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DINOSAUR GASTROLITHS OR "GASTROMYTHS"?

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Introduction

Some birds and reptiles swallow stones to aid either in digestion (chickens) or for ballast (penguins and crocodiles). Whatever their intended use may be, these stones are commonly referred to as gizzard stones or gastroliths ("gastro" meaning stomach, "liths" meaning stones).[1] Shiny, well-rounded pebbles and small cobbles comprise widespread gravel beds across Utah and are sold at a very low price in a variety of shops as dinosaur gastroliths. Many shop signs have quotation marks around the word "gastroliths" (let the buyers beware!).

It is difficult to distinguish true gastroliths from river rocks. Both show the rounding and polishing effects of water transport and the pitting and etching effects of water, wind and chemical erosion. Consequently, shiny or dull, rounded stones scattered over the ground may or may not be gastroliths. A report of a technique using light reflection properties proposed a way to distinguish between water/wind weathering of stones and gastroliths on the ground surface.[2] However, until it has been established whether or not chemical weathering processes can mimic the effects of the gastric juices on the stones, reflection techniques remain dubious.

Finding rounded, polished stones in the thoracic areas or stomach regions of a dinosaur may not solve the puzzle. Questions remain. Were the stones inside the animal or on the ground where the animal died, or transported and deposited during burial of the bones?

What is "out there"?

A survey of the geologic papers on gastroliths produced fifteen reports since 1997, some of which provide interesting information about the stones and "gastromyths." For example, one abstract states: "Claims that a high degree of polish is diagnostic of dinosaur gastroliths...are unsubstantiated because high polish has not been demonstrated as distinctive of bona fide dinosaur gastroliths."[3] This statement is further supported by a study using a scanning electron microscope (SEM) that documented surface criteria. According to this report, true gastroliths are pitted and have long, narrow ridges at 50X.[4] In addition, a previous report on a gravel layer in the lower part of the Cloverly Formation found that the large clasts of quartz, quartzite and chert that had been identified as "gastroliths or dinosaur stomach stones" have debris flow characteristics.[5] Thus, reports of shiny or polished "gastroliths" and rounded rock fragments that are not associated with bone material are highly suspect. Careful study is required with respect to those rocks that are associated with bones.

Gastrolith. Photo courtesy of the author.

An interesting study in China reports a catastrophically deposited bed with twelve coelurosaurs.[6] Each specimen contained gastroliths inside its rib cage.[7] An abstract on juvenile diplodocus remains is less convincing. Most of the bones are disarticulated, and small pebbles are strewn throughout the fine-grained sediments. Orientation of the bone material suggests "current flow running northwest/southeast prior to lithification[8] of the sediment." The authors argue that the presence of some articulated bones precludes strong currents.[9]

Parasaurolophus *(Hadrosauridae) skull from the Royal Tyrrell Museum in Drumheller, Alberta, Canada. Photo courtesy of Jim Gibson.*

This may or may not be valid, since research on the dismemberment and decay of dead organisms suggests partial articulation may be preserved as sections of the body sink.[10] Another seemingly unreliable report of gastrolith discovery comes from a recent study of a coelurosaur found in South Africa.[11]

Checking the Literature

A review of five groups of dinosaurs that have been cited often as specimens with associated gastroliths produced mixed results:

1) The first of these, *Claosaurus*, was a hadrosaur (duck-billed dinosaur) with gravel in the body cavity that probably was deposited during burial of the skeleton.[12] In addition, there has been some confusion in the reported claosaurs in the United States. A specimen once reported to be a claosaur is now considered an edmontosaur (also a hadrosaur). Numerous specimens of *Edmontosaurus* have been recovered since the original discovery and the misidentification was made, but none have gastroliths associated with the skeletons.[13]

2) Gastroliths within the rib cages of two specimens of *Psittacosaurus*, a ceratopsian dinosaur,[14] were reported in 1924.[15,16] More recently, five species of psittacosaurs with "gastroliths" have been reported from Asia.[17] Researchers suspect that the well-developed teeth of the animals thoroughly masticated the food so the stones appear problematic, since they were probably not needed for grinding. Numerous specimens were recovered from lake deposits, so Currie has suggested that these dinosaurs swallowed the stones for ballast.[18] Regardless of the purpose, the gastroliths found in the psittacosaurs are probably genuine.

