by unwitting followers of materialistic philosophy.

It is here that personal action enters. Since this "evolutionistic bunk" called "science" has been totally discredited, we must see that the "inputs" of the educational process are changed. Computers have built-in barriers to inconsistent, incomplete and illogical inputs. The minds of our youth should not be expected to sort out the conflicting and internally incongruent idea of random chance beginning of fantastic order, lest they continue to respond with their nonsense probing of anything they please.

One Texas couple—the Mel Gablers—has been a stalwart example, showing what can be accomplished. They worked untiringly for eight years and wrought profound changes in the Texas state textbook situation, all because their son rebelled against evolutionary biases presented to him in the classroom. This son is now an expert in computer logic.

The answer to youth's dilemma lies in the data of modern molecular biology. The complexity of cell structure and biochemical intricacy of DNA point unerringly to Divine special creation. Rather than pointing to an ethic of "survival of the fittest" by try this, try that, the knowledge of modern biology directs one back to the Bible, the "Wisdom of the Ages." Herein is direct knowledge gained about creation of life, the fall and history of man, personal salvation through Jesus Christ, and guidance for daily life.

Youth needs to experience this other knowledge—let's begin the task!

Reference

[1]Jukes, Thomas H. 1969. Cerebral contraception. *The Sciences* (New York Academy of Science), 9(12):18. December.

ROCHE'S LIMIT AND THE PATTEN EPIC*

PHILIP H. HOFF†

The flood mechanism postulated by Patten[1] depends critically upon Roche's limit. Since Patten did not provide a reference to Roche, and since this writer is not an astronomer, a great deal of searching of the literature was necessary to establish that there indeed ever had been such a person as Roche who had calculated a limit.

Reference to E. Roche's work was found finally in the writings of J. H. Jeans.[2] The journal in which Roche published over 100 years ago is not available in the library of the University of California at Berkeley, if indeed it is still published.[3] I am, therefore, indebted to Jeans for his rederivation of Roche's limit.

Two Objections Raised

There are two aspects of Roche's formulation that combine to make it completely unsuitable for the purposes to which Patten tries to put it. The first aspect or objection is that the very involved mathematics required to compute Roche's limit are predicated on the presence of only two gravitationally interacting and perfectly spherical bodies.

Suppose that Mercury was indeed an "invader" from deep space. As it approached the earth, how many bodies would have a significant gravitational interaction? Of course the earth would be one and Mercury would be another. The sun would certainly affect the balance of forces significantly, and the moon probably would also, depending on its position.

If the ice (which Patten postulates Mercury carried) were present as an icy satellite, it would be the fifth gravitationally interacting body. Thus on this basis alone it would be necessary to reject application of Roche's limit to the problem. If Mercury carried the ice in the form of rings, then the deep space invader would not be a perfect spheroid. This, combined with the multiplicity of interacting bodies, would invalidate the Patten hypothesis.

The second objection to Patten's use of Roche's limit is much more fundamental. To introduce this objection let us inquire whether or not physical intuition would suggest a dependence of the critical distance for fragmentation on the material of the fragmenting body and/or its size. If not, why do not our communications satellites fragment? Why doesn't everything on earth fragment?

All objects on earth are certainly within Roche's limit. Yet Roche's formulation shows no dependence on these factors. Is it in error then? The answer is that, as far as can be determined, it is not in error, since it was derived only for *liquid* bodies.

Other Aspects of Roche's Limit

This information answers the questions of dependence on material and size. The requirement that the bodies be liquid precludes the possibility that the fragmenting body has any tensile strength. It is because of differences in this quantity that we would intuitively expect one solid body to be harder to "tear apart" than an-

*EDITOR'S NOTE: See "The Ice Age Phenomenon and a Possible Explanation" by Donald Wesley Patten, *Creation Research Society Quarterly*, 3(1):63-72. May, 1986.

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other. The application of Roche's limit to an icy body is then valid to the same extent that it is equally easy to tear apart "chunks" of ice and water.

Stated in another way, in Roche's formulation, the critical distance is that at which the gravitational pull of the larger body just overcomes internal gravitational forces of the smaller body. Once these forces are cancelled, dissolution is immediate and automatic. If however, the internal gravitational forces of a solid planet were cancelled out, it would still be held together by its own tensile forces, which are generally thousands of times stronger than the gravitational forces tending to hold the planet together.

It might seem that a liquid body could not exist in the vacuum of space, but it is known that, if a liquid body is large enough, its cohesive gravitational forces can balance the outward pressure gradient.

Answering the question of whether or not Roche's limit should depend on the size of a liquid body, we note that unless there is adequate mass there never will be a body in the first place, and that all the larger body has to do is to reduce the smaller one to "chunks" of less than the minimum size in order to effect its complete dissolution.

Summary

In summary, it might be stated that, if Mercury or some other deep space invader with an icy satellite had swept close enough to earth, earth's gravitation might indeed have snatched the ice away, but that it would not have fragmented. It might have gone either into stable orbit around the earth, or else into a decaying orbit, which would then have caused it to plunge to the earth, probably having fragmented somewhat due to the effect of air friction on the outside and thermal stresses between the outside and inside.

It might be noted in closing that Patten also invokes his "intruder" as the mechanism of mountain formation on the earth. This viewpoint has a subtle, inherent pitfall. It is now widely accepted by both creationists and evolutionists that the Americas were once joined to Africa and Europe. Many creationists think that Gen. 10:25 is the place where the Bible records the dividing of the original land mass. It should be noted that this was after the flood.

Thus, if the mountains were formed during the Flood even, as Patten supposes, the land masses would not have had the same orientation as they do now. Thus the arcuate form of the mountain chains to which Patten attaches so much significance[4] would not be really significant at all. The land masses might have moved into their present positions after the mountain formation, and thus the present position could not be used to make any inferences about their formation.

References

[1]Patten Donald W. 1988. The Biblical flood and the ice epoch. Pacific Meridian Publishing Co., Seattle, Washington.
[2]Jeans, J. H. 1928. Astronomy and cosmology. Cambridge University Press.
[3]Roche, E. 1850. *Academie de Montpellier (Sciences),* 1:243.
[4]Patten, *Op. cit.,* p. 75ff.

THE RELEVANCY OF ROCHE'S LIMIT TO THE FLOOD-ICE DUMP THEORY

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The flood-ice dump theory of Patten is examined in view of objections to the use of Roche's fragmentation limit. A modified Roche's limit for rigid bodies with tensile strength is calculated and the tensile strength is found to be unimportant for an icy body of appropriate size.

One of the key axioms of the flood-ice dump theory of Patten[1] is the fragmentation of an icy body at a certain distance above Earth known as Roche's limit.[2] The theory suggests that after the demise of the icy visitor, the fragments interacted with the solar radiation and the geomagnetic field; were deflected along the magnetic lines, and descended over the magnetic poles in a period of a few weeks. The arrival of such a large quantity of ice in the magnetic polar regions caused the great ice age.

The strength of any theory depends on its ability to withstand legitimate objections that may arise regarding its claims. One such objection to Patten's theory is the application of Roche's limit (an idealized construction) to a somewhat less than ideal situation. This work seeks to examine several facets of this basic objection and to present mathematical evidence for the fragmentation of an icy visitor near Earth.

Gravitational Tension Forces

Although the mathematical derivation of Roche's limit (as recorded by Jeans[3]) is somewhat involved, the basic physical idea behind it is relatively simple and in fact is exactly analogous to the lunar tide effect. Due to the inverse square law for gravitational forces, the part of Earth nearest the moon is attracted by a force 7% greater than the part farthest away. The

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