

## ***THE METAPHYSICS OF BLACK HOLES***

For our amusement, let's consider those mysterious cosmic entities called black holes. Just thinking about traveling into a black hole is a mind-bending experience, and that's just the beginning. After arriving, would we be in a different universe? Would time stand still? If time stood still, would we be eternal?

With no further delay, let's begin our excursion. But be warned, there might be some surprises and shocks along the way ...

**Black holes are inferred from certain X-ray sources.** This ideological association is often expressed as follows: "Very high temperatures are required to produce X-rays. But not all X-ray sources are caused by black holes. For example, though the sun produces X-rays from the corona, the emission is so weak as to be invisible if we were observing the sun at the distance of nearby stars. Generally X-ray sources that may be seen over great distances are so rare that they must indicate unusual circumstances, hence the appeal to compact objects such as black holes. Other X-ray sources require even more exotic explanations. There are no other scenarios for most X-ray sources."<sup>1</sup>

However, there are a number of difficulties with this popular scenario.

### **I. How Common Are Strong X-Ray Sources in the Universe?**

We will examine below the notion that certain strong ("exotic") X-ray sources have been compellingly shown to be due to black holes. The question now is, What is the cosmic abundance of strong X-ray sources?

**Every part of the sky emits X-rays virtually uniformly** in much the same manner as the microwave background radiation. This X-ray background has been attributed to emission from an intergalactic plasma within galaxy clusters. Some of the X-ray background is also thought to originate from stars in the clusters themselves.<sup>2</sup>

However, a significant fraction of the X-ray background is thought to emanate from quasars. Quasars are strong X-ray emitters. In fact, Bruce Margon, one of the foremost authorities on the subject of the cosmic X-ray background, once opined that, "A large fraction, and possibly all, of the X-ray background is in fact due to distant, individually invisible quasars."<sup>3</sup>

Though it no longer seems that this extreme possibility is the case, nonetheless it is also true that "a large fraction of serendipitous X-ray sources are actually previously undiscovered quasars."<sup>4</sup> Thus it appears that a fraction of the X-ray background is due to "an ensemble of distant pointlike sources. If one peers through a fog and can just barely discern the nature of the brightest of a large number of distant objects that fade into a blur, it seems a reasonable assumption that similar objects constitute a significant fraction of the more distant, individually unobservable population. Similarly, the identification of a large number of the serendipitous X-ray sources with quasars . . . strongly hints that quasars are

responsible for a significant fraction of the background radiation. . . . [T]his fraction is about a fourth. Clearly objects such as quasars do make a significant contribution to the background radiation."<sup>5</sup>

The conclusion that much of the X-ray background is due to strong X-ray emitters means that **the cosmos is rich in strong X-ray sources.** In the context of discussing X-ray sources that could be considered candidates for black holes, one astronomer has noted, "X-ray astronomers have discovered a veritable zoo of X-ray sources."<sup>6</sup> Thus the popular notion that strong X-ray emitters are rare is not true. The belief that such sources require exotic explanations is also false.

In contrast to the hundreds of strong X-ray emitting quasars now known, it continues to be stated that there are only two good cases for black holes, Cygnus X-1 and A0620-00,<sup>7</sup> but these, as astronomer John Fix points out, are only "possible" black holes. Thus the popular notion is false that "there are no other scenarios [other than black holes] for most X-ray sources."<sup>8</sup>

**It is significant that the number of viable black hole candidates has not changed in several decades.** Cygnus X-1 was discovered in 1965, but it was not announced to be a black hole candidate until 1972. In 1980, Cygnus X-1 was considered the best black hole candidate, and astronomer Harry L. Shipman considered only two other candidates worth discussing, the stars Circinus X-1 and V 861 Scorpii. However, Circinus X-1 was not really a good candidate,<sup>9</sup> and the data on V 861 Scorpii were too sparse to consider its candidacy at all certain.<sup>10</sup> These last two stars have been dropped from the roster since 1980, leaving Cygnus X-1 as the only candidate to survive scrutiny over the decades. And Fix, as noted above, goes only so far as calling it a "possible" black hole.

**The prevalence of strong X-ray sources known to be unrelated to black holes suggests that a dogmatic insistence on the existence of black holes may not be wise,** especially considering that black holes cannot be observed, a dilemma to be examined below.