3) *Massospondylus*, a prosauropod,[19] was a small, common dinosaur with round, peg-like teeth.

Another prosauropod, *Sellosaurus*, is thought to have been more bipedal and a fast runner based on front to back limb and limb to vertebra ratios. Gastroliths have been found inside fossil remains of both of these kinds of dinosaurs.[20]

4) Sauropods,[21] especially titanosaurs, apatosaurs and seismosaurs, are thought to have used gastroliths for digestion. However, evidence of this has been rarely documented despite the large number of specimens that have been found.[22] Two hundred and forty "gastroliths" were found strewn through one seismosaur. Some of the gastroliths were concentrated near the front of the chest and others in the pelvic region;[23] however, data (physical features such as polish and roundness) indicate these "gastroliths" are stream-deposited cobbles.[24]

7) Gastroliths identified in a variety of Theropoda include: a tyrannosaurid, *Lourinhanosaurus, Poekilopleuron, Baryonyx* and coelurosaurs including ornithomimids. The tyrannosaurid is currently housed in a museum in Mongolia, but Currie (1997) maintains the reported gastroliths were probably deposited after death and decay during burial.[25] *Lourinhanosaurus*, an allosaurid, reportedly contained 32 gastroliths in its rib cage.[26] *Poekilopleuron bucklandii* was discovered in 1938. Unfortunately, most of the remains were destroyed prior to recovery, and what remained was destroyed in World War II. *P. valens* was identified based on one caudal vertebra and has since been discounted. Partial material from a second *P. bucklandii*, reported in a French newspaper in 1999 may have belonged to a juvenile; however, there is some doubt that the identification can be verified.[27] As previously noted, coelurosaurs have been found with gastroliths. Twelve ornithomimids were found in Mongolia with a small pile of stones in each rib cage.[28,29] (The type of ornithomimid was un-

Triceratops *(Ceratopsidae) skeleton from the Royal Tyrrell Museum in Drumheller, Alberta, Canada. Photo courtesy of Jim Gibson.*

known at the time of the researchers' publication.) The gastroliths are most unusual, because 1,000 sand grains ranging from 0.5 mm to less than 5 mm were "identified" as such. The authors noted that the grit may have been used to grind food, most likely plant material.[30] Another coelurosaur, found in South Africa, has also been reported with associated gastroliths. Twelve pebbles were located in the abdominal region of the dinosaur.[31]

Conclusions

Gastromyths abound, and even finding stones within the remains of dinosaurs may not be so rare. Providing convincing documentation that the stones are gastroliths is very rare. The different uses of gastroliths by modern organisms complicate the interpretations as well. Thoroughly documented discoveries of multiple members of a particular species with gastroliths provide the most reliable evidence that true gastroliths have been found in some dinosaurs. The discoveries of gastroliths within the "body cavities" of the fossilized remains include the psittacocaurs, some prosauropods, some sauropods and some coelurosaurs. Isolated finds are far more questionable. There may be some gastroliths scattered across northeastern Utah; however, in general, stones collected from the ground without direct association with dinosaur skeletons should be discounted. For those who would like to have their own personal example of a gastromyth — happy hunting!

Sauropod *skeleton from Museo de La Plata in Argentina. Photo courtesy of the author.*

Ornithomimus *skeleton from the Royal Tyrrell Museum in Drumheller, Alberta, Canada. Photo courtesy of Jim Gibson.*

