A Possible Creationist Perspective on the Tyrolean (Oetztaler) Ice Man

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ABSTRACT

Much attention has been given to the Tyrolean Ice Man since his discovery in 1991. To the evolutionist he is somewhat of an enigma; a resourceful and cultured individual from an area previously thought to be a Neolithic backwater. His retarded maturational development, on the other hand, should be of immense interest to creationists — many of whom hold to a belief in greater longevity in the recent past.

DISCOVERY OF THE TYROLEAN ICE MAN

On September 19, 1991 two German hikers, Helmut and Erika Simon, stumbled upon the remains of a man in the **Similaun Glacier** near the border between Austria and Italy. They suspected foul-play and subsequently reported the find to a local hostel owner, Markus Pirpamer, who alerted the authorities. The body and a number of associated artifacts, including tools and hunting implements, were discovered at an altitude of 3,200 metres above sea level in the **Ötztaler** (pronounced *erts-tarler*) **Alpen range**, in the northeastern corner of the Italian Tyrol.

The corpse (see Figure 1) has subsequently become known by a variety of names, including: the Similaun Man, the prehistoric Tyrolean Ice Man, *Homo tyrolensis*, the man from Hauslabjoch or, simply, **Ötzi** (pronounced *ertsee* and hereafter Oetzi).

The discovery merited considerable media attention for many months thereafter.[1-5]

DATING THE ICE MAN

The initial reaction of scientists concerning Oetzi's probable antiquity was one of skepticism.[6] After the corpse had been airlifted by helicopter from the glacier to Innsbruck and then to the mortuary at the University of Innsbruck's Institute of Forensic Medicine, a number of scientists expressed the belief that the corpse was unlikely to belong to an individual who died more than 500 years ago. For instance, expert glaciologists believed it unlikely that a glacier would retain a corpse for thousands of years. Indeed, it was pointed out that most bodies freed from Austrian and Swiss glaciers belonged to individuals who had died only 50 to 70 years earlier. In this regard Bahn and Everett have commented that:

> *'Even the slowest glaciers are renewed every 500 to 600 years, the time it takes them to flow from their summit to the base of the tongue, and they disgorge everything they contain. Any corpse found within a glacier is usually crushed or torn to bits; for example, the body of what is thought to be a Swiss mercenary from the sixteenth century was fragmented over a 100 m² area when found in the 1980s. The average static pressure of a glacier is 14 to 20 tons m⁻², and its mass is filled with convection currents, faults, subduction zones and rocks. How, then, could Similaun man have remained intact* in situ *for more than 5,000 years?* ***His preservation is little short of miraculous . . .'***[7]

Oetzi was initially described as being of Bronze Age.[8] (The Bronze Age is dated from c. 3,000 BC in the Middle East and from c. 2,000 BC in western Europe and Asia).[9] However, more recent assessments attribute him to the late Neolithic[10,11] or chalcolithic (Copper Age) period.[12]

The initial results of radiocarbon tests on grass samples taken from Oetzi's boots revealed ages ranging from between 4,250 ±70 and 4,230 ±90 years BP (calibrated to 4,616 and 4,866 years BP).[13,14] These dates were produced independently at radiocarbon laboratories at the University of Uppsala (in Sweden) and Gif-sur-Yvette (Paris, France) respectively and at the request of the University of Innsbruck's Botanical Institute. The preliminary results

were released to the press by Professor Klaus Oeggl in December, 1991.[15]

Separate radiocarbon datings were produced for the corpse's skin and bone at the behest of the University of Innsbruck's Institute of Anatomy. The calibrated results, released in February of the following year, ranged between 5,200 and 5,300 years BP and were carried out by radiocarbon laboratories at the Universities of Oxford (England) and Zurich (Switzerland).[16,17]

The uncalibrated radiocarbon datings for the grass were subsequently modified/reworked (in January, 1992) to 4,450 ±75 (Uppsala) and 4,550 ±60 years BP; rendering them in close conformity with those for the corpse.[18]

To date, none of the artifacts found in association with Oetzi's corpse have been dated.[19] Why this should be so is not clear at this point in time.

ASSOCIATED CULTURAL ARTIFACTS

It is apparent from a single photograph, taken by the Ice Man's co-discoverers, Helmut and Erika Simon, that Oetzi was naked when first found.[20] His clothes and a number of tools and hunting implements were discovered some distance away from the corpse.[21] They reveal Oetzi (and his people) to be remarkably sophisticated and adept.

(1) Oetzi's Clothes

According to Jaroff, the Ice Man was:

'. . . well prepared for the Alpine chill. His basic garment was an unlined fur robe made of patches of deer, chamois and ibex skin. Though badly repaired at many points, the robe had been ***cleverly whipstitched together with threads of sinew or plant fibre,*** *in what appears to be a mosaic-like pattern,* ***belying the popular image of cavemen in crude skins.****'*[22]

A woven grass cape, similar to those used by Tyrolean shepherds as late as the early part of the present century, was also recovered from the site.[23] It is thought that the Ice Man wore this cape over his fur upper garment.

The upper garment is thought to have taken the form of a cloak or cape.[24] It extended from the Ice Man's shoulders to his knees and shows no sign of inlaid sleeves.[25] The back of his garment was badly tattered; a by-product of wear generated by his haversack (see below).

The Ice Man wore a pair of leggings, which were strapped to a belt at waist level. A fur tongue, attached to the lower end of each legging, slipped into the neck of the Ice Man's shoes.[26] Support took the form of a loin-cloth, which extended from the front to the back of his belt.[27] A belt-pouch, which contained a variety of artifacts (including three flint implements, a bone awl and a piece of tin-

Figure 1. *The Tyrolean Ice Man as exhumed from* the Similaun Glacier *(sketch by Marie M. Wieland).*

der), was also attached to the belt.[28] The flint implements included a blade scraper, drill and thin blade.

Oetzi also possessed a well-worn pair of leather shoes, stuffed with grass (for added warmth/insulation).[29]

More recently, an Italian expedition has turned up another item of Oetzi's 'wardrobe'; a piece of fur thought to represent a cap.[30]

(2) Oetzi's Tools and Hunting Implements

According to Leon Jaroff the Ice Man's equipment revealed '*. . . **an unexpected degree of sophistication.***'[31] The implements included a copper axe, an incomplete bow, a quiver with no less than 14 arrow shafts, a knife or dagger with flint blade and wooden handle, two birch-bark canisters and a net of grass.[32] The dagger,[33] along with a retoucheur,[34] are thought to have been attached to the belt on either side of the pouch.[35] A variety of functions have been ascribed to the net, including carrying bag (Jaroff[36]) and bird trap (Spindler[37]).

The axe-head was first thought to have been manufactured in bronze.[38] However, subsequent analysis revealed its composition to be almost pure copper.[39] The axe blade, which measured only 9.5 cm in length,[40] was flanged along all four edges — which made for a very secure fitting to the shaft.[41] The blade reflected what has come to be known as the 'Remedello style': a style first identified at the Remedello Sotto burial site (c. 2700 BC) in northern Italy.[42] The axe-shaft was manufactured from yew and the blade fastened to the shaft by means of leather strapping and birch-bark glue.[43,44]

The bow, although incomplete, was carved from timber taken from a yew tree — widely regarded as the best bow-wood available in Central Europe and used in the manufacture of famous English long-bows.[45] The bow was broken-off at one end and was yet to be notched for reception of the bow-string.[46] Its length has been estimated to be of the order of 180cm or nearly six feet, which renders it longer than its owner's height.[47] Of particular interest is the fact that the yew is relatively scarce in the Alps. This would seem to indicate that the Ice Man had searched out specific raw materials for his bow.[48]

The arrow shafts, 14 in all, were carved from wayfaring (genus *Virburnum*) and dogwood (genus *Cornus*) branches.[49] Only two of the arrow shafts were complete with flint tips and feathers.[50] The feathers were affixed with a resinous substance and set at an angle that would induce an in-flight spin (to maintain a true course). With reference to their design the noted Austrian archaeologist, Hans Notdürfter, commented (with a measure of surprise) that: '*It is significant that **ballistic principles were known and applied.***'[51] Spindler, on the other hand, has noted that one of the two completed arrows is of composite-type; comprising two kinds of wood.[52] This could either be by design, such as in the case of a genuine composite arrow (which is designed to break into two sections upon impact), or by virtue of attempts to re-use two previously broken arrows.

