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Accounting for hominins' fast exit from Africa ("The Out of Africa Event 1") due to widespread wildfires, accidently and inevitably ignited by them, c.a. 1.8 – 1.6 mya

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Abstract

An established hypothesis explaining "The Out of Africa Event1" says that the cold climate or very arid conditions of the Pleistocene Epoch were most probably the driving-force of the H. erectus' migration out of Africa and into Eurasia, 1.8 – 1.6 mya, but a perspective is offered here which blames frequent, lightning-strikes and misusage of fire by hominins as the agents that led to uncontrolled, widespread wildfires. Paleo-winds advanced the hypothetical wildfires according to wind direction, thus intensifying the widespread threat to the chagrin of the hominins. A Pleistocene, temporary, land bridge, enabled some hominins to escape the threat of widespread wildfires by allowing them to cross over from east Africa to Eurasia. One anomaly noted is that either the wildfires or some vast impediment prevented H. erectus from climbing latitudinal lines to north Africa at that time, but that delay to the mid-latitudes may have ended coincidently with Eurasian travel on the eastern coastline of the juxtaposed Red Sea. The sea would have acted as a natural fire-retardant allowing hominins to finally move up to the mid-latitudes. The northbound migration would have also forced tropically-derived hominins to quickly adapt to environmental change and low temperatures while a rationalization is proposed concerning how they may have tackled their newest challenges.

Keywords: mishandling of fire; flight from wildfires; displacement of H. erectus; acclimation of H. erectus; 1.8 – 1.6 mya.

1. Introduction

Reasonable hypotheses in the literature attempting to explain why a species of hominins (H. erectus) initially migrated out of Africa, ca. 1.9 mya (Carotenuto et al., 2016), are at a minimum, and so, the object of this study is to present a novel reason that emphasizes 'widespread mobile wildfires' as the driving force in chasing H. erectus out of the Africa. It is commonly thought that 'The Out of Africa Event 1', inter-continental movement of H. erectus hominins from out of Africa and into Eurasia was accomplished within a relatively fast period of time according to investigators such as Lockwood (2013, p. 73). A popular, literary hypothesis for 'The Out of Africa Event 1' departure by the hominins is generally attributed to paleo-climate change, as affirmed by Lewin and Foley (2004, p. 329) such that very arid conditions or cold, periglacial conditions may have reduced food provenances, in motivating hominins to migrate out of Africa. The paleo-environment of H. erectus hominins at the time between ca. 1.8 – 1.6 mya, was the arid grasslands (deMenocal, 2004) proximal to the equator, proven by hominal, fossilized bones found in east Africa. Agusti and Lordkipanidze (2011) scrutinized and ultimately disproved secondary hypotheses but they also advocated their own hypothesis, whereby similar tools found in both Africa and at a hominal fossil site approx. 40° further, latitudinal north in Eurasia (Dmanisi, Georgia), somehow accounts for H. erectus' flexibility of being able in adapting to low temperatures and environmental changes of the mid-latitudes. Nevertheless, the threat of widespread wildfires in Africa, as an influential factor for the initial flight of hominins from Africa is developed in this study within a perspective versus the primary hypothesis of paleo-climate change.

2. Background

The migration of H. erectus out of Africa includes related hominins who were living at the same time as H. erectus such as H. habilis who existed 1.8 – 1.6 mya in Africa (Vekua et al., 2002; Lordkipanidze et al., 2007). The

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preceding investigators remarked about Dmanisi's (Georgia) earliest resident, H. erectus (from 1.8 mya) possibly radiating from H. habilis-like ancestors who already had abandoned Africa. Both groups of hominins are now popularly classified together within the general H. erectus species (Henderson, 2015) but only and strictly with an association to a specific timeframe of existence (which is 1.8 – 1.6 mya) for the purposes of the present study since H. erectus is generally regarded by many as having a very extended, exorbitant, time range of 1.8 mya – 100 kya. Although the topic of that extremely, lengthy, time range is only a very minor part of this study's thesis, the disposition here is that H. erectus should fall under a timeline of '1.8 mya to indefinitely while before the time of H. sapiens', but only for the sake of not debating against any general consensus that may claim a definitive time interval. Aside from that but even more importantly, the present study focuses only upon H. erectus' reason that forced his successful attempt in initially emigrating from Africa to Eurasia.