Endnotes

1. Currie PJ. 1997. "Gastroliths." In: Currie PJ, Padian K, editors. Encylopedia of Dinosaurs. San Diego, London, NY: Academic Press, p. 270.
2. (a) http://www.newscientist.com/hottopics/dinosaurs/stones.jsp; (b) Bains S. 1991. Dinosaurs' diet of stones shows up in a new light. New Scientist 130(1763):20; (c) Johnston RG, Manley K, Lemanski CL. 1990. Characterizing gastrolith surface roughness with light scattering. Optics Communications 74(5):279-283.
3. Lucas S. 2000. The gastromyths of "*Seismosaurus*", a late Jurassic dinosaur from New Mexico. New Mexico Museum of Natural History and Science Bulletin 17:61-67.
4. Whittle C, Onorato L. 2000. On the origins of gastroliths: determining the weathering environment of rounded and polished stones by scanning electron microscope examination. New Mexico Museum of Natural History and Science Bulletin 17:69-73.
5. Wiesemann S, Suttner L. 1999. Origin and significance of exotic clasts in the lower Cretaceous Cloverly Formation, Northwest Wyoming. Geological Society of America Abstracts with Programs 31(7):A-285.
6. Coelurosaurs are small, carnivorous dinosaurs, a type of therapod. Therapods were the bipedal, carnivorous dinosaurs. *Tyrannosaurus rex* is one example of a large therapod.
7. Kobayashi Y, Lu J, Azuma Y, Dong Z, Barsbold R. 2001. Bonebed of a new gastrolith-bearing ornithomimid dinosaur from the Upper Cretaceous Ulansuhai Formation of the Nei Mongol Autonomous Region, China. Journal of Vertebrate Paleontology 21(3 Supplemental):68A-69A.
8. Lithification refers to the process of consolidating and cementing loose sediments into rock.
9. Storrs GW, Garcia WJ. 2001. Preliminary analysis of a monospecific sauropod locality from Carbon County, Montana. Journal of Vertebrate Paleontology 21(3 Supplemental):105A.
10. Brand L. Personal communication.
11. de Klerk WJ, Forster CA, Sampson SD, Chinsamy A, Ross CF. 2000. A new coelurosaurian dinosaur from the early Cretaceous of South Africa. Journal of Vertebrate Paleontology 20(2):324-332.
12. Currie & Padian, p 270 (see Note 1).
13. http://www.cmnh.org/dinoarch/2002Jul/msg00706.html
14. *Triceratops* is probably the best known ceratopsian. Ceratopsians typically had large heads with a large plate extending from the back of the skull, short necks, massive bodies and stout legs. They are believed to have been herbivores.
15. Farlow JO, Brett-Surman MK, editors. 1997. The complete dinosaur. Bloomington and Indianapolis: Indiana University Press, p 322.
16. Weishampel DB, Dodson P, Osmólska H, editors. 1990. The Dino-

sauria. Berkeley and Los Angeles: University of California Press, p 592.
17. Farlow & Brett-Surman, p 322 (see Note 15).
18. Currie & Padian, p 270 (see Note 1).
19. Prosauropods had long necks, small heads, bulky bodies and long tails. Their hind legs were typically more robust than their forelimbs. Their fore feet had thumb claws that scientists speculate were used either for pulling down vegetation for feeding or as a weapon.
20. Farlow & Brett-Surman, p 251, 253, 256 (see Note 15).
21. Sauropods are the extremely long-necked, long-tailed, large-bodied, herbivorous dinosaurs.
22. Currie & Padian, p 720 (see Note 1).
23. Gillette D. 1994. *Seismosaurus*: the earth shaker. NY: Columbia University Press, p 205.
24. Lucas, p 61-67 (see Note 3).
25. Currie & Padian, p 720 (see Note 1).
26. Mateus O. 1998. *Lourinhanosaurus antunesi*, a new Upper Jurassic Allosaurid (Dinosauria: Theropoda) from Lourinhã (Portugal). Memórias da Academia de Ciências de Lisboa 37:111-124.
27. http://www.dinodata.net/Dd/Namelist/Tabp/P120.htm
http://www.dinodata.net/Dd/Namelist/Tabp/P123.htm
http://www.cmnh.org/dinoarch/1999Mar/msg00168.html
http://www.cmnh.org/dinoarch/1999Mar/msg00515.html
28. Ornithomimids, a type of coelurosaur, are saurischian (reptilian-hipped) dinosaurs that are often referred to as "ostrich-like" or "bird-mimic" because the outline of the body resembles that of ostriches.
29. Kobayashi, et al. (see Note 7).
30. Kobayashi Y, Lu J-C, Dong Z-M, Barsbold R, Azuma Y, Tomida Y. 1999. Herbivorous diet in an ornithomimid dinosaur. Nature 402:480-481.
31. de Klerk, et al. (see Note 11).

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Editor's Angle

In the spring of 2001 I received a letter from one of our readers raising questions about the validity of dinosaur gastroliths. I had received a gift of two reported dinosaur gastroliths having a relatively smooth, slightly polished surface appearance.

Knowing that many rounded pebbles found in the famous Jurassic Morrison Formation are not gastroliths, I decided to do a little research on gastroliths for a future issue of *Geoscience Reports*.

The time has come, and it is my hope that the information provided here will supply the information our readers need to assess such claims in the future.