The quiver also contained an untreated sinew that could have been made into a bowstring, a ball of cord, the thorn of a deer's antler (which is thought to have been used to skin animals), and four antler tips bound together with grass, as well as some flint and pitch.[53-55]

Two birch-bark containers were also recovered from the burial site — one of which contained grass or hay, leaves and charcoal. It is thought that this container was used to carry live embers.[56]

Also recovered was a small flint knife/dagger with a wooden handle.[57]

The Ice Man carried much of his gear in a 'primitive' haversack, mounted on a U-shaped wooden frame.[58] The frame was composed of hazel (*Corylus avellana*) rods and two short boards of larch (*Larix decidua*),[59] the latter of which possibly fulfilled a bracing function.

(3) Oetzi's Jewellery and Tattoos

Also recovered from the Oetztaler site was a piece of jewellery or talisman, comprising a polished stone circlet attached to a tassel of string via a hole through the stone's centre.[60]

It is also possible that Oetzi wore an ornamental stone (or earring) attached to his right earlobe. A pit-like and sharp-edged depression on the right earlobe is thought by Seidler *et al.* to indicate the presence of '*. . . an ornamental stone fitted into the earlobe **a long time before his death.***'[61]

Also recovered were two fungi which were attached to a knotted leather string.[62,63] One has since been identified as *Piptoporus betulinus*, a fungus rich in the antibacterial agent, 'polyporenic acid C'.[64] Commenting on this discovery, Roberts stated that:

> '*Archaeologists have never seen anything like this arrangement from this period. The fungi **contain chemical substances now known to be antibiotic.***'[65]

Finally, mention should be made of a number of tattoos on the body of Similaun Man. These tattoos have, according to Konrad Spindler, been coloured using a charcoal dye.[66] (Coghlan, on the other hand, suggests that they were produced using vegetable dyes[67]). They include a blue-grey series of parallel lines on the Ice Man's lower back (near his spinal column) and left calf, a cross behind his right knee and stripes on the right ankle.[68,69] According to Jaroff:

> '*Some scientists suggest that the designs **might have been used to mark the passage from youth into manhood.***'[70]

(The possible significance of this suggestion will be explored, at length, later in this paper.) Spindler, by way of contrast, suggested (in 1992) that they can signify almost anything, including membership of a particular family, tribe, village or class.[71] More recently, however, he has indicated a leaning towards therapeutic cauterization and branding.[72]

Assuming that the radiocarbon dates for Similaun Man are reliable (at least in a relative sense) the Ice Man's tattoos may well represent the earliest documented instance of such a practice.[73] The practice is said to have been common amongst the Thracians (5th century BC)[74] and Sjøvold[75] (citing Rudensko[76]) describes evidence of it on the bodies of ancient Skyths from Siberia (585 BC). At least one other authority has suggested that tattooing was practiced by the ancient Egyptians as early as 2000 BC.[77]

CONTROVERSY SURROUNDING THE ICE MAN

Controversy has surrounded Oetzi, virtually from the time of his discovery.

Firstly, there were cries of outrage concerning the methods employed in the exhumation of the corpse.[78,79] Pneumatic chisels, ice-picks and ski-poles were used in several attempts to prise the corpse from the enveloping ice. The corpse was damaged in a number of ways during these efforts.[80,81]

Secondly, there were the custodial battles between the Austrian and Italian governments concerning 'ownership' of the find.[82,83] It is interesting to note that most of Oetzi's artifacts were taken to the Roman-Germanic Museum in Mainz (Germany) for restoration.[84]

Thirdly, there is the issue of Oetzi's 'missing' genitalia.[85,86] The so-called 'castration' theory, which received widespread publicity in the media, has been thoroughly refuted by Spindler in his excellent book, **The Man in the Ice**.[87]

More recently, there have been a spate of accusations concerning the very authenticity of the Ice Man (as a genuine alpine death).[88-90] These accusations culminated recently in the assertion that the mummified remains of the Ice Man had been 'imported' from Peru (South America) and 'planted' at the Oetztal site as part of a carefully orchestrated hoax.[91] These accusations have persisted — despite having been soundly refuted in Spindler's book.[92] Nevertheless, the issue has been seemingly resolved, once and for all, with the simultaneous announcement that separate studies of the Ice Man's mtDNA have established Oetzi's origins as being distinctly European.[93-95]

ANATOMICAL CHARACTERISTICS OF THE ICE MAN

The Similaun Ice Man stood between 156 and 160 cm (5 feet 1½ inches and 5 feet 3 inches) tall and possessed an estimated cranial capacity between 1,503 and 1,564 cc.[96,97] The cranium is mesocephalic in shape and **bordering on dolichocephalic**.[98] According to Sjøvold[99] there is no evidence of cranial thickening or flattening and brow-ridge development falls within the normal range for modern Europeans. On the other hand, Spindler[100] draws particular attention to the fact that the Ice Man possessed **strongly developed superciliary ridges, a receding forehead, rather angular eye-sockets and marked mastoid processes**. His frontal sinuses, on the other hand, were, according to Sjøvold, **moderately well developed** and did not appear to deviate from the European norm.[101]

Only 11 of the 12 pairs of ribs were fully-developed in the Ice Man; the twelfth pair were missing. In fact, no joint surfaces were to be observed on the twelfth pectoral vertebra.[102] The lumbar region of his spine, on the other hand, exhibited '*. . . medium degenerative changes (osteochondrosis and also slight spondylosis).*'[103] Likewise, his knee-joints and ankles exhibited '*. . . medium-degree wear-and-tear phenomena.*'[104] These features may be a direct consequence of a robust and physically active lifestyle.

The Ice Man's pubic bone angle is described as being relatively small; clearly denoting his sex.[105]

His stature is described by Seidler *et al.* as falling within the known range of variation for previously described Neolithic populations from Italy and Switzerland, whilst his facial form is regarded as being **hyperorthognate**.[106] Jaroff, on the other hand, suggests that although Oetzi was a fit man, **his height was short even for his day**.[107] (For comparative metrical data on stature estimates of Neolithic Europeans, see Formicola.[108])

Oetzi is also thought to have weighed around 50 kg (or 7 st 12 lb).[109] He is also said to have possessed curly, brownish-black hair.[110] Although bald when recovered from the glacier, hair loss is regarded as having occurred post-mortem.[111] Samples of hair up to 9 cm (or 3.5 in) in length were found amid the remains of his clothing.[112] It has been suggested that the relatively short length of these hairs (numbering about 1,000) indicates that Oetzi (and his relatives) had regular haircuts. Jaroff[113] has suggested that this is far earlier than anthropologists had previously believed to be the case.

Jaroff[114] noted that:

> *An examination of* (Oetzi's) *body revealed* ***no sign of disease*** *and no wounds beyond those that were inflicted during his exhumation.*'

Likewise, Ross indicated that computerised axial tomography (CAT) scans had revealed no abnormalities in Oetzi's bones and organs.[115] **This has since been shown to be incorrect**. In fact, x-rays of the Ice Man's thoracic region have revealed no less than two serial traumas. Writing of these, Spindler states:

> '*The fifth, sixth, seventh, eighth and ninth ribs on the left show healed fractures, suggesting a one-time multiple trauma. All five ribs have healed well, even though some distortion remains. Serial rib fractures occur mainly in people at risk of falling: they are diagnosed chiefly in drunks, sportsmen* ***and mountaineers****. The Iceman, therefore, long before he died, had an accident which crushed the left side of his thorax.*'[116]

He then goes on to state that:

'A totally different picture, however, is presented by further fractures on the right. Here the X-ray shows that the third, fourth, fifth and sixth ribs are broken and are somewhat out of position. In this case there is no callus formation, no trace of the bones having healed, a fact which limits the time-frame in which the break happened to no more than two months before the Iceman's death.'[117]

Now the Ice Man's long bone epiphyses and diaphyses were **all fused**.[118] This would seem to rule out the possibility that Oetzi was still a juvenile at the time of his death. On the other hand, Sjøvold has indicated that traces of trabecular thickening have been observed in the area of the former metaphyseal plate.[119]

One final oddity. High resolution tomography has revealed **slight** arteriosclerosis (hardening of the arteries) in the area of the base of the brain.[120] This is usually associated with advanced age; yet Spindler suggests that in Oetzi's case:

'Even if the Iceman's age at death is taken to have been thirty-five to forty, the changes ***must have occurred relatively early in life.****'*[121]

He then invokes what he terms a 'daring' hypothesis to account for this phenomenon; that the Ice Man

'. . . had a metabolic susceptibility to ***early arteriosclerosis****, possibly due to a high blood cholesterol level.'*[122]

Could such a phenomenon be the down-side to a major shift in dietary emphasis in the period following the biblical Flood?