### **II. The Popular Black Hole Scenario Commits the "Best in Field Fallacy."**

**The popular belief that black holes are the only possible explanation for certain X-ray sources commits a serious logical error.** The commission of this fallacy is a charge which has long been leveled at evolutionists by creationists (and also by some non-creationists). **This fallacy has been called the "best-in-field fallacy."** Evolutionists fall prey to this fallacy when they say, in effect, "Evolution must be true because it is the only way we can conceive to explain our observations." It should be evident that a person committing this fallacy may have willingly, or out of ignorance, failed to consider other possible explanations for the phenomena under consideration.

Evolutionist Norman MacBeth illustrates this fallacy as follows: "Perhaps [the best-in-field fallacy] appears with unusual frequency among the evolutionary theorists, who seem to have a special weakness for it. . . . If such a theorist makes a suggestion that is better than other suggestions, or better than

nothing, he feels that he has accomplished something even if his suggestion will obviously not hold water. He does not believe that he must meet any objective standards of logic, reason or probability [or observability]."<sup>11</sup>

George O. Abell and colleagues when discussing black hole candidates committed the same fallacy discussed by MacBeth: "If a black hole should be a member of a double star system, then we may be able to detect the black hole by studying the orbital motion of its companion. ... So we want X-ray companions associated with binary stars with invisible companions of high mass. We cannot prove that such a system contains a black hole [a candid admission - but then Abell, now deceased, was one of an older generation of astronomers who perhaps retained a greater degree of objectivity than is now present in much astronomical theorizing!], but at present we have no other theory for what the invisible massive companion can be."<sup>12</sup> The last part of this statement commits the best-in-field fallacy.

The popular belief about black holes commits this fallacy when it says, "There are no other scenarios for most X-ray sources." However, **lack of simple explanations for phenomena constitutes no proof at all that only exotic theories are correct.**

### III. Black Holes Can Never Be Observed.

The gravest objection to black holes as a scientific concept is not that they have not been seen, but that they *cannot ever* be seen - are incapable of being seen - by the very nature of their definition. The definition of a black hole is an object from which nothing can escape, not even light or other radiation. **If nothing can escape a black hole, it is unobservable in principle.**<sup>13,14</sup>

Science has been shifting for 150 years to more of a reliance on "things not seen," i.e., phenomena which cannot be seen because of the way they are defined. This shift began with the rise of evolution, a phenomenon which cannot be seen because it (allegedly) happened in the past and is today (allegedly) occurring too slowly to be observable. Now the shift has progressed to the point where many innately unobservable objects are "believed in" by millions of people, black holes being one example. Evolutionary science has become truly a God-substitute in the ultimate sense, with its believers exercising the same faith in unseen things which the Bible ascribes to Christian faith in Hebrews 11:1.

**In fact, the concept of black holes was first conceived as a mathematical construct, not because they were observed or implied to exist by X-ray sources.**<sup>15</sup> The conclusion that some X-ray sources imply black holes is a belief that came later, and it is a conclusion that can be inferred only with the black hole model as the starting point. Therefore the belief that certain X-ray sources must be associated with black holes is a type of circular reasoning.

The totally theoretical and non-observational basis of the black hole concept has been emphasized in *Astronomy* magazine: "There is as yet no unequivocal proof that black holes exist on more than a theoretical basis. Our current conception of black holes is based on Albert Einstein's general theory of relativity. ... We have seen how particles and light

waves behave around black holes. It is important to remember, though, that our predictions are theoretical ones obtained from general relativity. This, of course, leads to the question: Have we checked out any of these predictions observationally? Embarrassingly, we have not."<sup>16</sup>

**The modern black hole concept is the outgrowth of a certain interpretation of the equations of Einstein's general relativity** which requires the existence of "singularities," regions in the cosmos of extremely high density: "The standard black hole ... is a product of Einstein's theory of gravitation. ... Black holes and Einstein's theory of gravitation are very closely tied together. ... If black holes are so closely connected to Einstein's theory, you might well ask, 'What happens to them if Einstein's theory is wrong?' ... As long as Einstein's theory of gravitation holds ... singularities must exist."<sup>17</sup>

As we will see below, Einstein's general relativity need not be disproved to eliminate black holes, for as with virtually all mathematical equations, differing interpretations are possible. Though Einstein's general relativity dates from 1915, it was not until 1968 that the term "black hole" was coined by Nobel-prize winning physicist John Wheeler. Previously, black holes had been known as singularities, frozen stars, or collapsars,<sup>18</sup> all terms which probably sounded erudite and overly-technical to the average person. John Wheeler's vivid phrase caught the public imagination, a factor to which growing acceptance of the black hole concept in the last few decades must partly be attributed.<sup>19</sup> Such a factor has nothing to do with science, of course, but everything to do with public perception.