Something New in Cretaceous Skies

Timothy G. Standish, Geoscience Research Institute

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Geoscience Reports is a newsletter published by the Geoscience Research Institute to present current happenings at the Institute as well as general-interest articles that deal with creation/evolution issues for elementary/secondary-school and college science classes. The views expressed are those of the authors and not necessarily those of the Institute.

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Xu X, Zhou Z, Wang X, Kuang X, Zhang F, Du X. 2003. Four-winged dinosaurs from China. Nature 421:335-340.

The authors report a new dromaeosaurid fossil dinosaur which they argue serves as evidence that dinosaurs went through a tetrapteryx (4-winged) stage during the evolutionary transition from reptiles to birds. The fossil appears to be a feathered dinosaur with not two, but four wings. The idea of a turkey-sized dinosaur gliding through blue Cretaceous skies with sun glinting on feathers extending from both its hind and forelimbs seems so peculiar that articles reporting it rapidly appeared in many major newspapers. Along with colorful descriptions of the four-winged dinosaur named *Microraptor gui*, most newspaper articles included the idea that this discovery serves as a link in the chain of evolution from dinosaurs to birds.

Many who believe God created life reacted strongly to the suggestion that *Microraptor* is a missing link. If God created birds on the fifth day of creation (Genesis 1:20-23), then birds could not have evolved from dinosaurs. This reaction may be unfortunate because it is based on faulty logic that says if God created birds, then dinosaurs can't have feathers. Believers should think carefully before coming to a strong opinion about the *Microraptor* fossil and its interpretation. Feathered dinosaurs neither challenge nor confirm

the creation worldview. If they existed, they merely broaden appreciation of life's past diversity.

Evolutionists, on the other hand, clearly believe feathered dinosaurs bolster the dinosaur-to-bird theory. This evolutionary bias may influence even careful interpreters of fossil finds. It is tempting for creationists to dispute feathered dinosaur data in an effort to deny "the enemy" succor, but this is a dangerous tactic driven solely by bias against the theory of evolution, not what Divine creation dictates. Uncompromising opposition to feathered dinosaurs could leave the impression that feathered dinosaurs are, in fact, a compelling argument for evolution. Even worse, believers might find themselves in the uncomfortable position of attacking something that may be true.

If feathered dinosaurs are real, and four-winged *Microraptor* once glided through the skies of ancient China, what would this mean? Fossils representing ancestral transitional forms must have lived prior to the derived form. In the case of *Microraptor* and other feathered dinosaurs, this criterion is not met.

Several years ago feathered dinosaurs from China were displayed at the Field Museum in Chicago. Next to the fossil dinosaurs, some of which really did look as if they could have feathers, were wonderful illustrations of dinosaurs slowly taking flight and becoming birds. A fossil bird, *Confuciousornis*, was included in the display to demonstrate the appearance of indisputable fossil feathers. *Confuciousornis* exhibits all the major traits of birds living today and came from the same rocks as the feathered dinosuars.

There is general agreement that organisms fossilized in the same rocks lived at the same time. As birds and feathered dinosaurs are found in the same rocks, it is reasonable to suppose that they lived together. Whether feathered dinosaurs were the ancestors of birds cannot be determined from these fossils, or, it seems, from any other fossils that have so far come to light.

If feathered dinosaurs existed with birds, then as-yet-undiscovered feathered dinosaur ancestors may have existed before birds; but this is an unconvincing appeal to the unknown. If feathered dinosaurs are to serve as good evidence for evolution, they must appear in the correct sequence, appearing in rock layers below units containing fossil birds. Even if fossils of this sort were found, they would be evidence consistent with the theory of evolution, not proof of it. Given their stratigraphic position, feathered dinosaurs do not seem to be particularly informative about evolution.

As believers in creation, we can evaluate this data objectively and decide for ourselves whether or not the fossil evidence supports feathers on some dinosaurs. Our faith requires no specific answer to this question.

* * * * *

An Educational Tour for Teachers in 2004

Jim Gibson, Geoscience Research Institute

Teachers will have the opportunity to enhance their own understanding of the latest thinking in creationism, as well as spice up their class presentations with fresh stories and photographs by attending the 5th Field School for Teachers, sponsored by the GRI.

Visit us thru cyberspace on our website at:

http://www.grisda.org/

The Field School is scheduled for 11-23 July 2004, and will include visits to several sites of interest in Arizona, Utah, and Wyoming. In cooperation with our colleges and universities, academic credit can be arranged. Financial assistance is available.

