

LETTERS

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COVER: More than 70,000 coronary artery bypass operations were performed last year. But the studies so far have not resolved which patients are most likely to benefit from the traumatic and expensive surgery. See story p. 314. (Photo: National Institute of Heart, Lung and Blood)

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Newtonian light bending

In a recent Letters section (SN: 4/15/78, p. 227) a letter from V. Gioscia, et al, concerning an *est* article states "...Light could not bend in a Newtonian universe, but light bends..." This statement is not correct. Since the Newtonian gravitational force is given by $F = GMm/r^2$ and the acceleration by F/m , even though light has zero mass, in the limit as m approaches zero the acceleration near a massive object such as the sun is toward the sun with magnitude GM/r^2 , where M is the sun's mass and G is universal gravitational constant. It is a simple matter to calculate the bending of the light ray from a star when this ray just grazes the limb of the sun. The angular deviation is approximately $2GM/Rc^2$ (where R is the radius of the sun and c the speed of light in vacuum), or about 0.87 seconds of arc. An interesting point is that this is exactly half of the first order result using Einstein's general theory of relativity. Latest measurements on quasars are within 1 percent of Einstein's prediction. Thus, Newtonian physics does *not* preclude the bending of light by a gravitational field, but it predicts the bending incorrectly.

H. H. Denman
Professor of Physics
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Detroit, Mich.

Stopping pain before it starts

Martha Asherman from Port Washington, Wisconsin discusses the Brompton cocktail, heroin, and Dr. Cicely Saunders (SN: 2/25/78, p. 115). When Dr. Cicely Saunders visited us last year, in her discussion of the management of cancer patients who were dying, she made two important points. The first was that pain preventing or relieving narcotics should be used at whatever was found to be the effective level, given by the clock regularly rather than awaiting the patient's request. Using this method it was possible to control, though not quite eliminate, the problem of pain. The key was the patients did not ask soon enough or often enough for help. The second problem was that in a carefully designed and controlled study, she found to her considerable surprise that morphine sulfate used in the same way was as effective as heroin, which she had not expected to find. The main problem was to keep ahead of pain and not let it get ahead of the patient and those caring for the patient.

William B. Bean, M.D.
Galveston, Tex.

Fats and Metabolism

The article "The Fat American" (SN: 3/25/78, p. 188) was interesting and informative, but it did not bring out the differing metabolic rates

that individuals apparently have. Most of us with weight problems are blessed (?) with friends who are able to eat seemingly unlimited quantities of everything in sight without putting on weight. This raises the question of whether it may some time become possible to solve weight problems by simply tinkering with the metabolic machinery.

M. F. Thorne
Pacific Palisades, Calif.

Comets and clouds

As your very interesting article "How to Trigger an Ice Age" (SN: 3/11/78, p. 148) mentioned, the idea that the sun's passing through a dense interstellar cloud triggered the last ice age has become very popular in the last few years (it was first mentioned in print — I think — in *African Genesis*). The idea has at least two very obvious problems: proof we went through such a cloud, and an explanation for the extreme climatic instability for the past million years.

A book copyrighted in 1955 by Fred Hoyle provides a possible answer to both. In chapter 1 of *Frontiers of Astronomy* in the section "Comets and Meteors," he discusses not only several mechanisms by which comets could disrupt the greenhouse effect, but also the interesting observation that "the break-up of many comets is taking place at such a rate that they will be entirely disrupted within a million years," the implication being that, up until about a million years ago, the sun would have had an outside supply of comet material—and that during the millions of years of climatic stability there would have been no comets!

Back to the dense cloud. If it has hydrogen in such amounts, it probably has other things as well. Small globs of matter would be apt to develop an orbit around a star passing near by. Unlike any planets, if already present, these new stepchildren would not have any obvious reason for having their orbital planes confined to the ecliptic plane, or any other narrow "plane" region. Comets have always been oddballs; maybe they are even more different than we gave them credit for.

In a recent SMITHSONIAN, it mentioned the possibility that new life forms might be introduced to earth via comet material, and that (carbonaceous) comets with their densely packed organic chemicals could be the true originators of life on earth. This prospect is both encouraging and discouraging. If a star must pass through such a cloud in order to have a decent chance of developing life, then there are probably fewer organisms "out there" than we could have previously hoped. On the other hand, maybe if the whole galaxy's populations are cousins, perhaps it will be easier to recognize most exo-life as life than some science fiction writers have thought.

Could McKay and Thomas use their hydrogen-induced rain scenario to explain what appears to be Mars's one-time-only deluge?

Fran Tabor
Kalispell, Mont.

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