**Despite rising acceptance, the non-observability of black holes has not changed.** The existence of black holes must be inferred based on models in the minds of those who believe in them. So strong has the belief in black holes become, however, that in many modern textbooks, the word "inference" has somehow been transmuted into the word "detection," as if inference were somehow equal to observation.<sup>20,21,22,23,24</sup>

**But inference is not detection,** a fact emphasized elsewhere: "Any such 'detection' (actually a deduction) of the existence of black holes must rely on observations of the surroundings of the object, combined with our ability to reject alternative explanations for what we observe."<sup>25</sup> **In other words, there is no observational evidence that compels a belief in black holes, and other explanations could possibly be devised for the X-ray sources commonly attributed to them.**

Since the Reformation science has been built on observation. Black holes may be a personally satisfying model for certain X-ray sources for some scientists, but they are not observable *even in principle*, so the black hole construct does not fit the mentality under which science has prospered since the 1600s. Astronomer Donald Goldsmith states: "We can never hope to observe [a black hole], theoretically or practically. Since neither light nor radio waves nor any particles with mass can escape from a black hole, black holes are by definition invisible. Our knowledge of them must

therefore remain circumstantial."<sup>26</sup> **This makes black holes more of a philosophical or metaphysical construct than a scientific one.**

Ironically, the existence of the hypothetical Oort cloud has been questioned on exactly the same grounds that the reality of black holes ought to be questioned: "[The lack of observational evidence] raises a very important question as to the scientific status of the Oort cloud. Can something that cannot be observed, even indirectly as in the case of subatomic phenomena, be classed as scientific? While the Oort cloud is often referred to as a theory, given the usual definition of a theory and the impossibility of observation, can the Oort cloud be termed a theory? Indeed, given that it is doubtful that this idea can ever be tested, one has to question whether the Oort cloud is even a hypothesis."<sup>27</sup>

In the same fashion, it would seem that creationists ought to be questioning whether the black hole model is even a hypothesis. **Indeed, the theory behind black holes is so flexible that black holes can be theorized out of existence,** as we will see below. Of immediate interest to the creationist, however, is the exploitation of the black hole concept in models of stellar evolution.

#### **IV. The Black Hole Model Is Used to Buttress Stellar Evolution.**

Since black holes cannot be observed, the black hole model is not physical in character. It is metaphysical. Of course, many models in science are of a metaphysical nature, but it is a fallacy to confuse such a model with observations or with truth.

**Scientific models are used because they work to help us visualize phenomena. This does not mean the models are true.** Even worse, the phenomena we wish to visualize may themselves be false. An example is the presumed phenomenon of stellar evolution, which though accepted as true by many is really fictitious.

**In stellar evolution models, black holes have come to be accepted as the end stage of stellar evolution for some stars.** Bruce Margon has explicitly stated this fact: "Stellar evolution is a finite, one-way process that eventually converts galactic matter into faint compact stars such as white dwarfs, neutron stars and possibly black holes."<sup>28</sup>

Harry Shipman notes that the "late evolution" of some stars leads to a "black hole as the only indication that a star was ever there."<sup>29</sup> Shipman also proposes that a refinement of stellar evolution models "can provide us with definitive evidence that black holes do exist."<sup>30</sup> Of course, such a hope is nothing more than circular reasoning in which the alleged product of the model is "proved" to exist by the model requiring it.

For several decades, the black hole state has been an accepted stage of stellar evolution. The influential New Age physicist Fritjof Capra has written, "According to current ideas in astrophysics, every star reaches a stage in its evolution where it collapses. ... If the star is massive enough ... no known process can prevent the collapse from going on indefinitely ..."<sup>31</sup> Physicists John Barrow and Frank Tipler believe that stellar evolution "leads to what is called a *black hole*"<sup>32</sup> (emphasis in original).

