189 000 km (30 Earth radii) it is: 1 in $30\,000/30^2 = 1$ in 33.3;

and for:

315 000 km (50 Earth radii) it is: 1 in $30\,000/50^2 = 1$ in 12.

If Sagan still insists on raising the probabilities to the sixth power he should first correct for the factors he admits neglecting but does not correct for (gravitational attraction, planetary motion). At least the factor of three, which he derives from Opik's more exact calculation (page 98), should have been corrected before he raised 30 000 to the minus sixth power; after all $3^{-6} = 7.3 \times 10^{-4}$.

Correcting for this factor of three we find that for every comet within the orbit of Jupiter and Venus, the probability per millennium is: 1 in 100 that it will come within 10 Earth radii (1/6 the lunar distance), 1 in 11 that it will come within 30 Earth radii (1/2 the lunar distance) and 1 in 4 that it will come within 50 Earth radii (still only 5/6 the distance to the Moon).

In Appendix 3, Sagan discusses the prediction of *Worlds in Collision* that Venus should be hot and calculates the heating of Venus by a presumed passage near the Sun and the planet's subsequent cooling by radiation to space. He obtains a ridiculously low temperature—79K. He then writes: "I find it odd that Velikovsky does not attribute the temperature of Venus to its ejection from Jupiter . . . but he does not" (page 79).

Sagan then calculates the temperature Venus would have been heated to if ejected from Jupiter: "incidentally this would appear to be a good Velikovskian argument for the high temperature of the surface of Venus but . . . this is not the argument."

But in *Worlds in Collision*, on "The Thermal Balance of Venus" (page 371) we find:

"Venus experienced in quick succession its birth and expulsion under violent conditions; an existence as a comet on an ellipse which approached the sun closely; two encounters with the earth . . . with a thermal effect caused by conversion of momentum into heat . . . the core of the planet Venus must still be hot."

As we see, Velikovsky did indeed mention the ejection from Jupiter as the first among three or four other reasons (only one of them being close passage to the Sun) for predicting the elevated temperature of Venus.

Thus by calculating Venus's temperature of ejection, Sagan verified the first reason Velikovsky gave for predicting Venus to be hot.

In Appendix 2 Sagan demonstrates that the claim of his predecessors (Payne-Goposhkin, *et al.*) that if the Earth were to slow down everything not attached would fly off is wrong. In a short calculation he shows that were the Earth to stop rotating, within a little over an hour, not even stalactites would break, let alone things fly off the Earth—an objection to Velikovsky's work that had been used by Asimov very recently and earlier by Sagan himself.

He also calculates that the heat generated would not be enough to melt the Earth (an argument still used by some of Velikovsky's critics) but would cause an average temperature increment of 100 K. Actually this increment should be much lower, because Sagan forgot to include in his calculations the latent heat that would have been absorbed by the melting ice and evaporation of water of the seas and oceans.

Sagan concludes (page 64): "The oceans would have been raised to the boiling point of water, an event which seems to have been overlooked by Velikovsky's ancient sources."

It is Sagan who overlooked a whole section of *Worlds in Collision* called "Boiling Earth and Seas." By overlooking even the "Contents" of the book he was analyzing, he unwittingly helped demonstrate that ancient writings refer to actual events, and thus supplied evidence for what he considered the "nub" of the whole issue. In the introduction Sagan had written (page 48):

"In the 4.5 billion year history of the solar system, many collisions must have occurred. But have there been major collisions in the last 3500 years, and can the study of ancient writing demonstrate such collisions? That is the nub of the issue."

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More on Esperanto

Inspired by the letters in the recent issues, especially that of Bruce Sherwood (July 1979, page 9) I have tested the relative ease of learning Esperanto. I grasped its grammer within a week just from its key, which is available from the Esperanto Associations in every country. Within a month, since I had received it, I was able to write my first letter in Esperanto of an unrestricted complexity. I had not been able to achieve this in any of those languages I am reasonably competent in, even after a year of study.

I write this letter in response to Thomas Wood's comments (November 1979, page 74). Do his ideas reflect a growing isolationist tendency in the US? Certainly in that case Esperanto is the best educational personal investment for the bulk of the US population, especially scientists, to minimize their burden of learning foreign languages. I come from the very heart of Europe where to learn foreign languages is a life necessity for everybody. However, for short-term travel, such as tourism or international scientific conferences, Esperanto is the best candidate because of its neutrality. I join the declaration of the 85 Japanese scientists who suggested that Esperanto become the language of all scientific publications.

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Stretching longevity

An additional characteristic of J. S. Garrow's longevity parameter W/H^2, discussed by L. X. Finegold (June, page 78), (W = mass in kg; H = height in meters), is that it indicates a clearly more efficient route to lower values of this important vital statistic than the traditional methods of diet and exercise for those of us whose current numbers are above optimal. Because

$$\Delta \log W/H^2 = \Delta W/W - 2\Delta H/H,$$

a given fractional change in height is twice as effective as the same fractional change in mass. I have joyfully abandoned my diet and taken up stretching exercises, in anticipation of the many extra years that will accrue after I am able to call Wilt Chamberlain "Shorty."

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Detectives of art forgery

When I read Stuart Fleming's April story (Detecting art forgeries, page 34) I was disappointed to find that although investigation of "Blakelock" paintings was featured prominently in the article, Maurice Cotter, the leading scientific investigator of R. A. Blakelock's works, was unmentioned. I was acquainted with Cotter's work from the beginning, since shortly after neutron-activated radio-autography began to be used to authenticate paintings,[1] Cotter mentioned to me his desire to use the method in a study of Blakelock's work. In fact, the very first Blakelock painting so analyzed was done by Cotter on a painting (authentic) from his own collection in 1969. In the following years Cotter and his collaborators analyzed 40–45 "Blakelocks."[2] The paragraphs on Blakelock in Fleming's article could be taken as an abstract to reference 2. Also no reference was made to the group[3] that used radio-autography to study illuminated manuscripts by "The Spanish Forger" even though the work