

letters

should have had said:

"The fountains also of the deep... were stopped..."³

But of course, we have only known about all this in the last few years, and we definitely should not look in the Bible to see what was actually said.

References

1. *Handbook of Chemistry and Physics*, 62 Edition (1981-1982), page F-161.
 2. Genesis 7:11 (King James Version)
 3. Genesis 8:2 (King James Version)
- GERALD L. O'BARR
San Diego, California

THE AUTHOR COMMENTS: I am not sure that Gerald O'Barr's letter is answerable. Of course, my letter to PHYSICS TODAY was facetious and specious. But if I was making fun, it was only of those who take some matters too seriously.

It is difficult to respond to the first paragraph of O'Barr's letter because I don't understand what atmospheric pressure has to do with the Flood or with any of the calculations one can make regarding it.

The second paragraph concerning the source of the water in the Flood is, of course, pure conjecture. Since the flood waters arrived on the Earth as rain, some natural mechanism, such as intense heat, would have to be brought into play to dislodge the water from the mantle. I say natural because the tenor of the story is that the Flood was a natural phenomenon. Conceivably such heat might have been generated naturally—perhaps through a minor pulsation of the Sun, perhaps through some inner convulsion of the Earth. But would not both of these disturbances have been sufficient to wipe out mankind? Perhaps we should ask our prospective class in Bible study to calculate the amount of heat needed to evaporate the Flood waters and to estimate the surface temperature needed on the Earth to release water from the rocks.

ROBERT W. BREHME
Wake Forest University
Winston-Salem, North Carolina

9/83

Glass flow revisited

George Elliott's letter in August (page 86) related the story of how an overturned box of wine glasses yielded one broken glass with its stem smoothly bent at a 90° angle. It is difficult, if not impossible, to imagine how this result could have been produced by an impact at room temperature, but there may have been an alternative *modus oper-*

andi. As youths, most of us have experimented with glass lenses to produce fairly high temperatures, that is igniting bits of paper. Is it possible that the configuration of wine glasses, "repacked loose, with no padding" and left on the window sill, was such that light could enter the box and be focused by one or more glasses upon the stem in question? If such a heating mechanism is realistic, then the only remaining question is whether the bending occurred before or after the great fall.

As an aside, we really should not go around branding as hoaxes that which we cannot immediately explain.

ROBERT L. OLDERSHAW
Dartmouth College
Hanover, New Hampshire

8/83

This was not a hoax! Haven't you seen the windows of a very old house? The glass is thicker at the bottom than the top due to gravity constantly pushing the glass down. Glass will bend due to steady low pressure, such as gravity. Elevated temperatures will speed up the bending. The glasses were probably kept on their side while a steady elevated temperature was applied (maybe the glasses were kept in an attic or on a radiator just before they were bought, and since the glasses were not seen between the time when they were bought and the time when they were dropped, Elliot mistakenly thought the drop caused the bend when the glass was actually bent before he brought them. The glass was stored on its side during this period: The weight of the bowl part of the glass was enough pressure to cause the glass to bend at the stem.

MARK NAGEL
Beltsville, Maryland

8/83

THE AUTHOR COMMENTS: The comments of Robert Oldershaw and Mark Nagel no doubt have some valid points under certain practical conditions, but, unfortunately, they do not fit the conditions of this particular event. The glasses were packed in a cardboard box with a lid and left on a north-facing window sill. The season was early winter, so that there was little chance of receiving heat from the Sun. The glasses were borrowed from a wine store for the occasion, and were observed to be in normal condition before the party and before being re-packed in the box for return. Mark Nagel's observation on old window glass leads us back to some of the original arguments in the earlier correspondence on this topic, and there does seem to be evidence for glass flow in old windows. A friend has reminded me of a demonstration experiment for physics students, in which a glass rod was clamped at one end to a bench, while a suitable heavy weight was attached to the

opposite end, causing the rod to bend. After a period of time (not specified) the weight was removed, revealing that the rod was permanently deformed into a curve.

The important point about the incident I described was the rate of bending, which I estimate was somewhere in the millisecond range—the duration of the impact of the box with the floor. One cannot imagine how glass could deform at this rate at room temperature. As the photograph shows, the bowl of the glass, which probably took the first impact, did actually shatter, but the stem did not.

As Oldershaw suggests, we should maintain an open mind with regard to events that are difficult to explain. The event shows that there may be some gaps in our knowledge of materials science.