ANTHROPOLOGICAL PERSPECTIVES

According to Notdürfter, Oetzi *'. . . look*(ed) *like one of our well-tanned* (European) *ancestors'*.[123] In 1992 Coghlan indicated that a forthcoming research programme would focus upon the Ice Man's DNA, in an effort to establish his relationship to modern Europeans.[124] Seidler and his colleagues, however, cautioned against such claims and optimism — recognising the inherent dangers of extrapolating from a single specimen. They stated:

'We have ***no knowledge about the variability of the population from which he descended****. Especially the examination of small, sometimes locally and closely neighbouring Late Neolithic populations shows that there are* ***remarkable differences of types.****'*[125]

Whilst it was thought possible to draw some tentative conclusions from the skeletal (and tissue) remains, it remained to be seen whether sufficient non-degraded chromosomal DNA could be retrieved from Oetzi's body to establish a definitive genetic relationship with living European populations. Because most of Oetzi's chromosomal DNA had decayed away, researchers were forced to turn their investigations to his mtDNA.[126] (The results of these investigations were discussed earlier.)

Speculation has also been rife concerning Oetzi's occupation. The possibilities are many — farmer, explorer, trader, hunter, prospector or shepherd to list but a few of those already suggested.[127-131]

CIRCUMSTANCES OF DEATH

There has also been considerable discussion concerning the circumstances surrounding Oetzi's death. Ross[132] has noted that Oetzi's corpse did not feature any cuts or bruises, and this would appear to rule out the possibility of foul play. After an exhaustive examination of the corpse Seidler *et al.* concluded that the Ice Man *'. . . was in a state of exhaustion perhaps as a consequence of adverse weather conditions.'*[133] Coghlan, quoting Sjøvold, suggests that the Ice Man *'. . . may have lost his way in a freezing fog which suddenly swept up the mountain.'*[134]

It is thought that mummification (dehydration) had taken place prior to Oetzi's body being enveloped in ice.[135] The fact that Oetzi's body tissues had not been transformed into white grave wax (adipocere) — the normal state of glacial corpses — gives strong credence to this view.

Ironically, it would appear that the Ice Man died probably some time in early autumn; a pile of sloeberries (which usually ripen during September) being found at the burial site.[136,137]

A portion of the skin covering at the rear of the Ice Man's cranium had been removed (possibly by a bird) shortly after death.[138]

As stated previously, the corpse was damaged in a number of ways during exhumation (including severe damage to the left pelvic region, the release of the caput femoris and, possibly, the slight fracturing of the distal humerus shaft).[139] These 'injuries', along with several others sustained during glacial interment, must be isolated from the corpse's anatomical and physiological condition prior to death.

In assessing the Ice Man's condition at the time of death we are confronted with some interesting contradictions. For instance, Spindler has suggested that Oetzi possessed **an extremely strong physique**.[140] Yet elsewhere he also notes that the Ice Man had **no stored fat reserves**.[141] This, together with his broken ribs and the incomplete state of many of his hunting implements, suggests that his last days were a time of great stress. Indeed, Spindler has gone so far as to speculate that the Ice Man *'. . . felt himself pursued'* and that

'. . . There must have been some reason for him to risk the ascent to the main ridge with these massive handicaps'.[142]

A POSSIBLE CREATIONIST PERSPECTIVE ON THE ICE MAN

Of particular interest to the palaeoanthropologist is the age of the individual(s) at the time of their death. Such

estimates are usually made after a careful comparison of several indicators of maturational development; for instance, the thickness of the person's cranial bones, the extent of obliteration of their cranial sutures, the state of long bone development and whether fusion of the diaphyses and epiphyses has taken place, wear and stage of development of the dentition, general condition of the teeth and jaws, deformation of the bones, and incidence of osteoarthritis and other age-related osteological changes and disorders.[143,144] The indicators employed in the determination of age will vary in accordance with the stage of maturational development of the individual.[145] Even then the estimated age(s) may not always be reliable.[146] Indeed, different indicators may yield widely disparate estimates of age, and this has certainly been so in Oetzi's case.

One also needs to recognise that maturational development can proceed at different rates in different, though contemporaneous, cultures.[147,148] The rate may also have varied greatly throughout human history.[149,150] Let us now set about examining several of the age estimates for the Ice Man.

Coghlan[151] has noted that, like many skeletons from this age, Oetzi's teeth have been worn down. Brothwell also suggested that:

> *'By the age of 40 to 50, most Bronze Age people had very worn teeth — they had to chew coarse food, from raw meat to wholemeal breads. Their breads often contained stony material from the querns in which the grain was ground.'*[152]

Seidler and his colleagues[153] have taken these observations one step further; suggesting that the remarkably strong degree of abrasion on the front teeth indicates an age of between 35 and 40. They then go on to add:

> *'Sometimes, however, an extremely high degree of abrasion* ***can be found in juvenile individuals from Late Neolithic and Bronze Age finds.****'*[154]

Sjøvold has also noted that the upper and lower molars are **also rather worn**.[155] Similar patterns and degrees of wear have also been documented for young adult and juvenile Neanderthals and (proto) Cro-magnoids.[156-158] Yet despite such wear, there is **no evidence of dental caries at all in the Ice Man's teeth**.[159]

In modern man the degree of enamel wear is usually a function of dietary and other cultural factors. When examining the teeth of ancient man palaeoanthropologists often encounter degrees of wear hitherto unknown in modern populations. Such attrition is usually attributed to a combination of factors — advancing years of the individual being examined, diet and cultural habits. Such explanations are often difficult to accept for several reasons. Firstly, it is difficult to establish, with any degree of certainty, that early man ate meat raw. Indeed, in Oetzi's case, there seems to be circumstantial evidence to the contrary. For instance, we have already noted that Oetzi was in possession of two birch-bark canisters, one of which is thought to have been used to carry embers from one campsite to another.[160] Secondly, he was in possession of tinder.[161] This being the case, it seems reasonable to assume that he cooked his game prior to eating it. Thirdly, there is the obvious problem of accounting for such wear in juveniles.[162] Fourthly, most transformists subscribe to the belief that the average life expectancy of our ancient ancestors was decidedly less than that of modern man; yet the teeth of our ancestors, with few exceptions, seem to be better equipped for sustained wear and tear than our own![163,164]

Returning, then, to the Ice Man, the degree of wear appears to be incompatible with Oetzi's dental age in other respects. For instance, studies by Sjøvold and others have revealed that Oetzi **did not possess third molars (that is, wisdom teeth)**.[165,166] Whilst Sjøvold[167] has suggested that the third molars are 'congenitally missing' and that Oetzi is representative of a group of prehistoric European skeletons in which the third molars are absent, several other anatomists associated with the team investigating Oetzi's remains have argued that there may be traces or a trace of one of them **which has *not* erupted**.[168] Sjøvold has cautioned that their claims are not altogether convincing.[169] Spindler, however, has not been nearly so cautious. He states:

> *'X-rays and computer tomograms show that all four wisdom teeth are missing.* ***Although partially present in the jaw, not one of them has broken through.****'*[170]

Now in modern humans wisdom tooth crown formation usually takes place between the ages of 9 and 12, with root formation following a little later (between 12 and 20 years of age).[171] As such, crown formation and eruption of the third molars occur much later than the same events for all other permanent teeth.[172] Eruption, in fact, usually takes place in the late teens or early 20s — if, indeed, it takes place at all.[173]

Of course, were certain aspects of maturational development to have been retarded in the distant past, it remains possible that the so-called 'trace(s)' are, in fact, the germs of the third molars.[174] This could mean that Oetzi was old enough to account for the tooth wear, but appeared to be younger if judged by today's standards of when wisdom teeth erupt.[175]

Let us, now, examine several other age indicators.

Seidler *et al.* have also noted that CAT scans of the external surfaces of the Ice Man's cranial sutures also allow an age estimation to be made. They note that:

> *'. . . the sutures were closed but not obliterated. In the following sections there were no signs of obliteration: sutura coronaris: C1, C2 and C3; sutura sagittalis: S1, S2 and S4; and sections of the sutura lambdoidea. The sagittal region S3 was possibly obliterated. The degree of suture closure* ***may therefore indicate an age of 25 to 30 years.****'*[176]

Of course, if this aspect of skeletal maturation were delayed, Oetzi would be significantly older in actual years — consistent with the observed degree of tooth attrition.