This Field School will be different from the usual format. In previous Field Schools, the group's activities centered around one location for the entire duration, whereas this Field School will be more like a tour. We will visit many interesting sites, taking time to discuss their significance in understanding the relationship between science and creation. The Field

Fossil fish, Green River Formation

Meteor Crater, Arizona

School will be of special interest to teachers who discuss issues in earth science, life science, or Bible studies, but all teachers are welcome to participate.

We will begin at Flagstaff, Arizona, where we will visit the Grand Canyon (south rim) and Meteor Crater. Both sites are striking features of Earth's surface, and experiencing them close-up will impress you with their size in a way impossible to obtain from books and videos.

From Flagstaff we will travel to Moab, Utah, where we will visit Arches National Park, and Upheaval Dome in Canyonlands National Park. On the way we will stop briefly at the "Goosenecks" of the San Juan River, and see the mesas for which Monument Valley was named.

The "Goosenecks" of the San Juan River, Utah.

Vernal, Utah, will be our next stop, where we will visit Dinosaur National Monument. On the way, we will pass through Price, Utah, where we will examine coal beds and other features. We will spend the Sabbath in Vernal, where there is a small Seventh-day Adventist church.

From Vernal we will travel to Kemmerer, Wyoming, the home of Fossil Butte National Park. This is the site of the famous "Green River" fossil fish. We will visit a commercial quarry, where we can collect some fossils for ourselves. Although we cannot guarantee a complete fossil fish, there is always that possibility, and there will definitely be some fossil material to collect. We also plan to visit a trona mine deep underground.

We will leave Kemmerer and travel to Salt Lake City, Utah, where the tour will end. If you are traveling by air, a good plan would be to fly into Flagstaff and out of Salt Lake City. In Salt Lake City, we will be a short day's drive to West Yellowstone, the gateway to Yellowstone National Park. Unfortunately, we will not have time to visit Yellowstone as a group, but some may wish to visit it on their own at the end of the tour. Another suggestion is a pre-tour visit to Bryce Canyon and Zion Canyon National Parks.

The Field School offers the opportunity for teachers to enhance their professional preparation, and to enrich their classroom presentations. Several hours have been scheduled during the second half of the tour for teachers to develop one or more PowerPoint presentations. This special touring Field School should be a valuable and pleasant experience for every teacher.

For further information, contact your principal, Conference Director of Education, or the Geoscience Research Institute website at FieldSchool@grisda.org.

For information about our videos, please go to our website:

http://www.grisda.org/video/

In Memoriam

David Laurence Show

1947-2002

Henry Zuill, retired Professor of Biology, Union College

In writing an obituary, it is customary to give salient facts about the person, but here I also hope to capture more of who David Show was. Born in 1947 in Illinois, David, together with his brother, spent five of his early years in Singapore as a child of missionaries. Returning to the States when he was eight, the Shows moved to Berrien Springs, Michigan. There David would later complete a B.A. in physics at Andrews University.

In 1971 he married Melanie Grall, and in 1974, after completing his Ph.D. in physics at Michigan State University, David and Melanie accepted a call to Gitwe College in Rwanda. With several months of intensive French studies in Colonges, France, behind them, they took up their duties in equatorial Africa where, David, with a Ph.D., was somewhat of an anomaly at that time. In 1978 they returned to the States, and David began teaching at Union College in Lincoln, Nebraska. He stayed there the rest of his life and left behind footprints that will be difficult to follow or fill.

Of particular interest to readers of *Geoscience Reports*, David had an avid interest in origins questions. He was a regular and significant team-teacher in the Origins course, where he and I grappled together with these questions for ten years. He was also a member of the Biblical Research Institute Science Council. A major concern of his was that students be able to withstand attacks on faith in later university studies. Consequently, he did not steer around hard questions, nor skip over evidence that might appear to threaten our understanding of creation. Some students might have found this discomforting, but he thought it better to be uncomfortable in the context of Union College than later on where there would be no help at all.

David loved tennis and golf, especially golf. When I met his brother, Richard, I asked if he too played golf. "Yes," he confessed, "And I always get higher scores than David!" No wonder, with his ability to low score in golf, David won several golf tournaments.

