Haldane's nor Crow's cost concept was general-purpose; they were accurate only under special circumstances. That was later clarified by my cost concept, which is clearer and applies to all evolutionary scenarios, in the most general possible manner.

Let me summarize the above point. Housley's counter-examples are technically correct, though they are nearly irrelevant to nature, because they assume the typical substituting mutation has an incredibly high selection coefficient. The difficulty facing Sanford (and all science writers) is how much technical detail to press into a book *aimed at the general public.* I believe Sanford's book handled those tradeoffs well. In this way I here give justice to both Housley and Sanford.

Housley's final point involves many independent mutations substituting into the population simultaneously. Such cases are challenging to analyze. Haldane handled it, quite reasonably, by continuing his assumption that the selection coefficients are tiny (which, by the way, also minimizes the cost of substitution, and thereby minimizes the problem for evolutionists). Next, add the assumption of either the additive-fitness model or the multiplicative-fitness model. (These models describe how the fitness is affected by simultaneous substitutions.) Housley claims the former model is applicable here and the latter model is not. However, using either model, the cost of many independent substitutions occurring simultaneously is approximately equal to the sum of their costs occurring individually—and Haldane's analysis is valid. Haldane happened to frame his 1957 paper[4] in terms of a multiplicative-fitness model, though his analysis would also have been good for an additive-fitness model. Either model applies. In this instance, Housley's claim is not correct.

Walter ReMine
Saint Paul, MN
UNITED STATES of AMERICA

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Ancient Greeks sometimes used the stars as God intended

Genesis 1:14 speaks of how God created lights in the expanse of the sky to mark seasons, and days and years. Although many have known for centuries that stars can be used for such useful purposes, I was pleased to accidentally come across the following mention illustrating that the usefulness of stars was well described even in the times of Hesiod. Hesiod was a Greek poet who appears to have lived in about the 8th century BC. A very prolific Greek writer called Athenaeus (who lived in about the 2nd century BC) quoted Hesiod as saying: "Begin ye the reaping when the Pleiades (Πληιάδων), daughters of Atlas, rise, and the ploughing when they begin to set."[1] No doubt even earlier mentions of the usefulness of constellations can be found, but this is certainly clear evidence of it in ancient Greek culture.

The quote is also interesting from the point of view of testifying to the very early Greek name of this constellation being fairly fixed. However Athenaeus goes on to say that many of the poets do sometimes call the constellation Peleiai or Peleiades, the latter also meaning Doves.

A few sentences after this quote, Athenaeus states that "it is the appropriate office of those Maidens [Pleiades]… that they should also bring ambrosia [food or drink of the gods] to Zeus." This feminine association supports the statement by Laurie Reece who described how the aboriginal name for the group of stars called Pleiades is based on them being the dream stars of women in the Warlpiri tribe. Reece then states that "The almost universal association of the Pleiades with women is a good indication of the origin of the constellation names prior to the tower of Babel."[2]

The Hebrew Old Testament word translated as Pleiades however may not actually refer to this same constellation.[3]

Roarie Starbuck
Brisbane, Queensland
AUSTRALIA

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The Hittites—second time round

I would like to comment on David Down's recent article, "The Hittites—second time round".[1] As I get time, I follow what David Down presents concerning revising the chronology and also what is reported in websites supporting a traditional timeline. There are some major conflicts, and this report in *Journal of Creation* is a good example. David Down indicates Rameses II should be dated to 759–693 BC.[2] However, a recent article by Charles Aling makes a compelling argument for accepting Rameses II in the 1200s BC according to conventional 19th dynasty dating.[3]

The logic used in this report appears sound. Synchronisms between Assyria, Egypt and Hittite rulers for the period 1,300–800 BC seem like a good argument. As the report states:

> "Hattusilis III also corresponded with the Assyrian king Shalmaneser I (ca. 1275–1245 BC). Consequently, Shalmaneser I must have been a contemporary of Rameses II as well. And we know roughly how many years there are between Shalmaneser I and his namesake Shalmaneser III: slightly over 400. Since we know that Shalmaneser III lived in the 800's, Shalmaneser I and hence Rameses II must have lived in the 1200's."[3]

Dating Shalmaneser III and the battle of Qarqar at 853 BC (astronomical anchor date) as well as the time interval between Shalmaneser III back to Shalmaneser I is a critical pillar. The Assyrian King List provides a list of kings and length of reigns for this period from Shalmaneser I to Shalmaneser III and so supports the conventional chronology. This looks like a solid argument for dating Rameses II in the 1200s BC and not 759 BC as David Down suggests.