**Grade school science texts contain some of the most explicit diagrams placing black holes into the sequence of stellar evolution.** One such text shows the alleged sequence of stellar evolution occurring over billions of years accompanied by a caption stating, "The fate of a star depends on the star's mass when it first formed. The sun is a low-mass star that will one day become a white dwarf and finally a dead black dwarf."<sup>33</sup> In the diagram a black hole is depicted as the fate of the most massive stars. Assuming this text is representative, apparently millions of school children are being taught that black holes exist as the end-point of evolution for some stars. **Regardless of the mathematically inspired interpretation that originated the black hole concept, belief in black holes today is strongly associated with the alleged function they have in stellar evolution.**

Indeed, there have been cosmic scenarios built around the idea that the entire universe may one day become a black hole, or that stars may all eventually become black holes.<sup>34</sup> So though at present only certain stars allegedly evolve into black holes, according to these scenarios eventually black holes may encompass the entire universe, only to experience gradual dissolution over the eons into nothing but radiation.<sup>35</sup> Biblical creationists recognize, of course, that the universe will not end this way (see 2 Peter 3:10), but the popularity of such theorizing nevertheless demonstrates the grip which the black hole concept has over the minds of men.

**Were it not for the "need" for black holes in such theories, perhaps other alternative models would be found to be more acceptable for the X-ray sources now conceived as being explicable only by the black hole model.**<sup>36</sup> Indeed, as noted above, the number of black hole candidates generally given "votes of confidence" is so small as to remind one of the handful of biological transitional forms trotted out to confirm biological evolution.<sup>37</sup>

As mentioned, black holes were conceived originally as a consequence of certain interpretations of the equations of general relativity. This is why it has been claimed that "a black hole is a perfectly natural consequence of the principle of relativity"<sup>38</sup> - that is, *provided the equations are interpreted appropriately*. Scientists often become used to certain interpretations of mathematical equations as if they were the only possible ones, but in this case, theorists in Canada and Japan several years ago proposed new interpretations of the equations of general relativity that eliminated the black hole prediction. One of the theorists, John Moffat of the University of Toronto, stated that the "resulting equations ... give the same results as relativity but eliminate singularities [i.e., black holes]."<sup>39</sup>

It is strange indeed that a construct predicted by one interpretation of a theory, yet made to vanish by another interpretation of the same theory, can be taught and believed in as if it were real. Such a situation indicates vividly how far science in our modern culture has moved from any constraints imposed by observation.

In addition to the fact that general relativity does not uniquely predict the existence of black holes, inconsistencies between general relativity and black hole theory exist:

"Einstein's general theory of relativity does not specify a finite limit to the continued contraction of a supermassive collapsing star. Thus with no contraction limit a black hole would seem to be an inevitable consequence. But this is where a contradiction lies. One facet of general relativity dictates that nothing whatever can come out from inside an event horizon, including light. This one-way effect is said to be induced by an intense gravitational field.

"Another facet of general relativity dictates that the field of gravity has a finite propagation velocity which is equal to the finite propagation velocity of light. ... In strict compliance with both dictates, a gravitational field simply cannot be propagated from a black hole. Thus, there is no sound way that the black hole theory can be defended."<sup>40</sup>

When observing a putative black hole, we cannot be observing the gravitational field existing before the mass contracted within the event horizon, for then we are not seeing evidence of the black hole at all, but rather the state of the star before it became a black hole.<sup>41</sup> Perhaps the black hole is a state approached asymptotically by collapsing stars, but never actually achieved.

## V. Black Hole Theory Shows the Shift from Biblical to "Greek" Thinking.

One of the world's foremost theorizers on black holes, Kip S. Thorne, Feynman Professor of Theoretical Physics at the California Institute of Technology, has stated, "I have never seen a black hole. Nobody has. Astronomers have found only indirect evidence for the existence of black holes and no observational evidence whatsoever for their claimed detailed properties."<sup>42</sup>

Amazingly, immediately before this frank statement, Thorne makes a confession of utter belief in black holes and all of their presumed properties: "I can guarantee with considerable but not complete confidence that black holes exist in our Universe and have the precise properties described ... above ..."<sup>43</sup>

How can black holes be admitted to have no direct evidence in their favor, yet at the same time be objects of such firm belief? The answer cannot lie in the scientific realm, the realm of observation, but is to be found in the ability of fallen man to believe that he can logically reason his way to truth using only his own mind. Indeed, Thorne himself believes exactly this, when he writes: "I ask myself ... 'What is the most important thing that you want your readers to learn?' My answer: the amazing power of the human mind ... to unravel the complexities of our universe ..."<sup>44</sup>

