The majority of the colouration is from varying levels of iron oxidation. As iron oxidises it turns yellow first, then with increasing oxidation becomes brown then red. Iron oxidation can be hindered by carbon (which is dark) so the bright colouration does not develop. However,

'When clays containing carbon and iron are burned, as in brick-making, the carbon is burned up, thus freeing the iron to oxidise; and it forms its vivid yellow, brown, and red colours'.[4]

They list the main sources for the primary colours as follows:

White: lime (in chalk or white limestone), sodas, borates, magnesium and potassium compounds, quartz, diatomaceous shale, alumina, kaolinite, talc — (all of these in the pure state).

Black: carbonaceous material from vegetation, manganese oxide, and other mineral compounds.

Blue: carbonaceous material, some copper-sulphur combinations, some silver compounds, and many minor sources.

Yellow: from sulphur in many forms, from the first step in iron oxidation, etc.

Brown: mixtures of greens and reds, also second step in iron oxidation.

Red: from complete oxidation of iron, and from many other mineral oxides and other compounds, all very much less in amount than iron.

Green: mixtures of yellows with blues, silver chloride, and blue carbonaceous material tinged with yellow iron oxidation, etc.

Purple: reds and blues mixed.

The authors note that they had written a thorough technical paper on rock colouration which they intended to publish, but evidently it never was. If anyone knows of the whereabouts of this work I'm sure it would make fascinating reading.

John Kaplan,
Pawtucket, Rhode Island,
UNITED STATES OF AMERICA.

REFERENCES

1. White, H. C. and Allen, B. F, 1944. The deluge on the screen, a synopsis. **Bulletin of Creation, the Deluge, and Related Science,** 4(2): 15-18.
2. White and Allen, Ref. 1.
3. White and Allen, Ref. 1.
4. White and Allen, Ref. 1.

THE ORIGIN OF LIFE

Dear Editor,

In reading the article 'The origin of life' (Aw)[1] I noticed the reference to Schidlowski's 1988 estimate of life's antiquity based on the ratio of $^{12}C/^{13}C$ in rocks at Isua in Greenland,[2] held to be the oldest on Earth. Although Schidlowski's proposition was made years ago I was amused, nay disgusted, when in October this year this was presented on the media as if it was a conclusion scientists had only just reached!

Pflug, Jaeschke-Boyer and Sattler reported finding structures in the Swartkoppie cherts, South Africa, in 1979, similar in size, shape and formation to modern yeast cells.[3] The cherts are supposedly 3.4 Ga old, and the existence of yeasts in these rocks would push back the antiquity of eukaryotes by an alleged 2 Ga. The structures were not therefore initially presented as microfossils. Later that year Pflug and Jaeschke-Boyer reported similar structures in the metamorphosed rocks as Isua.[4]

Regarding the $^{12}C/^{13}C$ proportions in the Isua rocks, Walters, Shimoyama and Ponnamperuma reported such as evidence of photosynthesis in the Isua deposits at a meeting of the American Chemical Society in autumn 1979.[5]

'In a broadcast interview for the Sri Lanka Broadcasting Corporation in January 1980, Ponnamperuma was more positive: ". . . we have now what we believe is strong evidence for life on Earth 3,800 million years ago . . . we are now thinking, in geological terms, of instant life..."'[6]

As Schidlowski's suggestion would mean that 'Almost from its beginning the Earth had life', the idea of this life being an immigrant from outer space seems to be growing in favour. Perhaps his conformist colleagues may follow Hoyle in discarding belief in evolution altogether in a decade or two from now?

Derek Briarley,
Newcastle upon Tyne,
ENGLAND.

REFERENCES

1. Aw, S. E., 1996. The origin of life: a critique of current scientific models. **CEN Tech. J,** 10(3):300-314.
2. Schidlowski, M, 1988. A 3,800-million-year isotopic record of life from carbon in sedimentary rocks. **Nature,** 333:313-318.
3. Pflug, H. D., Jaeschke-Boyer, H. and Sattler, E. L., 1979. *Cited in:* **Evolution from Space,** F. Hoyle and C. Wickramashinge, 1981, Granada Publishing, pp. 77-80.
4. Pflug, H. D. and Jaeschke-Boyer, H., 1979. *Cited in:* **Evolution from Space,** F. Hoyle and C. Wickramashinge, 1981, Granada Publishing, pp. 77-80.
5. Walters, C, Shimoyama, A. and Ponnamperuma, C, 1979. *Cited in:* **Evolution from Space,** F. Hoyle and C. Wickramashinge, 1981, Granada Publishing.
6. Hoyle, F. and Wickramasinghe, C, 1981. **Evolution from Space,** Granada Publishing.

See pp. 2-4 of this issue for further comments and developments on these topics.

— Editor

ARCHAEOASTRONOMY THEORY — IS IT THE PITS?