A description of H. erectus' paleo-habitat in east Africa (1.8 – 1.6 mya) is given here. As previously mentioned, his main environment was the grassland biome that originated in Africa due to: a certain combination of high temperatures; a barely adequate amount of rainfall; and a particular time-interval of dryness during the dry season that all together virtually prevented tree growth. The grasslands of Africa also typically happen to envelope a scattering of trees and very small areal forests. Above the northern rim of the grasslands, is the arid, Sahara Desert which experienced an extended time-interval of a wet climate during the Pleistocene between 2 – 1.6 mya (Larrasoana et al., 2013). Today, the grassland biome points to another important element in Africa, which is widespread wildfires, compelling authoritative environmentalists to declare Africa as the most fire-prone continent in the world (Bowman et al., 2011; Daniau, et al., 2013). That alone, is one criterion towards the perspective of fire in chasing the hominins out of their home environment and ultimately out of Africa.

The frequent usage of fire by H. erectus (Fig. 1) was for many reasons such as: cooking food; frightening predators away including insects; warmth and light (Ko, 2016). Gowlett (2016) mentions that hominins most probably learned about the useful aspects of fire, when previous lightning-strikes ignited vegetative wildfires. But fires caused by hominins and by lightning are difficult to discern in the geological record (Gowlett, 2016). He considers that hominins employed fire at a rough estimation of 1.8 mya while Bellomo & Kean (1997) and Rowlett (2000) both report the earliest evidence of fire used by African hominins in Kenya, is dated at 1.5 mya based on burnt sediments containing stone tools that were apparently modified by fire. Proof of widespread paleo-fires is a sedimentary layer of charcoal but Scott (2010) ascertains that even though grasslands anywhere are vastly and incessantly scorched during the long term, the yield of macroscopic charcoal in the rock record of the Cenozoic Era is scant at best because it is difficult to recognize in the field.

3. Rationale of the Study's Perspective

The perspective is determined from many established facts, circumstantial evidence, as well as indirect evidence which collectively add up to 'widespread mobile wildfires' that forced H. erectus' emigration from Africa and into Eurasia, and it is itemized here:

3.1. Non-controlled fires accidently ignited by hominins.

We've already established a presupposition of inevitable lighting-strikes igniting fires compounded by hominins who started using fire around 1.8 – 1.6 mya. But an immediate consequence arises from hominal usage of fire, which is the non-control of fire, that was accidently and inevitably ignited by them (Fig. 1). The consequential effects were widespread smoke and the vast reduction of food resources, including animals that were killed and the disintegration of the hominins' edible vegetation. A net result of the hypothetical, widespread wildfires ignited by both lightning and the accidental misuse of fire by H. erectus is simply the impossibility of containing and extinguishing paleo-wildfires, especially during long dry seasons in paleo-Africa.

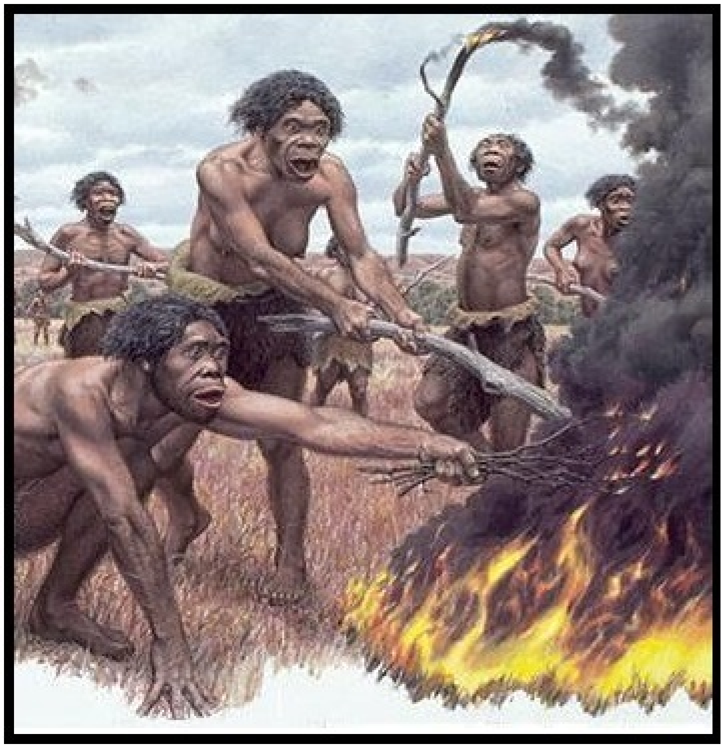

Figure 1 – Artwork depicting H. erectus hominins igniting a bonfire upon the open grasslands and their excitement of it, which implies that this typical paleo-scenario was repeated nearly an infinite amount of times by a hominin and / or his communities. Of course, one can also easily envision how a bonfire could escalate into an uncontrollable wildfire by spreading rapidly and according to wind direction. The artist drew them wearing garb but that actually wasn't the case for H. erectus at the time, 1.8 – 1.6 mya in Africa. Drawing by J. Matternes.