GEORGE ELLIOTT
Chelmsford, England

9/83

Last word on first computer

Recently C. N. Yang called my attention to a photograph in the November 1981 issue (page 16), showing Oppenheimer and von Neumann. They are standing in front of what is described in the caption to the picture as "the Institute for Advanced Study's EDVAC computer." This caption was responsible for a letter in May 1982 by Yale Jay Lubkin (page 116), a letter in January 1983 issue by John G. Brainerd (page 13), and a rebuttal in August 1983 (page 13) by Lubkin.

In the interests of accuracy, let me correct a few errors in the caption and in the letters cited. The computer built at the Institute for Advanced Study—the IAS machine with descendants ILLIAC, MANIAC, ORDVAC, and so on—was not an EDVAC-type machine. It was a novel design that serves as the prototype for most modern computers and was based upon a machine architecture described in a 1945 paper, "Preliminary discussion of the logical design of an electronic computing instrument," by A. W. Burks, H. H. Goldstine and J. von Neumann. Brainerd says in his letter that the IAS machine "was completed much after the EDVAC." In fact, the two machines were finished around the same time—the EDVAC in 1950 and the IAS machine in 1952.

There is a marked omission in Brainerd's paper, where he attributes the design of EDVAC to "John W. Mauchly and J. Presper Eckert." It would be wrong not to quote words of Eckert, Mauchly and S. R. Warren Jr, director at the time of the EDVAC project on this subject. They said in March 1945:

The problems of logical control have been analyzed by means of

informal discussions among Dr. John von Neumann... Dr. Mauchly, Mr. Eckert, Dr. Burks, Capt. Goldstone and others. ... Points which have been considered. ... are flexibility of the use of the EDVAC, storage capacity, computing speed, sorting speed, the coding of problems, and circuit design. ... Dr. von Neumann plans to submit within the next few weeks a summary of these analyses... together with examples showing how certain problems can be set up.

This paper by von Neumann entitled *First Draft of a Report on the EDVAC* is one of the classics in the field.

Finally, a word about Samuel Lubkin. To the best of my recollection, he was a post-war employee of the Computing Branch of the Ballistic Research Laboratory at the Aberdeen Proving Grounds and probably was responsible there for the EDVAC. I do recall that he was much interested in its design in the post-1946 period, and I recall that as consultants to the Ordnance Department von Neumann and I corresponded at some length with Lubkin about how many addresses an order or instruction should contain. He favored three addresses per order and we one address.

HERMAN H. GOLDSTONE

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9/83

Monopole flux limits

One of the statements made in the recent article, "Proton Decay Not Seen at Predicted Rate" (September, page 20), regarding the "model dependence" of the IMB monopole flux limits from non-observation of monopole catalysis of nucleon decay is incorrect. Perhaps it is only a matter of English; however, the correct statement is: "the IMB monopole flux limits from multiple (catalysis) interactions in the detector are cross section and velocity dependent." No assumptions were made in the data analysis with regard to any specific theoretical model, other than that super-heavy monopoles of the type predicted by many grand unified theories may exist, and that such monopoles may catalyze nucleon decay with an (experimentally) unknown cross section.

The IMB monopole flux limits¹ carve out a three-dimensional surface in monopole-flux/velocity/cross-section space, which is independent of theoretical uncertainties in the catalysis cross section. This surface is determined solely by the spatial-temporal properties of the IMB detector, with the

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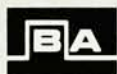


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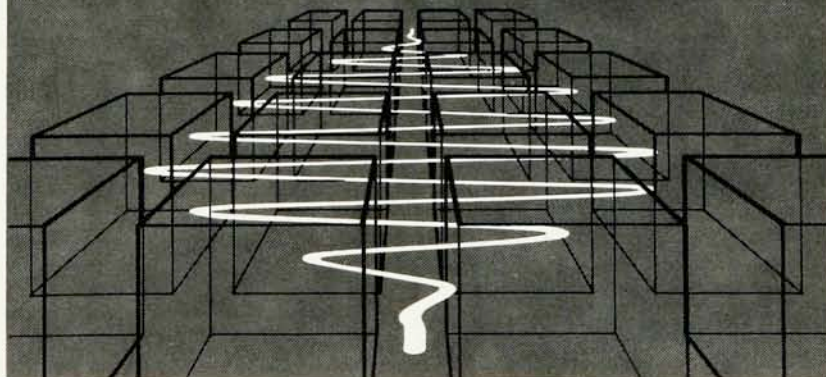


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