Turning then to the long bones, we have already noted[177] that the diaphyses and epiphyses were ***all* fused** in Oetzi's case. On the other hand, radiological examination has also revealed evidence of trabecular thickening in the region of the former metaphyseal plates.[178] Given that fusion in the long bones of both males and females usually takes place in the late teens,[179] and the fact that **thinning-out of the trabeculae usually commences from about 30 years of age**,[180] it would appear that the Ice Man was somewhere **between 20 and 30 years of age** if based on modern rates of skeletal maturation.

Regrettably, age assessments for Oetzi based on the state of the bony surfaces of the symphysis pubis are not known at the present time.[181] Nor have other methods of assessing age — such as the degree of deformation of the limb bones — been examined at the time of writing.

Nevertheless, at least three aging indicators (thus far) appear to indicate (based on comparison with modern rates of maturation) that Oetzi was a young adult at the time of his interment. However, the degree of wear exhibited in his upper and lower dentitions would seemingly contradict this view — unless, of course, we invoke the possibility of maturational retardation (see below). This would mean that Oetzi's bones, when calibrated against rates of maturation observed today, would be interpreted as far younger than his true age. **If such delayed maturation was associated with greater longevity he would have, indeed, been a young adult in his own terms, though possibly 40 or more years old in actuality.**

PAST MATURATIONAL RETARDATION AND GREATER LONGEVITY

(1) Biblical and Secular Precedents

The related postulates of greater longevity and maturational retardation in the past are supported by biblical and secular writings. For instance, the Psalmist has alluded to the fact that:

> '. . . *all our days* (that is, life-spans) **have declined** *in Thy fury. . . . . As for the days of our lives, they contain seventy years, Or if due to strength, eighty years.*'[182]

This statement — uttered by David approximately 3,000 years ago — testifies to the dramatic decline in longevity following the Flood.[183] (David's 40 year reign is conventionally dated at between 1010–971 BC[184] and his birth ca. 1040 BC.)

Working backwards, by the time we reach the time of the Exodus — dated at 1447 BC by Bimson and Livingston[185] according to a strict biblical chronology[186] — we are confronted with **substantially greater** life-spans than those of David and his contemporaries. For instance, the life-spans of Aaron and Moses were 123 and 120 years respectively,[187,188] both patriarchs dying in the fortieth year after the Exodus.[189] Given that Moses and Aaron died in the same year — 1407 BC — we may assume that life expectancies approaching 120 years were still common place in the 15th century BC.

As we get closer in time to the Flood (c. 2300 BC based on a tight Massoretic chronology) the documented life-spans of the patriarchs increase dramatically. For instance, the early post-Flood patriarch, Job, lived 140 years after the calamitous events described in the book of the Old Testament by the same name.[190] Two of the survivors of the Flood — Noah and his son Shem — lived to ages of 950 and 600 years respectively,[191] whilst the patriarch Abraham (some ten generations later) lived to the ripe old age of 175.[192] His wife, Sarah, died at the age of 127.[193]

However, the Old Testament is not the only historical document to cite such instances of great longevity. For instance, the noted Egyptologist, Sir Alan Gardiner, commenting on the hieratic papyrus known as the **Turin Canon of Kings**, states that:

> *'The chronicle started, like that of Manetho, with the gods and demi-gods,* ***to whom reigns of fabulous length are attributed.***'[194]

Likewise, the historian, Flavius Josephus (*fl.* AD 70) asserted:

> '. . . *let no one, upon comparing the lives of the ancients with our lives, and with the few years that we now live, think that what we have said of them is false; or make the shortness of our lives at present an argument that neither did they attain to so long a duration of life. . . . . Now I have witnesses to what I have said, all those that have written Antiquities, both among the Greeks and barbarians; for even Manetho, who wrote the Egyptian history, and Berossus, who collected the Chaldean monuments, and Mochus and Hestiaeus, and besides these, Hieronymus the Egyptian, and those who composed the Phoenician History, agree to what I here say: Hesiod also, and Hecataeus, Hellanicus, and Acusilaus; and besides these, Ephorus and Nicolaus* ***relate that the ancients lived a thousand years****; but as to these matters let everyone look upon them as he thinks fit.*'[195]

In a footnote to his translation of **The Works of Josephus** Whiston,[196] in reference to Josephus's commentary on Genesis 6:3b, states that:

> *'Josephus here supposes, that the life of these men, for of them only do I understand, was now reduced to 120 years; which is* ***confirmed by the fragment of*** (The Book of) ***Enoch, sect.10, in Authent. Rec. 1.268.*** *For as to the rest of mankind, Josephus himself confesses their lives were* ***much longer than 120 years for many generations after the flood****, as we shall see presently; and he says they were* ***gradually shortened till the days of Moses****, and then fixed [for some time] at 120,* ***6.5****.'*

A number of other historical documents attribute great ages to individuals from early human history. The Australian archaeologist, Clifford Wilson, has recently noted

that, in addition to the so-called **Sumerian King List**:[197]

> *'. . . The Egyptians and Chinese also speak of kings who lived for thousands of years. The later Greeks and Romans were more conservative,* ***suggesting 800 to 1,000 years — closer to the Biblical figures.***'[198]

whilst Free[199] noted the existence of a Babylonian king-list which also featured exaggerated life-spans.

However, along with greater longevity, there is also a measure of evidence in support of deferred skeletal and sexual maturation in the past. The genealogies of Genesis 5 and 11 seem to infer that sexual maturation took place at ages somewhat greater than those of today.[200] For instance, the minimum cited ages of begetting of sons to pre-Flood patriarchs was 65 years.[201] By way of comparison, those of most of the post-Flood patriarchs ranged from the late twenties to mid thirties.[202] (There are several other patriarchs for whom ages at either the time of marriage and/or birth of their first-born child can be established).[203] Whilst conceding that some of the sons cited in Genesis 11 may not necessarily have been first-borns, there does, nevertheless, appear to be a general trend towards delayed sexual (and thus probably skeletal) maturation the further back in time we go.

(2) Possible Relevance to the Ice Man

Given such possibilities, it remains to be said that many of the morphological characteristics observed in so-called 'archaic' and ancient humans may be related, at least in part, to significantly slower ontogeny (as expressed in slower skeletal and sexual maturation) and a generally greater longevity in the past. Indeed, Gardiner, has (unwittingly) alluded to just such a possibility when describing the contents of historical records from ancient Egypt. In his book, **Egypt of the Pharaohs**, he wrote of the Old Kingdom:

> *'The present tendency is to assign to Dyn.IV a duration of no more than 160 years and to Dyn.V no more than 140.* ***These figures are small in view of the great works accomplished,*** *but apparently will have to be still further reduced, for there seems no reason to doubt the veracity of a courtier who claimed to have been honoured by* (no less than) *six kings (pharaohs) from Ra'djedef to Ŝahurē', or of a royal prince who enjoyed similar favour, but starting only with Ra'djedef's successor, Chephrēn.*'[204]

The impression we are left with is that these individuals lived well in excess of 100 years. To concede such a possibility was unthinkable to a secular archaeologist.

Craniofacial characteristics such as large cranial capacity, dolichocephalic skull-shape, prominent brow-ridges and expanded frontal sinuses are readily recognizable traits of many of our purported 'archaic' ancestors. The Ice Man also exhibits these same traits — though in a somewhat more subtle form. We have already noted that Oetzi possessed a very substantial cranial capacity and cranium that bordered on being 'dolichocephalic'.[205] He also possessed moderately developed brow-ridges and associated frontal sinuses.[206] (These two characteristics tend to go hand-in-hand).