**A virtual adoration of the human mind is not uncommon in evolutionary writings.** Donald Goldsmith, in his aggressively evolutionary college astronomy text lauds the human mind in terms very similar to Thorne's wording: "The power of the human mind, seen both in its analytic ability and in its development of superfast calculating machines, has enabled us to penetrate the interiors of stars and to discover the liberation of kinetic energy within them. We have achieved this success despite the fact that we can see only the *surface* [emphasis in original]."<sup>45</sup> **This is a stunning statement. It is tantamount to saying that we no longer require**

**observations of phenomena, because the human mind can divine the truth apart from external input.** Leaving aside the fact that there are grave problems with conventional theories of stellar energy generation, surely it is easy to see that it is only a short step from such a reverence for the human mind to a total disdain of observation or experimentation in general. Was this not exactly the failure of the ancient Greeks, who believed they could attain truth unaided by any aid apart from human reason? It would appear that our science, and our culture generally, is slowly sliding back into Greek modes of thought from which the Reformation rescued us half a millennium ago. The popular insistence that black holes must exist is merely one symptom of this cultural condition.

**One can in fact discern this shift by comparing recent versus not-so-recent sources on black hole theorizing.** In older sources, black holes are treated as only a theoretical possibility, and maybe an unlikely one at that, but in newer sources, the possibility that black holes may not exist is not even mentioned. They are accepted as dogmatically real,<sup>46</sup> though they can never be seen.<sup>47</sup>

Older sources were not so dogmatic. Some were skeptical of the concept: "Because the existence of black holes is still in doubt, and because in any case a diagnosis of a black hole is an exotic and unlikely way to explain the peculiarities of astronomical objects, astrophysicists are reluctant to accept that explanation unless all other possible explanations can be eliminated."<sup>48</sup> This statement dates from 1976. As we have seen, the number of black hole candidates has not increased since then, making this assessment is as reasonable today as it was then. Even more to the point, since the number of candidates has remained static, it is apparent that the belief in black holes has grown not because of observational evidence, but because of the tightening grip of "Greek" thinking on the minds of scientists.

Only a few decades ago, warnings against unwarranted speculation in black hole theory continued to be written. Anyone caught up in the modern dogma that black holes must exist would do well to consider statements such as the following: "The progress of science involves both theory and observation. It is often possible for theorists to forget that they are only model-builders. The models become so fascinating that they become real, like the statue of Pygmalion. Synge, a theorist himself, calls fascination with models the Pygmalion syndrome. You get caught up in your own work and become oblivious to the fact that you're only dealing with pencil marks on paper (or ten-foot-high piles of computer printout) and not real stars. We astronomers have a particular difficulty here because we can't touch a real star. All we know is what our telescopes reveal. ... This means not simply indulging yourself in an elaborate mathematical exercise, thinking it represents the real world. The Pygmalion syndrome is moderately prevalent among black hole theorists, so watch out for it. There is nothing wrong with mathematical speculation so long as you recognize it as such."<sup>49</sup>

Other astronomers likewise cautioned: "We are not yet positive that black holes even exist;"<sup>50</sup> and "Black holes are primarily theoretical. ... Do they even exist?"<sup>51</sup> Even Cygnus

X-1, the sole long-term candidate for black hole status, was criticized: "It is not completely certain that Cygnus X-1 is a black hole. ... [Some] people feel uncomfortable with the idea of a black hole as the central object of the accretion disk in the Cygnus X-1 system. ... And if the critics are right, the best candidate for a black hole vanishes, and we come back to square one: Do black holes really exist?"<sup>52</sup>

In the 1600s only a century after the Reformation, metaphysical speculation that centered on inherently unobservable entities was rejected as being valid science. Isaac Newton, who has been described as "the greatest scientific thinker of modern times,"<sup>53</sup> wrote, "I frame no hypotheses ... and hypotheses, whether metaphysical or physical, whether of occult quantities or mechanical, have no place in experimental philosophy."<sup>54</sup> This dictum, "I frame no hypotheses," ("Hypotheses non fingo"), has long been recognized as one of the strongest denunciations of unwarranted metaphysical speculation in science.

Astronomer and Newton scholar Florian Cajori wrote that this famous dictum is not to be interpreted as Newton's "private practice, nor his individual habit of thought, but as the position which he took in public print, on the occasion of placing before the scientific world the positive results of his mathematical thinking, which were primarily based on observation and experimentation. ... An examination of the various passages in Newton's writings ... discloses the rule that ... hypotheses which seem incapable of verification by experiment [i.e., by direct observation] are to be viewed with suspicion."<sup>55</sup> One can only regret that the same caution is no longer exercised in astrophysics today.