Rod Bernitt
Upper Marlboro, MD
UNITED STATES of AMERICA

David Down replies:

Shalmaneser was a common name for Assyrian kings, and I would dispute the identification of the Shalmaneser addressed by Hattusilis III as the one scholars have numbered as Shalmaneser I.

David Down
Hornsby, NSW
AUSTRALIA

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Arches and natural bridges

Mike Oard's paper on natural arches and bridges provides a superior model for the origin of these spectacular features. He summarized his objection to the uniformitarian model by stating, "erosion by normal weathering processes during the formation of large natural bridges and arches would have destroyed these features long before eroding down to their present levels." This is a major point that we can make when visiting these popular land forms and interacting with other tourists there.

For those wanting to know more about natural arches and bridges, a wealth of information and great photos can be viewed at the Natural Arch and Bridge Society website. I'd like to comment on a few arches and bridges which I have visited and which can be seen at the above website.

1. Delicate Arch is not only spectacular. It is an extremely popular hike at Arches National Park in Utah. You have to hike uphill for 4.8 km with an elevation gain of 146 m to get there. When you first see it, you are struck by this freestanding (abandoned) arch located high above the surrounding countryside. When hiking to it, you can not see it until the very end of the hike when the view suddenly opens up and there it is—quite spectacular! Your first view of it is across a large, well-rounded basin. This basin appears to be the work of a colossal amount of swirling water. A lot of swirling water forming this basin at a considerable height above what is today a dry desert cannot be adequately explained by present processes. The arch and its companion basin together testify eloquently of massive amounts of water.
2. Kolob Arch, one of the largest in the world, is located in Zion National Park, Utah. This unusual arch stands directly in front of a massive cliff face. I believe that an arch situated like this was not likely formed by large amounts of late-Flood runoff. Rather, the process of post-Flood sapping may have been largely responsible for it.
3. Lexington Arch in Great Basin National Park, Nevada, is another unusual arch. It is located high up on a ridge, but is composed of limestone. Could this be a relic of a cave at this height? If so, then enormous amounts of limestone

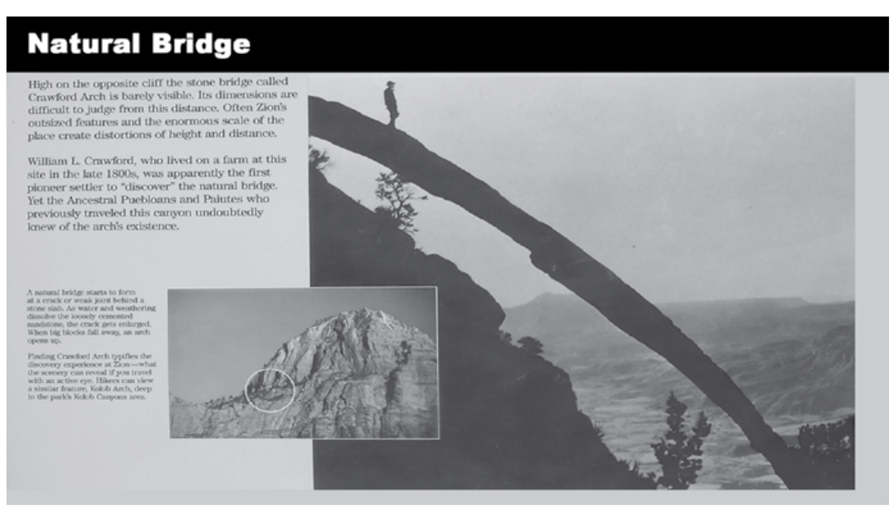

Figure 1. Crawford Arch, Zion National Park, Utah.