Of particular interest to us is the Ice Man's 'hyperorthognate' facial profile.[207] This trait **recalls the retrognathic profile of virtually all Neanderthal children.**[208] The retrognathic condition in Neanderthal infants and young children manifests itself in the posterior-superior positioning of the jaw. This condition arises as a consequence of jaw growth and development being decidedly out-of-phase with cranial development.[209] That is to say, **jaw growth in Neanderthal children (and perhaps juveniles and young adults) was retarded with respect to cranial development.**[210] This retardation may well have necessitated the deferral of the formation and eruption of the third molars in Neanderthals (and possibly *Homo erectus*) **until such time as the jaw had reached its full adult size.** Such retardation in jaw development may well explain the absence of erupted third molars in the Ice Man. In other words, the late eruption of the third molar, together with the taurodont nature of the molars, would seemingly represent **a design mechanism geared for greater longevity in the early history of humankind!** Conversely, the impaction of third molars and the overcrowding of teeth generally[211] — conditions prevalent in many modern-day societies — could be directly attributable to the fact that longevity has declined dramatically during the course of human history. It is well to remember that in the case of the Ice Man there is no apparent evidence of over-crowding; in fact, there is evidence to the contrary in the form of a pronounced diastema (gap) between the medial incisors of the upper jaw (only).[212] Whilst the lower (and possibly 'immature') jaw doesn't contain any obvious diastema, it does appear that there may be sufficient space between the second molars and the ascending ramus of the lower jaw to accommodate the purportedly 'missing' wisdom teeth.[213] Even if there weren't, this would not necessarily preclude future eruption of the wisdom teeth, since extension of the body of the mandible parallels the enlargement of the crypts in which the post-canine teeth are developing.[214] If we are, indeed, dealing with germs in the Ice Man's case, then it follows that jaw growth is not yet complete. The same argument may also hold for the upper jaw, since it incorporates a relatively wide dental arcade and diastema.[215]

If the present writer's contentions of deferred maturation and greater longevity in the past are correct, then it is possible that the Tyrolean Ice Man represented a young adult **who was significantly older in terms of actual years than his modern-day counterpart at the same ontogenetic stage of life.** The deferral of skeletal maturation to an age of, say, 40 years would certainly go a long way to explaining the degree of wear observed in the Ice Man's upper and lower dental arcades. Under such circumstances it would be possible to match the degree of tooth wear to the somewhat 'immature' development of

the mandible and maxillary, the largely unobliterated cranial sutures, unerupted wisdom teeth and his limb bone development.

CONCLUSIONS

A number of conclusions can be drawn from this study.

Firstly, the radiocarbon datings — which are (at least in a relative sense) **not** in dispute — suggest a dating of between 5,200 and 5,300 years BP for the Ice Man — dates which render Oetzi contemporaneous with the Chalcolithic cultures of the Middle East and Mesopotamia, the Old Kingdom of ancient Egypt, the stone-working Nubian civilizations of North Africa, ornamental metalworkers from Varna (Bulgaria) and numerous other 'advanced' cultures throughout the Old and New World.[216]

Secondly, whilst Oetzi's calibrated age has been accepted by most palaeoanthropologists, his apparent sophistication and adeptness have surprised most cultural anthropologists who, until now, have regarded Europe as a cultural backwater until comparatively recent times.[217]

Thirdly, the presence of two serial traumas in the Ice Man's thoracic region testifies to the dangers confronted by the Ice Man during the course of his life.

Fourthly, the relative recency of at least one of these serial traumas and the absence of stored body fats, suggests that the Ice Man's death was almost inevitable.

Fifthly, and despite his deteriorating condition, the Ice Man ventured high into the alps — perhaps in an attempt to escape hostile pursuers.[218]

Sixthly, there is the issue of retarded skeletal maturation. Several lines of evidence have been cited which indicate that Oetzi was either a young (or sub-) adult. Yet his teeth exhibit a degree of wear consistent with that of a much older individual. Given the possibility that his third molars were still germinating and that he (probably) didn't consume meat in a raw state, the only tenable explanation for the disparity between his presumed dental age and largely unobliterated cranial sutures on the one hand, and the degree of tooth wear on the other, is that he had been masticating for a period of 35 to 40 years, but was still essentially a young adult (equivalent to a 25 to 30 year old in today's world). In other words, the Tyrolean Ice Man was **maturing skeletally in many respects at a much slower rate than is the case today**.

Finally, the general wear-and-tear observed in the Ice Man's bones and teeth need not imply that he was approaching middle age. For instance, physically active individuals — such as athletes and perhaps in this instance, alpine shepherds — tend to be susceptible to wear-and-tear of the knee and ankle joints (osteoarthritis). The Ice Man's spondylosis could have been brought on by heavy loading of the vertebral column (for example, carrying injured or new-born sheep/goats over the shoulders). The wear-and-tear would have been amplified, in part, by any prolongation of ontogeny.

Many of the Ice Man's morphological traits (including his large cranial capacity, moderate brow-ridges and associated frontal sinus development and relatively short stature) recall those of relatively late *archaic* Europeans — though these features are certainly more subtly expressed than those of Eurasian Neanderthals. It is, therefore, the considered opinion of the present writer that Oetzi represents a post-Flood individual born during the recessional phase of the great Ice Age.

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13. Bahn and Everett, Ref. 6, p. 11.
14. Coghlan, A., 1992. Ötze: the man who came in from the cold. **New Scientist, 133**(1803):11.
15. Anonymous, Ref. 4.
16. Seidler *et al.*, Ref. 11, p. 455.
17. Bahn and Everett, Ref. 6, p. 11.
18. Bahn and Everett, Ref. 6, p. 11.
19. Bahn and Everett, Ref. 6, p. 11.
    The above writers suggest that:
    'They should have been dated at the same time as the body, but there was no coordination between the Institutes of Anatomy (corpse) and Archaeology (artifacts).'
20. Bahn and Everett, Ref. 6, p. 11 (photographic reproduction).
21. Bahn and Everett, Ref. 6, p. 12.
    It is argued by the writers that victims of exposure to intense cold and hypothermia often remove their clothes.
22. Jaroff, L., 1992. Iceman. **Time, 7**(43), October 26, p. 54.

