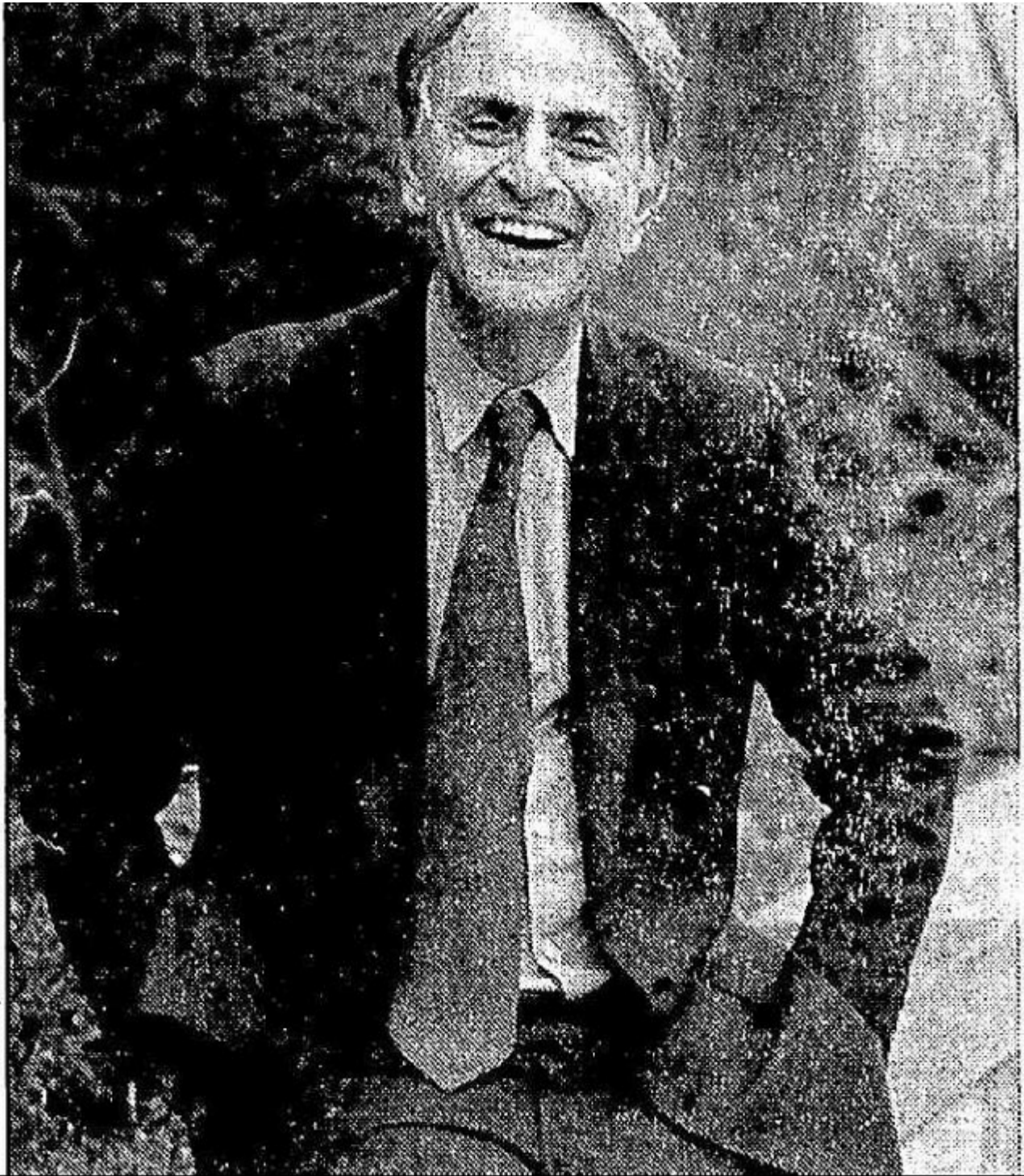
When he gets stuck on one project, Sagan moves on to the next, allowing his subconscious to go to work. "When you come back, you find to your amazement, nine times out of 10, that you have solved your problem, or your unconscious mind has, without you even knowing it."

At Cornell University's Laboratory for Planetary Studies, which he set up in 1968, space-mission data go into lab simulations to draw lessons about dust storms on Mars or the greenhouse effect of Venus.

Organic molecules, the kind that life on Earth is dependent on, "seem to be almost everywhere in the solar system beyond Mars", suggesting that "life and intelligence ought to be in lots of places", he says. But extra-terrestrials would "almost certainly not" bear any physical resemblance to humans.

"If you started the Earth over again, absolutely identical 4½ billion years ago, and just let ran-





Carl Sagan believes that 'kids are natural-born scientists'.

dom factors operate — when a cosmic ray would hit a gene — which gene gets mutated — you might wind up with intelligence of great moral virtue but they would

great moral virtue, but they would not look anything like us."

While detection techniques are limited to spacecraft and radio telescopes, finding out whether

telescopes, finding out whether mankind is alone, or not alone, "is one of the most important issues you can imagine," Sagan says.

Trying to convince Earthlings of that is not always easy.

"The trouble often is, you can't just invent something, you have to have underlying science," Sagan says. "It is foolish for us not to encourage at every level in the educational system better support for science education and for the encouragement of young scientists. From the most practical self-interest, if you care about anything else, our policy is foolish."

Who's to blame when science takes a back seat? Parents and teachers. Politicians who emphasise short-term solutions over long-term ones. Newspapers that

publish "hokum" horoscopes in place of science columns.

"When's the last time you had an intelligent unprompted remark on science by a president of the United States? Put that all together and you can see that there's a problem that just runs up and down the society."

As for UFOs, lost continents and the like, the world can ill afford such pseudoscientific twaddle, Sagan says.

"Nobody would be more interested than me if we were being

ested than me if we were being visited by extraterrestrials, but I demand reasonable standards of evidence, just as I do in searching for radio signals.

"We sometimes pretend something is true not because there's evidence for it but because we want it to be true. We confuse reality with our hopes and fears, and that is dangerous not just on the borders of science but in politics and lots of other places."

Not least when it comes to deeply held beliefs about our origins.

"What if the universe is infinitely old?" he asked. "Then there's no reason to posit a creator because it wasn't created."

Then what is meant by "God?"

"There's a wide range of things that are called God, from the out-sized, light-skinned male with the long white beard who sits on a throne in the sky and tallies the fall of every sparrow, to the kind of God of Einstein and Spinoza, which is something like the sum total of the laws of nature.

"Who could deny that there are laws of nature that apply everywhere in the universe? So, whether you say 'Absolutely, of course, there's a God!' or 'What are you talking about, there's not a smidgen of evidence for a God!' depends in a very deep way on what kind of God you're talking about."

Sagan says he has encountered "surprisingly little" hostility from people who equate evolutionary research with the devil's work to

**research with the devil's work to
undermine religious faith.**
— Associated Press