Dear Editor,

This *Perspectives* item[1] notes the findings of Linda Therkorn, University of Amsterdam, that pits dug at sites in the Netherlands in prehistoric times seem to be arranged to match certain familiar constellations (Taurus, Canis Major, Pegasus, Hercules). The item is based on a brief review of this work

CONSTELLATION	EGYPTIAN[3]	BABYLONIAN[4,5]	GREEK[6]
Taurus	?	Bull of Heaven 'The Stars'	The Bull Pleiades
Pegasus	?	Field Swallow	The Horse
Canis Major	*spdt* (Sirius)	Bow and Arrow	The Dog
Hercules	?	Gods of Ekur Dog	The Kneeler

Table 1. *A comparison of Egyptian, Babylonian and Greek images of four constellations.*

in **New Scientist.**[2]

The age of the earliest site, dated sixth century BC (where only Taurus and Pegasus have been identified), suggests that the ancient inhabitants of the Netherlands knew the same constellations as the ancient Greeks and Babylonians. Perspectives item author CW suggests further that many constellations, including those of the Zodiac, go back to Babel (Genesis 10:8-12 and 11:1-9).

Four points should be noted.

First (a minor point), I believe CW misread the date of the earliest site as AD 600.

Second, I have seen nothing on this discovery except the **New Scientist** item. Therkorn refused to publish a map of the sites, stating that her dissertation would be published in 1996. Rather than rely on an item in the popular media, let's get the full story from the dissertation before we draw conclusions.

Third, the constellations we know were not as widespread as CW seems to assume. Table 1 is a comparison of Egyptian, Babylonian, and Greek images of the four constellations mentioned.

To the Egyptians, the Bull, or his leg, was Ursa Major. To the Babylonians, the Horse was Cassiopeia, and the Dog was southern Hercules. The Greek Horse, Dog, and Man on His Knees are not Egyptian or Babylonian. Perhaps they share a common Indo-European origin with those of the ancient Netherlands. The Horse probably predates the Perseus group.

The origin of the Bull in Taurus is uncertain, but probably ancient as the Lion-Bull combat (Leo being the Lion).[7] Among the Babylonians, it apparently displaced, or was paralleled by, the Chariot, of which parts are mentioned in Late Babylonian 'diaries' as the stars we see as the Bull's horns.[8] Today, only the Charioteer (Auriga) survives.

The Zodiac did not appear in 12-constellation form until Hellenistic times, I believe.

A good popular survey of the variety of constellation figures found around the world is Staal's **The New Patterns in the Sky.**[9]

Fourth, Nimrod cannot be dated. We don't know whether he was a son or a more remote descendant of Cush. Since he is called 'a mighty hunter before the LORD' (Genesis 10:9, NIV), it is at least doubtful that his religion was pagan. We should not treat old Jewish legends as Scripture.

Donald V Etz,
Dayton, Ohio,
UNITED STATES OF AMERICA.

REFERENCES

1. Wieland, C, 1996. Archaeoastronomy theory — is it the pits? CEN Tech. J., 10(1):9.
2. Schilling, G., 1995. Stars fell on Muggenburg. New Scientist, 148(2008): 33-34.
3. Neugebauer, O. and Parker, R. A., 1969. Egyptian Astronomical Texts **III,** Brown University, Providence, p. 183.
4. Hunger, H. and Pingree, D., 1989. **MUL.APIN,** Ferdinand Berger, Horn, Australia, pp. 137-138.
5. van der Waerden, B. L., 1949. Babylonian astronomy II. The thirty-six stars. Journal of Near Eastern Studies, 8(1949):6-26.
6. Aratus,Phaenomena. See translation by G.R. Mair in Callimachus, Lycophron, Aratus, revised edition, Harvard University, Cambridge, Massachusetts, 1955.
7. Hartner, W, 1965. The earliest history of the constellations in the Near East and the motif of the lion-bull combat. **Journal of** Near **Eastern** Studies, 24(1965):1-16+.
8. Sachs, A. and Hunger, H., 1988. **Astronomical Diaries and Related** Texts **from Babylon I,** Vienna, p. 17.
9. Staal, J.D.W., 1988. **The New Patterns in the Sky**, McDonald & Woodward, Blacksburg, Virginia.

The Author replies ...

The 'AD600' slip is correctly pointed out by Mr Etz — it should have been '600BC'. I respectfully submit, however, that he is somewhat off the mark in the other criticisms he raises.

Firstly, *Perspectives* items are not meant to be in the same category as the carefully refereed contributions to the scientific papers section of this journal. They are 'newsy' reports which are almost invariably based on items reported in the secular scientific press. This one was not different in that regard.

I think it is potentially misleading for Etz to refer to the source as 'the popular media'. **New Scientist,** for all its ease of readability and high circulation, is scarcely the **Daily Mirror.** In fact, the report, which unusually took up a full two pages of text in **New Scientist,**[1] gave every indication of being carefully researched and properly cautious in its approach. Its very existence attests to the fact that the orthodox scientific community regards it as quite appropriate to report on such matters before the 'doctoral dissertation' appears.