Scientifically, black holes can never be directly observed and so must always remain a completely theoretical or metaphysical construct. From the standpoint of creation studies, the black hole stage of stellar evolution is arguably the weakest link in the alleged sequence of the stellar evolutionary chain because of its inherent unobservability. It seems that a creationist challenge to models of stellar evolution could most productively begin by emphasizing this fact.

However, some creationists maintain that portions of stellar evolution models are valid, but this position is a truism, and is similar to agreeing that parts of biological evolutionism, such as "microevolution" (better called genetic variation), are a reality. This position amounts to using evolutionary terminology which could be avoided and replaced by distinctively creationist terminology. Physicist Don DeYoung, for example, has pointed out that since all cosmic and stellar processes seem to be destructive, the term "stellar evolution" should be replaced by the more accurate "stellar degradation,"<sup>56</sup> a term carrying no evolutionary connotations.

Beyond the difficulty with terminology, there are some creationists who opine that virtually all of stellar evolution is valid. This error is typically rationalized by appealing to the usual but fallacious definition of stellar evolution as mere "change,"<sup>57</sup> and the argument runs that since all the cosmos is certainly changing, stellar evolution must therefore be occurring.<sup>58</sup> Such a conclusion is confusing at best and misleading at worst. Indeed, this is the identical rationale used by evolutionists in the early 1800s to convince the public of biological evolution. Acceptance of stellar

evolution within the creationist community has probably been a factor in blunting creationist skepticism of inherently metaphysical concepts such as black holes. After all, if stellar evolution is valid, then black holes come as part of the package and must also be valid.

## VI. Conclusions

Since black holes can never be observed even in principle but can be only inferred from observable phenomena, it is possible that other explanations may exist for the phenomena now attributed to black holes. Every model (antecedent) has consequences (predictions), but "The confirmation of a consequence does not confirm the antecedent."<sup>59</sup>

Furthermore, the number of X-ray sources considered "good" evidence for the existence of black holes is arguably only two, in contrast to the hundreds of strong X-ray sources known to be unrelated to black holes. The black hole concept first emerged from general relativity theory, not from X-ray observations, and in recent years physicists have used that same theory to show that black holes need not exist at all. Therefore, the so-called "theoretical evidence" for the existence of black holes really carries no weight since the same theory has been used as evidence against them. Most importantly, however, theory is not observation. Science should balk at labeling as "scientific" any putative entities that can never be seen.

The black hole concept has been incorporated into theories of stellar evolution. In turn, stellar evolution models now depend on the black hole concept. Were it not for this development, the black hole model probably would be seen as the speculative concept it really is.

"Do black holes exist?" If one means by this question, Can they be directly observed?, the scientific answer is no. But if one means, Do they exist as metaphysical entities lurking behind observable phenomena?, this is a question science cannot answer. Nevertheless, creationists would do well to avoid affirming that metaphysical entities used in stellar evolution models must be accepted as real.

Of course, the excursion we have now completed cannot be taken seriously. After all, nearly everyone believes in black holes. Most astronomers believe in black holes. Stephen Hawking, the most well known astrophysicist in the world, believes in black holes. Hawking occupies the prestigious Lucasian Chair of Mathematics at Cambridge University, the Chair first filled by Isaac Newton, who said, "I frame no hypotheses ..." But times have changed. Metaphysical speculation is now acceptable as "science." These days everyone knows the majority is always right ... No matter how far a culture strays from its biblical foundations to an abject dependence on human reasoning, the majority is always right ...

## References and Notes

1 The preceding paragraphs do in fact summarize what is believed about black holes. Furthermore, this set of beliefs has been fairly constant for quite some time, as may be confirmed by consulting recent and not-so-recent sources. See, for example, Harry L. Shipman, *Black Holes, Quasars, and the*

*Universe*, Houghton Mifflin, 1980, pp. 24, 71, 77 ("Time comes to a stop" inside the event horizon of a black hole), 102 ("The only reasonable way that a star can produce lots of X rays is for the star system to contain a neutron star or a black hole"). Also see John D. Fix, *Astronomy*, WCB/McGraw-Hill, 1999, pp. 468-469, 474-475.