23. Jaroff, Ref. 22, p. 54.
24. Spindler, K., 1993. **The Man in the Ice** (1994 English edition), Weidenfeld and Nicolson, London, p. 135.
25. Spindler, Ref. 24, p. 137.
26. Spindler, Ref. 24, pp. 139–140.
27. Spindler, Ref. 24, pp. 141–142.
28. Spindler, Ref. 24, pp. 106–113.
29. Jaroff, Ref. 22, p. 54.
30. Jaroff, Ref. 22, p. 54.
31. Jaroff, Ref. 22, p. 54.
Elsewhere in the same article (p. 52) Jaroff states:
'Examining that person and his implements, scientists have gained new insight into late Stone Age society. They've been stunned by the sophisticated design of his (Oetzi's) arrows, which reflect a basic grasp of ballistics, and by the ingenuity of his clothing.'
32. Jaroff, Ref. 22, pp. 54, 55.
33. Spindler, Ref. 24, pp. 101–103.
34. Spindler, Ref. 24, pp. 103–106.
35. Spindler, Ref. 24, p. 108.
36. Jaroff, Ref. 22, p. 55.
37. Spindler, Ref. 24, pp. 118, 119.
38. Anonymous, Ref. 8.
39. Bower, Ref. 10.
40. Sjøvold, T., 1992. The stone age Iceman from the Alps: the find and the current status of investigation. **Evolutionary Anthropology, 1**(4):122.
41. Roberts, Ref. 12, pp. 51–52.
42. Roberts, Ref. 12, p. 52.
43. Sjøvold, Ref. 40, p. 121 (Figure 5 and text).
44. Spindler, Ref. 24, p. 89.
45. Jaroff, Ref. 22, p. 55.
46. Sjøvold, Ref. 40, p. 122.
47. Sjøvold, Ref. 40, p. 122.
48. Jaroff, Ref. 22, p. 55.
49. Jaroff, Ref. 22, p. 54.
50. Jaroff, Ref. 22, p. 54.
51. Jaroff, Ref. 22, p. 55.
52. Spindler, Ref. 24, pp. 126, 127.
53. Jaroff, Ref. 22, p. 55.
54. Sjøvold, Ref. 40, p. 122.
Sjøvold describes these items as possibly constituting a 'repair kit'. However, Pöder (Ref. 55, below) disputes this interpretation.
55. Pöder, R., 1993. Ice Man's fungi: discussion rekindled. **Science, 262**:1956
Pöder has noted that:
'. . . among the equipment found in his leather bag (including several flint objects) was a large amount of mysterious black stuff. At first it was thought to be part of a prehistoric repair kit, ... but this black stuff has ***now been clearly identified as "classical tinder"****. It consists of loosely interwoven context hyphae of the "true tinder bracket"* (Fomes fomentarius) ***still containing traces of pyrite.'***
56. Spindler, Ref. 24, pp. 97–101.
57. Sjøvold, Ref. 40, p. 119 (Figure 2 and text).
58. Jaroff, Ref. 22, p. 55.
59. Spindler, Ref. 24, p. 91.
60. Jaroff, Ref. 22, p. 55.
61. Seidler *et al.*, Ref. 11, p. 457.
62. Roberts, Ref. 12, pp. 45, 62.
63. Jaroff, Ref. 22, p. 55.
64. Pöder, Ref. 55.
65. Roberts, Ref. 12, p. 62.
66. Ross, P. E., 1992. A messenger from the Stone Age. **Scientific American, 266**(5):78.
67. Coghlan, Ref. 14, p. 12 (Inset: Trappings tell of ancient lifestyle).
68. Jaroff, Ref. 22, p. 54.
69. Sjøvold, Ref. 40, p. 120 (Figure 4 and text).
70. Jaroff, Ref. 22, p. 54.
71. Ross, Ref. 66, p. 78.
72. Spindler, Ref. 24, pp. 171–174.
73. Jaroff, Ref. 22, p. 54.
74. **New Age Encyclopaedia** (7th edition, 1983), Vol. 28, p. 26.
75. Sjøvold, Ref. 40, p. 120.
76. Rudensko, S. I., 1970. **Frozen Tombs of Siberia: The Pazyrik Burials of Iron Age Horsemen**, University of California Press (Translated from Russian by M.W. Thompson).
77. **Funk & Wagnalls New Encyclopedia** (1986 edition), Vol. 25, p. 150.
78. Jaroff, Ref. 22, pp. 53, 54.
79. Bahn and Everett, Ref. 6, p. 11.
80. Spindler, Ref. 24, p. 19.
In describing one of the earlier exhumation attempts, Spindler writes:
'Some of the work ha(d) *to be done under water. Time and again the pneumatic chisel slips and cuts into the flesh of the corpse, especially its left hip.'*
81. Seidler *et al.*, Ref. 11, p. 457.
Seidler and his colleagues state:
'The CT images revealed that the distal humerus shaft of the left arm was fractured slightly above the trochlea. The possibility that the fracture happened during an initial recovery attempt cannot yet be excluded.'
82. Jaroff, Ref. 22, pp. 55, 56.
Although most scientists involved in the subsequent investigative programme derive from Austria and Germany, the corpse was actually discovered 92.6 metres inside Italian territory (the South Tyrol).
83. Bahn and Everett, Ref. 6, p. 12.
84. Bahn and Everett, Ref. 6, p. 11.
85. Jaroff, Ref. 22, p. 54.
Jaroff notes that:
'He (Oetzi) *had also been castrated; it turned out that his penis and most of his scrotum were missing, perhaps accidentally broken off during his recovery and taken by a visitor.'*
86. Bahn and Everett, Ref. 6, p. 12.
Bahn and Everett state that:
The final puzzle is that the corpse's genitalia are missing. The study team assume that they were probably broken off during excavation; but the possibility remains that the body was castrated before death. In addition, rumours are rife — and have been reported in several homosexual publications in mainland Europe and in Britain — that sperm has been found in the corpse's anal canal and that the study team is hushing up this point out of embarrassment. In our opinion it is far more likely that the team thinks the rumour is too ridiculous to merit attention; but for posterity's sake it should make a clear statement.'
87. Spindler, Ref. 24, pp. 173–177.
Spindler notes that, prior to the castration theory becoming widespread,
'The condition of the sex organs had ***already*** *been described as "foliate, desiccated" by the forensic experts when the corpse was delivered to the dissection room.'* (p. 175)
He then goes on to conclude that:
'One result of this first examination of the Iceman's genital region is that ***castration before or after death can be ruled out.'*** (p. 176)
88. Bahn and Everett, Ref. 6, p. 12.
Bahn and Everett state that: *'. . . there is a considerable list of problems and uncertainties with* (Oetzi's state of preservation at the time of exhumation).' They then go on to cite Bader and Heim (Ref. 89, below), stating that:
'Bader and Heim list some of these inconsistencies, but stop short of declaring the corpse to be a fake. They imply that they would not be surprised if some of those involved were engaged in a very elaborate hoax.'
89. Bader, J.-M. and Heim, M., 1992. **Sci. Vie., 901**:178.
90. Heim, M. and Nosko, W., 1993. **Die Öztal-Fälschung: Anatomie einer archäologischen Groteske**, Rowohlt Verlag.
Heim and Nosko have gone so far as to suggest that the Ice Man was a shaman (or 'medicine man'). They have suggested that the pathologist who first examined Oetzi believed him to be a 'mummy' from another cultural setting and that the ritual tattoos on his body are known from other parts of the world.
91. Coghlan, A., 1994. Iceman's relatives traced to northern Europe. **New Scientist, 142**(1931):6.
92. Spindler, Ref. 24, pp. 259–264.
Spindler points out that:

'Thanks to their connections the (above) *two authors were able to place their book in the hands of an eagerly receptive media. . . . . In their euphoria and a few weeks after publication, the authors rashly agreed to take part in a discussion programme. In a ninety-minute* Club 2 *transmission for Austrian television, also relayed to Germany, they had to stand up to questioning by two Innsbruck scientists. One almost had to pity them; they were taken to pieces and made to look complete fools. Since then a deafening silence has descended on the subject of the "Ötztal fraud".'* (p. 264)