Much more importantly, Etz disputes my contention that the zodiacal signs/names were widespread in the ancient world. In fact, Dr Cecilia Payne-Gaposchkin's well-known **Introduction to Astronomy** states of the zodiacal constellations that

> '. . . *they were already known by the Greek equivalents of their present Latin names more than two thousand years ago. But they were not invented by the Greeks — they came to Greece from the earlier civilizations of the Euphrates valley* [the site of ancient Babel/ Babylon — CW], *and their names*

are found in Euphratean tablets of about 600BC, which embody ideas of an even remoter age.'[2]

She also points out that these 'Euphratean constellations' must have been from a much earlier time than the Greek Hipparchus, who compiled the earliest list of stars still in existence, since they began with Taurus 'the "Bull in Front"'. She writes:

'If the sun was in Taurus at vernal equinox when the constellation was named, the date would have been about 2450BC. Virgil was echoing this tradition when he wrote: "The gleaming bull opens the year with golden horns, and the Dog sinks low, his star (Sirius) averted ", but he was already more than two milleniums [sic] *out of date.'*

2450BC is close to the biblical date for the Flood and the early post-Flood era, which is consistent with the speculation raised in my item. Payne-Gaposchkin also points out that the symbol of Capricornus is found on Babylonian gems. The usual symbol for Aquarius is in fact the Egyptian hieroglyph for 'water'. Although she points out that the 'Egyptian constellations were not the same as those of Babylonia and Greece', she also says that in the most famous Egyptian star map *'we can recognize the signs of our zodiac'*, thus surely supporting the thesis of a common origin.

A 1995 article in Sky **and** Telescope, which puts forward a theory for the origins of the various zodiacal constellations, points out that apart from the Ram, ancient Babylonia already had all the other zodiacal names. Also shown in that article is a second-century depiction of the Egyptian goddess Nuth, surrounded by all 12 signs of the zodiac, on the sarcophagus of Zoter of El-Kurne.[3]

One of the reasons for the confusion may be that some of the information known about star-names in antiquity is not necessarily shared between all authorities. Thus, despite Etz's list showing Sirius as being called 'Bow and Arrow' by the Babylonians, Payne-Gaposchkin, a secular non-creationist authority, refers to

'Sirius, the "Dog Star", in the constellation that the Babylonians called the "Dog of the Sun "'.

Elsewhere in a list she features the same label as the 'Euphratean' name for this constellation.

While many of these matters of antiquity are too shrouded from clear view to permit excess dogmatism (which, I submit, features in much of Etz's attempted rebuttal), there would appear to be ample evidence to support the generalisation I made in the item, namely that the animals identified with

'many of the constellations, including the well-known signs of the Zodiac, were and are shared in common with many cultures around the world'.

In Job chapter 38, after referring to Pleiades and Orion, God asks Job (verse 32): 'Canst though bring forth Mazzaroth in his season?' Modern Bible versions agree with the Jewish Targum in translating *Mazzaroth* as the zodiac. But then, I am not sure how Etz would view the testimony of Scripture in any case. Does his statement that *'Nimrod cannot be dated'* deny the validity of the biblical genealogies — or is it merely a comment on precision? Since I did not refer to any 'old Jewish legend', is he applying this label to the Bible's account of Nimrod/Babel itself— that is, Genesis?

Finally, concerning his assertion that it is unlikely that Nimrod was a 'pagan'.

Nimrod founded the first post-Flood city (and was presumably in charge of it at the time of the dispersion, since he retained the power and authority to found other cities thereafter — Genesis 18:10). The entire city he ruled was engaged in actions which so displeased God that He sent catastrophic judgment. That observation would scarcely lead one to deduce from it the intrinsic godliness of that society's *Führer*.

I have yet to come across any commentator, ancient or modern, who would think that Nimrod was anything other than a great rebel against God. What does it mean, 'mighty hunter *before* the Lord'? It appears that the Hebrew word here translated *before* (which in any case, even in the English does not necessarily imply God's favour) is derived from the word 'face' (as in turning).[4] Thus, while it can be translated 'before', a better translation in context might be *'in the face of* the Lord'.

Carl Wieland,
Brisbane,
AUSTRALIA.

REFERENCES

1. Schilling, G., 1995. Stars fell on Muggenburg. **New Scientist,** 148(2008):33-34.
2. Payne-Gaposchkin, C, 1961. **Introduction to Astronomy,** University Paperbacks, Methuen & Co., London.
3. Gurshtein, A., 1995. When the Zodiac climbed into the sky. **Sky and Telescope,** October 1995, pp. 28-33.
4. **Strong's Exhaustive Concordance of the Bible with Hebrew, Chaldee and Greek Dictionaries,** MacDonald Publishing, USA.

EARLY HISTORY OF MAN

Dear Editor,

I would like to draw the readers' attention to some matters supplementary to Bill Cooper's series 'The Early History of Man', particularly to Part 1.[1]

Some Middle Eastern traditions tie in with the pedigrees in Genesis 10. The Koran mentions a tribe Ad, 14 times, who had lived in the Hadramaut region, holding their ruined cities up as an example of God's wrath against idolatry — here expressed as fierce roaring wind which scoured the land some time between the Flood and the destruction of Sodom.

Ad was the son of Uz, son of Aram, son of Shem. He built a city and named it after himself, as well as the palatial Garden of Irem. His son Shedad reigned after him.[2]

One medieval Arabian tradition