2 John D. Fix, *ibid.*, p. 592.

3 Bruce Margon, "The Origin of the Cosmic X-Ray Background," *Scientific American*, Vol. 248 no. 1, January 1983, p. 112. Interestingly, Margon was motivated to espouse this explanation for the X-ray background partly by the fact that plasma sufficient to account for all the X-ray background implies that the universe would have a mass large enough to provide a "critical density" for intergalactic matter. With critical density, the universe would expand forever, asymptotically approaching a static condition in which the presumed processes of cosmic evolution would cease. This fate for the universe is sometimes viewed as philosophically undesirable. Margon in fact calls this a "gloomy prediction (*ibid.*, p. 111).

Assuming that all of the X-ray background is due to intergalactic plasma, Margon states, "Unfortunately the background radiation is evidence, but by no means proof, of the existence of a critical density of intergalactic matter. ... It would be comforting to know that there are no other existing explanations of the X-ray background that are also consistent with the data" (*ibid.*). One can sense Margon's emotional response to the existence of critical density and its associated outcome by his use of (non-scientific) words such as "unfortunately" and "comforting." Margon here illustrates the subjective nature of science, a subjectivity which is no less in science than in other endeavors. There are philosophical reasons why this scenario is disliked that relate to a desired eternity for the universe according to principles of Eastern mysticism, but discussion of these concepts is beyond the scope of this discussion. 4 *ibid.*, p. 114. 5 *ibid.*, p. 116. 6 Shipman, *op. cit.*, p. 111. 7 Fix, *op. cit.*, p. 498. 8 *ibid.* 9 Shipman, *op. cit.*, pp. 108, 109. 10 *ibid.*, p. 109. 11 N. MacBeth, *Darwin Retried*, Gambit, 1971, p. 78. 12 G. Abell et al., *Exploration of the Universe*, Saunders, 1987, pp. 588-589. 13 Theodore P. Snow, *Essentials of the Dynamic Universe*, 1984, p. 285. Snow says, "A black hole literally cannot be seen."

14 Jay M. Pasachoff, *Contemporary Astronomy*, 1985, p. 200. Pasachoff says that in becoming a black hole, a "star has withdrawn from the observable universe."

15 Snow, *op. cit.*, p. 285.

16 Barry Parker, "In and Around Black Holes," *Astronomy*, Vol. 14 no. 10, October 1986, pp. 8, 15. 17 Shipman, pp. 65, 67, 132. 18 *ibid.*, p. 79. 19 Tony Rothman (ed.), *Frontiers of Modern Physics*, Dover, 1985, p. 22: "... 'black hole' [is] an expression coined in 1968 by John Wheeler as he leafed through a thesaurus. In connecting the words 'black' and 'hole' to describe an object that had been studied peacefully by relativists for the better part of a century, he stumbled upon a profound psychological truth and unleashed a torrent of popular books and articles that has not ceased to the present day." The first article using the term "black hole" was by Wheeler in *American Scientist*, Vol. 56 no. 1, 1968.

20 Abell et al., *op. cit.*, pp. 588-589. 21 Donald Goldsmith, *The Evolving Universe*, Benjamin Cummings, 1985, p. 345. 22 William K. Hartmann, *Astronomy*, Wadsworth, 1991, p. 428.

23 Pasachoff, *op. cit.*, p. 204. 24 Fix, *op. cit.*, p. 475.

25 Goldsmith, *op. cit.*, p. 353. 26 *ibid.*, p. 335.

27 Danny R. Faulkner, "Comets and the Age of the Solar System," *Creation Ex Nihilo Technical Journal*, Vol. 11 no. 3, 1997, pp. 264-273; at <http://answersingenesis.org/docs/4108.asp>

28 Bruce Margon, *op. cit.*, p. 111. The claim that stars reach an end state as "faint, compact" bodies would seem to be problematic from the standpoint of the second law of thermodynamics, thus throwing the entire stellar evolutionary scenario into doubt. The second law is certainly antithetical to evolutionary processes, and evolutionism does seek to limit the effect of the second law: "Individual processes ... can give rise to structures of great complexity. When we observe something with an intricate structure, we therefore should not jump to the conclusion that it is a consequence of design" (Peter W. Atkins, *The Second Law*, Scientific American Library, 1984, p. 189).

29 Shipman, *op. cit.*, p. 63. 30 *ibid.*, p. 64.

31 Fritjof Capra, *The Tao of Physics*, Bantam Books, 1984, p. 163.

32 John D. Barrow and Frank J. Tipler, *The Anthropic Cosmological*

*Principle*, Oxford, p. 342; p. 350 has a diagram showing thirteen types of stars or stellar conditions theorized to culminate in the formation of a black hole.