93. Handt, O., *et al.*, 1994. Molecular genetic analyses of the Tyrolean Ice man. **Science, 264**:1175–1178. 1775-1778.
A sequence of Oetzi's mtDNA, some 394 bases in length, was compared with those of sample populations from the European Alps, Northern Europe, the Mediterranean, sub-Sahara Africa, Siberia and the Americas. The average mismatches amounted to 3.38, 3.73, 5.35, 7.45, 6.87 and 6.64 bases respectively, clearly supporting a European origin for the Ice Man. Shared sequences were greatest in the North European sample.
94. Coghlan, Ref. 91, pp. 6, 7.
95. Riordan, T., 1994. Iceman unlikely to be hoax, DNA tests show. **The Sydney Morning Herald**, Saturday, June 18, p. 17.
96. Seidler *et al.*, Ref. 11, pp. 455, 456 (Table 2).
97. Bahn and Everett, Ref. 6, p. 11.
98. Sjøvold, T., 1993. Personal communication dated October 29, 1993.
99. Sjøvold, Ref. 98.
100. Spindler, Ref. 24, p. 158.
101. Sjøvold, Ref. 98.
102. Spindler, Ref. 24, p. 179.
103. Spindler, Ref. 24, p. 172.
Osteochondrosis is a disease of the growth/ossification centres in children. It begins as a degeneration or necrosis, which is then followed by regeneration or recalcification. **Spondylosis** is a form of osteoarthritis involving ankylosis (stiffening) of a vertebral joint.
104. Spindler, Ref. 24, p. 172.
105. Spindler, Ref. 24, p. 158.
106. Seidler *et al.*, Ref. 11, p. 455.
107. Jaroff, Ref. 22, p. 54.
108. Formicola, V., 1989. La ricostruzione della statura dalle ossa degli arti. Valutazioni sull'attendibilità dei risultati in campioni neolitici. **Rivista di Antropologia (Roma), LXVII**:310–313.
109. Jaroff, Ref. 22, p. 54.
110. Jaroff, Ref. 22, p. 54.
111. Coghlan, Ref. 14, p. 12.
112. Jaroff, Ref. 22, p. 54.
113. Jaroff, Ref. 22, p. 54.
114. Jaroff, Ref. 22, p. 54.
115. Ross, Ref. 66, p. 79.
116. Spindler, Ref. 24, p. 179.
117. Spindler, Ref. 24, p. 180.
118. Sjøvold, Ref. 98.
119. Sjøvold, Ref. 98.
Sjøvold has, however, noted that such traces can remain at least until mid-life.
120. Spindler, Ref. 24, p. 179.
121. Spindler, Ref. 24, p. 179.
122. Spindler, Ref. 24, p. 179.
A dramatic shift in diet — towards meat (Genesis 9:3,4) and dairy products — during the early post-Flood epoch, coupled with generally greater longevity and slower maturation may provide a viable hypothesis for this intriguing phenomenon.
123. Quoted by Jaroff (Ref. 22, p. 54).
124. Coghlan, Ref. 14, p. 12.
125. Seidler *et al.*, Ref. 11, p. 457.
126. Coghlan, Ref. 91, p. 6.
127. Shreeve, J., 1992. The ice man cometh. **Discover, 13**(1):35.
128. Coghlan, Ref. 14, p. 12.
129. Ross, Ref. 66, p. 79.
130. Jaroff, Ref. 22, p. 55.
131. Spindler, Ref. 24, p. 236.
132. Ross, Ref. 66, p. 79.
133. Seidler *et al.*, Ref. 11, p. 456.
134. Coghlan, A., 1992. Victim of the freezing fog? **New Scientist, 136**(1844):9.
135. Seidler *et al.*, Ref. 11, p. 456.
136. Jaroff, Ref. 22, p. 55.
137. Shreeve, Ref. 127.
138. Jaroff, Ref. 22, pp. 53, 55.
139. Seidler *et al.*, Ref. 11, pp. 455, 457.
140. Spindler, Ref. 24, p. 247.
141. Spindler, Ref. 24, p. 178.
142. Spindler, Ref. 24, p. 131.
143. Kanowski, M. G., 1987. **Old Bones: Unlocking Archaeological Secrets**, Longman Cheshire (Publishers), Melbourne, p. 18.
144. Warwick, R. and Williams, P. L. (eds), 1973. **Gray's Anatomy** (35th British edition), W. B. Saunders Company, Philadelphia, p. 205.
Other reliable indicators used by palaeoanthropologists and forensic scientists include changes in the symphyseal region of the pubic bones as well as changes in the scapula, sternum and costal cartilages. Lipping of the borders of vertebral bodies and around the margins of articular surfaces, exaggerated secondary markings on bones, and ossification into tendons and ligaments are also regarded as *'. . . manifestations of advancing years, but they provide no more than vague indications of actual age.'* (p. 205)
145. Ref. 144, p. 205.
Dental development and ossification provide the primary means of assessing skeletal age up to approximately 25 years of age. Beyond this age other indicators must be employed, including suture closure/obliteration and the state of the symphysis pubis.
146. Ref. 144, p. 205.
The precision in estimating skeletal age declines somewhat once skeletal maturation is reached. **Gray's Anatomy** states that:
'Up to the age of about 25 years, including fetal life, the states of dentition and of ossification provide numerous data upon which an assessment can be made.'
The writers then go on to list a number of factors which are critical in assessing the skeletal age — given the diversity which exists in even the smallest population group. They then go on to say that:
'. . . Despite these complications, it is usually possible to assess the age of a complete skeleton within a year or so each way up to the age of 25, and with greater accuracy in earlier years, especially if dental observations are also available. . . . . From about 25 years onwards, skeletal age can be estimated to within ±5 years by the state of the cranial sutures and of the bony surfaces of the symphysis pubis. From the mid-twenties onwards into old age, sutures exhibit a progressive closure. Unfortunately, closure begins from within, and unless crania can be opened for internal inspection (or examined by some non-intrusive method such as CAT scan) *observations are likely to be misleading. More recent studies have thrown doubt upon the value of this particular technique and possible complications due to racial variation have been recorded. A series of progressive changes in the borders and surface configuration of the articular aspects of the pubic bones at their symphysis have been shown to occur. Appearances characteristic of ages from late teens to the fifties and beyond have been established.* ***Most authorities now regard this as the best method available for estimation of skeletal age in the decades of maturity.'***
147. Sjøvold, Ref. 98.
Sjøvold suggests that maturational rates may vary according to living circumstances, citing observed variations between living populations of Eskimos (Inuits) and Europeans (Caucasians). Rates of development also differ between the respective sexes of a particular racial grouping.
148. Lasker, G. W. and Tyzzer, R. N., 1981. **Physical Anthropology**, third edition, Holt, Rinehart and Winston Inc., Orlando (Florida), p. 452.
Lasker and Tyzzer, in attempting to explain variations in the age at which menarche takes place in girls across different cultures, point out the relevance of the nutritional value of available foods. They also suggest that observed variations within cultures may be rooted in socioeconomic factors which, in turn, also relate back to nutrition.
149. Dean, M. C., Stringer, C. B. and Bromage, T. G., 1986. Age at death of the neanderthal child from Devil's Tower, Gibraltar and the implications for studies of general growth and development in neanderthals. **Ameri-**

can Journal of Physical Anthropology, 70:301–309.
These writers fix the age of the Neanderthal child on the basis of modern human standards of dental development. They conclude their examination by stating that:
'. . . the developing dentition of the Gibraltar child falls much closer to, or at the lower end of, the expected range of values known for modern Homo sapiens *and as such must be considered to show an accelerated but essentially human pattern of development.'* (p. 308)
However, they are then confronted with an obvious problem concerning the precocious brain growth of the individual (pp. 301 [Abstract], 308).

150. Cuozzo, J. W., 1987. Earlier orthodontic intervention: a view from prehistory. **Journal of the New Jersey Dental Association, 58**(4):33–39.
Cuozzo adopts a different line of thought to Dean *et al.* (Ref. 149, above). In reference to a number of separate studies of various Neanderthal children, Cuozzo surmises that:
'It is obvious that none of the investigators wished to deny the uniformity of eruption dates commonly accepted in dental science today. When faced with such discrepancies in facial development events in Neanderthal children from those of dentally equivalent modern children, the notion of uniformity in eruption dates seems to take precedence and the cranium was termed accelerated ***rather than the jaw systems retarded****. . . . . It could have been that either their craniums were accelerated and their jaws were normal or their craniums were normal and their jaws retarded. There is also the possibility that the teeth were accelerated in their eruption times while the face still remained immature. There is also the possibility that the face was very slow in its development and the teeth were on the modern time schedule. The physiological condition which seems most likely to have occurred is that which places the teeth and face on the same timetable whether it be fast or slow. It is definite that* ***the facial timetable was slower than the modern one*** *. . . This ultimately points to a child of prehistory that* ***matured later physically as well as sexually****.'* (pp. 37, 39)
151. Coghlan, Ref. 14, p. 12.
152. Brothwell quoted by Coghlan (Ref. 14, p. 12).
153. Seidler *et al.*, Ref. 11, p. 455.
154. Seidler *et al.*, Ref. 11, p. 455, 456.
155. Sjøvold, Ref. 98.
156. Wolpoff, M. H., 1980. **Palaeoanthropology**, Alfred A. Knopf, New York, p. 273.
Referring to Neanderthal remains from Krapina in Yugoslavia (most of which are regarded as having belonged to young people), Wolpoff states that: *'. . . incisor wear exceeds the wear on the surrounding teeth.'*
157. Tillier, A.-M., 1989. The evolution of modern humans: evidence from young Mousterian individuals. *In*: **The Human Revolution: Behavioural and Biological Perspectives in the Origins of Modern Humans**, Mellars, P. and Stringer, C. (eds), Princeton University Press, p. 293.
Tillier states:
'Most aspects of Neanderthal facial morphology are generally regarded as reflections of biomechanical factors, ***due to heavy use of the anterior permanent teeth, which are strongly worn****.'*
She then goes on to add:
'However, it remains uncertain to what extent anterior dental enlargement and anterior tooth wear can be attributed to dietary as opposed to non-dietary use.'
158. Vallois, H. V. and Vandermeersch, B., 1975. The Mousterian skull of Qafzeh (Homo VI). An anthropological study. **Journal of Human Evolution, 4**:452, 453.
In this paper the authors describe the skull of Qafzeh VI as belonging to **a young** (and possible male) **adult**. They also state that the teeth preserved in the upper jaw of this same specimen exhibited **a considerable degree of wear, although not excessive**. Nevertheless, *'. . . On all of* (the preserved teeth), *except right M^2, the cement is bared.'*
159. Spindler, Ref. 24, p. 183.
160. Jaroff, Ref. 22, p. 55.
Jaroff, in reference to the speculations of Egg, states that *'Two birchbark canisters may have been used to carry the embers from a fire . . .'*
161. Spindler, Ref. 24, pp. 110–113.
162. Seidler *et al.*, Ref. 11, pp. 455, 456.
163. Cuozzo, Ref. 150, pp. 36, 37.
Cuozzo has argued that:
'All classic Neanderthal children have taurodont primary molars. . . . This type of tooth stands in contrast to the modern cynodont primary molar. Taurodont means bull-like, while cynodont signifies dog-like. The taurodont (molar) has a low bi or trifurcation and long pulp chamber internally while the cynodont has a higher bifurcation and a shorter pulp chamber. The taurodont formation ***enables the tooth to undergo extensive occlusal wear (attrition) without infringing on the pulpal contents of the tooth****. As the occlusal surface wears down, secondary dentin builds up inside the chamber as the pulpal contents recede towards the bi or trifurcation area to escape from force or temperature stresses. In the cynodont form the higher bi or trifurcation restricts the amount of pulpal recession and therefore limits the longevity of the tooth.* ***The taurodont tooth is superior to the cynodont in terms of longer wear as the radial tire is to all of the preceding types of tires****.'*
164. The secondary (or permanent) molars of Neanderthal Man are also taurodont. See: Zihlman, A. L., 1982. **The Human Evolution Coloring Book**, Barnes and Noble Books, New York, Part V, Plate 108 (text).
165. Sjøvold, Ref. 40, p. 120.
166. Bower, Ref. 10.
167. Sjøvold, Ref. 40.
Whilst it is common for wisdom teeth to become 'impacted' in modern man (a legacy of jaw shrinkage during human history), it is rare for teeth to be 'congenitally missing'.
168. Sjøvold, Ref. 98.
169. Sjøvold, Ref. 98.
170. Spindler, Ref. 24, p. 181.
171. Smith, B. H., 1986. Dental development in *Australopithecus* and early *Homo*. **Nature, 323**:327 (Figure 1).
172. Smith, Ref. 171.
173. Smith, Ref. 171.
Holly Smith's data (which, incidentally, was based on United States Caucasian schoolchildren only) suggests that wisdom teeth crown formation takes place, on average, nearly six years after the second molars.
174. Sjøvold, T., 1994. Personal communication dated January 1, 1994.
175. Sjøvold, Ref. 40, p. 120.
Sjøvold cites the usual transformist explanations for tooth wear, but also contemplates the possibility of 'old age'.
176. Seidler *et al.*, Ref. 11, p. 456.
177. Sjøvold, Ref. 98.
178. Sjøvold, Ref. 98.
179. Warwick and Williams, Ref. 144, p. 209.
180. Sjøvold, Ref. 174.
181. Although CAT scans of the pelvic region have already been carried out, analysis of the surfaces of the symphysis pubis are yet to be evaluated by the team investigating the Ice Man.
182. Psalm 90:9, 10.
183. Genesis 11:10-32; 23:1; 25:7, 17; 35:28; 47:28; 50:22, 26; Exodus 6:16–20; Numbers 33:39; Deuteronomy 34:7.
184. Free, J. P., 1974. **Archaeology and Bible History**, Scripture Press Publications, Wheaton, Illinois, p. 165.
185. Bimson, J. J. and Livingston, D., 1987. Redating the Exodus. **Biblical Archaeology Review, 13**(5):42.
186. Based on 1 Kings 6:1, which establishes an interval of no less than 480 years between the Exodus from Egypt and the commencement of construction of Solomon's temple in the fourth year of his reign (967 BC).
187. Numbers 33:38.
188. Deuteronomy 34:7.
189. Aaron was already 83 years old and Moses 80 at the time of the Exodus (see Exodus 7:7). They died forty years later; just prior to Israel's entry into the land of Canaan.
190. Job 42:16.
At the time of the events described in the book, Job had already become a person of exceptional renown (Job 1:3) and had fathered seven sons and three daughters (Job 1:2).
191. Genesis 7:6; 9:28, 29 and Genesis 11:10,11.