David Show

David had two items of clothing that set him apart: a cowboy hat and suspenders. Perhaps these hinted that behind his quiet nature, David still had a subtle sense of humor. He often brought cartoons to class that had a particular and pertinent punch. He loved to play on words.

An outstanding teacher, he will long be remembered as no easy touch. Students knew their subject after his courses and knew too that their grades were well earned. In 1989 he was given the Zapara Excellence In Teaching Award. During his last year of illness, David chafed to be back in the classroom.

While visiting with him shortly before he died, I could see the old spark was still there, even though he was greatly weakened by that time. Despite the unfairness of it all, he did not allow his condition to weaken his faith. One time I heard him give a chapel talk on righteousness by faith. It was one of the best chapels I attended at Union College, one I will long remember. He quite evidently knew the One he trusted.

A major concern was leaving Melanie. Once, when speaking about this, I saw tears flow, not an easy feat for one as private as David. But he had a big and tender heart under his quiet facade. David Show will be missed by all who knew him. He leaves a particular void in my heart.

MEN OF SCIENCE AND FAITH IN GOD

C. EVERETT KOOP (1916-)

Benjamin L. Clausen, Geoscience Research Institute

C. Everett Koop (1916-) became known as America's family doctor after his 1981-1989 tenure as United States Surgeon General. For 35 years preceding that he was surgeon-in-chief at Philadelphia's Children's Hospital working to save and repair premature and damaged babies.

During his first year at Children's Hospital he gradually realized what it meant to be a Christian. "As a person whose training and experiences put full faith in science, I came to see an even higher truth. From then on, I saw a coexistence between science and God." He taught residents to not only master the science of medicine, but also share the milk of human kindness with distressed patients.

In 1981 during the acrimonious and protracted confirmation hearings for Surgeon General he and his wife did their usual morning Bible reading. They found especially helpful the story of Abraham being wrenched from his home to follow God's call and the book of 1 Peter outlining how to face vituperation and vilification for right-doing. The cause of the protracted confirmation hearings was his deep conservative convictions. He was called a right-wing crank, a mean-spirited nut, and a religious zealot. Later as Surgeon General he lashed out against drunk drivers, criticized American eating habits, called tobacco lobbyists "sleazy" and "flat-footed liars" who were exporting death to the third world, declared nicotine as addictive as heroin, and proposed a ban on all cigarette advertising.

Koop prefers to call himself an evangelical rather than a fundamentalist. Fundamentalists are known more for what they are against than what they are for, whereas "evangelist" means "messenger," a bearer of the good news of the mercy of Christ. He preferred the attitude of the concerned family doctor rather than the nagging moralist. He respected the value of all human life: Washington socialites as well as malnourished children and abused wives, abortion rights activists as well as dying AIDS patients. He had a soft spot for any who were weak and disenfranchised.

By the end of his term as Surgeon General, his former critics heaped praise on him and some former supporters felt their cause had been betrayed. This change of view centered around three issues:

(1) In the Baby Doe case, nourishment was withheld from a birth-defective infant. Koop's stiff regulations to prevent future occurrences were overturned in court. After meeting with both conservatives and the medical establishment a compromise was reached. Conservatives felt betrayed by the compromise and Koop was frustrated by their all-or-nothing approach to morality. He realized that everything immoral can't be made illegal.

(2) In preparing the report on the AIDS epidemic among homosexuals and intravenous drug users, he interviewed 25 different groups. Although he personally abhorred sexual promiscuity, he saw himself as Surgeon General of the immoral as well as the moral. Although Koop's report prescribed abstinence and sex within monogamous marriage as safest, it also called for sex education and condoms for those with multiple partners. The gay community disagreed strongly with his personal beliefs, but listened to him because they had learned to trust him.

(3) In preparing the report on the health effects of abortion on women he surveyed 255 studies and concluded that the scientific studies did not provide incontrovertible data about the health effects of abortion on women. Koop had not changed his position on abortion, but did refuse to be dishonest with the statistics.

Koop found too many people willing to stretch the truth for an agenda, and who felt that because they were correct morally they didn't need good scholarship or accurate facts. He was disturbed by the attitude and activities of some of the people who shared his views and found their tone and rhetoric offensive. Because of his intellectual, moral, and ethical honesty he became one of the most admired public servants in the United States and received its highest civilian award, the Presidential Medal of Freedom. He successfully and spectactularly integrated his religious and professional life.

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