33 Charles R. Coble et al., *Earth Science*, Prentice Hall, 1987, p. 62.

34 See for example J.S. Trefil, *The Moment of Creation*, Scribners, 1983, pp. 210-217.

35 Fix, *op. cit.*, p. 620 also presents this (bleak) scenario.

36 A possible alternative model is hinted at in J.F. Henry, *The Astronomy Book*, Master Books, 2002, p. 55. The greater intensity of catastrophic activity in distant cosmic objects may be due to a higher rate of "c-decay" which they experienced several thousand years ago. To the extent that c-decay may be associated with, say, radioactive decay, to that same extent (some) distant cosmic objects as we see them today would appear "exotically" active.

37 Like transitional forms in biology, bona fide black hole candidates are very few indeed, including objects such as Cyg X-1, LMC X-3, and A0620-00. Fix (see **Note 7**) apparently does not consider even LMC X-3 one of the best candidates. One wonders if the true count, as with biological transitions, might not actually be zero.

38 "Stellar Ontogeny ... To Ashes," *Mosaic*, Vol. 9 no. 3, May/June 1978, p. 40.

39 Faye Flam, "Theorists Make a Bid to Eliminate Black Holes," *Science*, Vol. 266 no. 5193, December 23, 1994, p. 1945.

40 William Van Deusen, "There's a Hole in the Black Hole Theory," *Industrial Research and Development*, April 1983, p. 95. 41 *ibid.*, p. 96.

42 Kip S. Thorne, *Black Holes & Time Warps*, Norton, 1994, p. 57.

43 *ibid.* 44 *ibid.*, p. 19. 45 Goldsmith, *op. cit.*, p. 253.

46 Fix, *op. cit.*, pp. 468-476. This discussion does not hint at the possible non-existence of black holes.

47 *ibid.*, p. 468: When a star forms a black hole it "disappears," p. 474: "Nothing can ever reach us from a black hole."

48 Clotfelter, Beryl E., *The Universe and Its Structure*, McGraw-Hill, 1976, p. 383. 49 Shipman, *op. cit.*, p. 17. 50 *ibid.*, p. 19. 51 *ibid.*, p. 20.

52 *ibid.*, pp. 98, 105.

53 Christianson, Gale E., *In the Presence of the Creator: Isaac Newton and His Times*, Free Press, 1984, dust jacket.

54 Newton, Isaac, *Mathematical Principles of Natural Philosophy*, University of California, 1934, p. 547. The *Principia* was first published in 1687, the third edition was published in 1726, the third edition was translated from Latin into English by Andrew Motte in 1729, the Motte translation was revised and annotated by astronomer Florian Cajori 1930, and the Cajori revision was edited by R.T. Crawford for publication in 1934. The statement quoted here is from the "General Scholium." 55 *ibid.*, p. 671.

56 Donald B. DeYoung, *Astronomy and the Bible*, Baker, 1994, p. 75: "Some of what astronomers describe as 'stellar evolution' does take place. However, the process is misnamed ... [I]t might better be called stellar decay, degradation, or degeneration."

57 Fix, *op. cit.*, p. 432: "When astronomers say that a star evolves, they mean that it changes its appearance and internal structure."

58 Danny B. Faulkner and Don B. DeYoung, "Toward a Creationist Astronomy," *Creation Research Society Quarterly*, Vol. 28 no. 3, December 1991, p. 87: "The use of the word 'evolution' [in astronomy] carries a different connotation as it does in biology where an increase in complexity is implied. Instead, its astronomical use means change, whether the change is one of decay or perceived improvement."

But the case can be made that stellar evolution must indeed ultimately signify an increase in complexity: "This evolutionary history of the world, from the 'big bang' to the present universe, is a series of gradual steps from the simple to the complex, from the unordered to the organized, from the formless gas of elementary particles to the morphic atoms and molecules, and further to the still more structured liquids and solids, and finally to the sophisticated living organisms" (Victor Weisskopf, "The Frontiers and Limits of Science," *American Scientist*, Vol. 65, 1977, pp. 405-411). Stellar evolution is in a continuum with chemical and biological evolution; creationists should reject all of these.

59 A.S. Otis, *Light Velocity and Relativity*, Christian E. Burckel, 1963, p. 87.