192. Genesis 25:7,8.
193. Genesis 23:1.
194. Gardiner, A., 1961. **Egypt of the Pharaohs** (1964 paperback edition), Oxford University Press, New York, p. 48.
195. Whiston, W., (translation). **The Works of Josephus: New Updated Edition**, 1987, Hendrickson Publishing, Inc., Peabody, Massachusetts, Whiston, W. (translator), pp. 34–35 (*Antiquities* 1.3.9).
Whilst Josephus lived in the first century AD, the other historians to whom he refers extend back as far as the fifth and sixth centuries BC.
196. Whiston, Ref. 195, p. 32 (footnote b).
The Josephic passage to which Whiston refers states:
'. . . where Terah died, and was buried, when he had lived to be two hundred and five years old; for the life of man was already by degrees diminished, and became shorter than before, till the birth of Moses; after whom the term of human life was one hundred and twenty years.' (*Antiquities* 1.6.5)
197. Wilson, C., 1993. **Visual Highlights of the Bible: Volume 1 — From Creation to Abraham**. Pacific Christian Ministries, Boronia (Victoria), pp. 42, 43.
198. Wilson, Ref. 197, p. 42.
199. Free, Ref. 184, p. 40.
Free notes:
'These texts are certainly mythological, but they ***may well be a*** **legendary account of the fact** ***revealed in the Bible that men did live to greater ages in early times.'*** (p. 40)
200. Cuozzo, Ref. 150, p. 39.
201. Genesis 5:15, 21.
The minimum cited ages of begetting of sons to pre-Flood patriarchs was 65 years. By way of comparison, most of the post-Flood patriarchs ranged between their late twenties and mid thirties.
202. Genesis 11:24 cf. 11:12
203. There are a number of recorded instances where a post-Flood patriarch's age at the time of marriage or begetting of a first-born son is known. For example: Isaac married Rebekah when he was 40 years of age and was 60 at the time of the birth of Jacob and Esau (Genesis 25:20,26); Esau was 40 years old at the time of his marriage to Judith and Basemath (Genesis 26:34) and Joseph was between 36 and 37 at the time of the birth of his first-born, Manasseh (Genesis 41:46-50). Each of these instances supports our contention of deferred sexual maturation.
204. Gardiner, Ref. 194, p. 390.
205. Seidler *et al.*, Ref. 11, p. 455.
206. Sjøvold, Ref. 98.
207. Seidler *et al.*, Ref. 1, pp. 455–457.
This particular characteristic is apparent in separate profile views in the **Science** article; Refer to Figure 2 (p. 456) and Figure 4 (p. 457). The retrognathic profile is expressed in terms of the facial and alveolar angles of the profile — 97° to the Frankfurt Horizontal; Refer to Table 1 (p. 456).
208. Cuozzo, Ref. 150, p. 35.
209. Khor, S., 1994. Personal communication dated March 4, 1994.
Dr Khor, a specialist orthodontist, indicated that a baby's facial skeleton becomes more prognathic as it matures. This is because the neonatal head is well-developed in comparison to the jaws. The jaws will 'catch-up' as the individual matures
210. Cuozzo, Ref. 150, p. 37.
211. Lambert, D., 1987. **The Cambridge Guide to Prehistoric Man**, Cambridge University Press, Cambridge, p. 38.
Impaction in the lower jaw occurs when there is insufficient room between the second permanent molar and the ramus of the jaw to permit complete eruption of the third permanent molar (or wisdom tooth).
212. Seidler *et al.*, Ref. 11, pp. 456, 457
The existence of tremata of various kinds is described as being a frequent occurrence amongst prehistoric populations (p. 457). It would be interesting to establish whether this phenomenon is confined to juveniles and young adults or spread across the entire gamut of adolescence, adulthood and old age.
213. The reader is referred to the photograph of Gurche's craniofacial model of the Ice Man contained on p. 48 of Ref. 12.
214. Warwick and Williams, Ref. 144, p. 1235.
215. Spindler, Ref. 24, p. 181.
The presence of a pronounced diastema in a relatively wide dental arcade suggests that extension of the mandibular body is not, as yet, complete.
216. Lemonick, M. D., 1992. The world in 3300 BC. **Time** (Australia), 7(1):56–57.
217. Lemonick, Ref. 216, p. 57, 60.
Lemonick describes Europe as an *'agricultural backwater'* and likens the Ice Man to a prehistoric Daniel Boone confronting Thomas Jefferson at the Second Continental Congress in 1775. He goes on to say:
'That sort of culture clash — mountain man meets high society — would have happened had Iceman ventured to meet his contemporaries on other continents. . . . . By the Iceman's day, much of the world had made the transition from Paleolithic to Neolithic society — from the Old Stone Age to the Late Stone Age . . . Eventually, the Iceman's region and the rest of Europe would catch up with other parts of the world. . . . . But back when he was plodding through the Alpine passes, the concept of the Eurocentric view of civilization would have been laughable, especially to the sophisticated societies that were thriving in Africa and Asia.'
218. Spindler, Ref. 24, p. 254.

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