3.2. Modern-day analogy reflecting the potential magnitude of paleo-wildfires.

The realization of widespread wildfires as a reason for the hominins' dispersal out of Africa is supported by comparing it to a modern-day analogy that could reflect the magnitude of hypothetical, African paleo-widespread wildfires. The Black Dragon Fire (Salisbury, 1989) that occurred in both China (Manchuria) and Russia (eastern Siberia) together, in May 1987, was the worse, widespread, wildfire recorded in history, in terms of the amount of seared land surface which was 72,843 km², while it took over a month's time for those wildfires to finally die out, mainly due to the tardy arrival of ample rain. Furthermore, that recent fire was accidently ignited by just one person, which serves as a good example of whenever epitomizing paleo-scenarios of hominins who accidently started nearly an infinite number of widespread wildfires during the advent and post-advent of fire usage in Africa. This is, of course, keeping in mind, the paleo-scenario's conjuncture of widespread wildfires also ignited by lightning.

3.3. Wind as an agent towards the advancement of wildfires.

The perspective of a paleo-inferno in east Africa was powered not only by raging, widespread wildfires but also by associated wind. The force and speed of wind together with the force of fire happen to spread the forward advancement of fire in particular directions. North of the equator, northeasterly trade winds blow toward the southwest, while south of the equator, southeasterly winds blow toward the northwest (Fig. 2). The climate of Africa back then during the Pleistocene Epoch was more or less similar to that of today (Maslin et al., 2014), which implies that the wind regime of Pleistocene Africa may have been more or less similar to today's winds, although climate and wind deviated from that pattern whenever the influential, Pleistocene continental glacier was superimposed over northern Europe. In general, fire is also capable of burning in a backward or upwind direction by simple contact with the adjacent vegetation. Hence, the advancement of widespread wildfires would have been in directions opposite to one another, although its forward direction would have been exponentially faster than in its reverse direction.

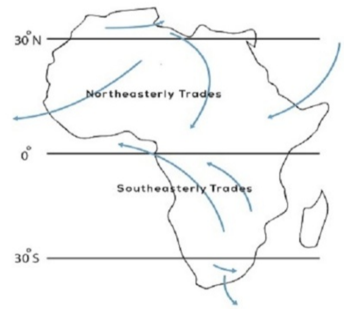

Figure 2 – Map of trade winds and other wind directions over Africa both north and south of the equator.

3.4. Escape route of H. erectus during ca. 1.8 – 1.6 mya.

Africa geo-physically connects to Eurasia where the extreme northeastern end of Egypt borders with the extreme southwestern end of Israel (commonly referred to as the Sinai Peninsula), otherwise known as the 'Northern Dispersal Route (NDR)', which is a possible route traveled by H. erectus when he first entered Eurasia (Carotenuto et al., 2016) (Fig. 3). But a different and more likely dispersal route taken by H. erectus was via the Horn of Africa (in Djibouti, Africa), specifically across the Bab el Mandeb Strait and into Eurasia, even though the strait geo-physically disconnects Africa from Eurasia during the Present, called the Southern Dispersal Route (SDR) (Lahr, 2010, p. 38) (Figs. 3, 4). This had to have been accomplished by H. erectus when eustatic sealevel was lowered during the Pleistocene Epoch, 1.8 – 1.6 mya, because of continental glacial ice accumulation occurring with tectonic fluctuation that created a temporary land bridge linking the Horn of Africa to neighboring Eurasia which is presently the southwestern end of Yemen on the Arabian Peninsula (Haq et al. 1987; Turner, 1999; Lahr, 2010). Petraglia (2003) questioned the validity of a temporary land bridge existing there in the past, but Whalen and Schatte (1997) nullified Petraglia (2003) by citing a coincidental, archaeological site containing hard evidence of both Olduwan and Acheulean cultures located just past the east end of the Bab el Mandeb Strait on the Arabian Peninsula, 25 – 40 km inland.

Figure 3 – Map of general paleo-migrations by H. erectus within Africa and Eurasia, ca. 1.8 – 1.6 mya. The map shows routes (indicated by a starting point ((No. 1)) and a blue-dashed arrow up to points A and C; red-dashed arrow up to point B) taken by hominins once they exited Africa and entered Eurasia. The migration within Eurasia also includes an optional route taken by hominins in a direction towards the Far East (blue-dashed line), which either further diverged towards the far north in China (point C), or towards the south within the land area of the Pacific Ocean (purple-dashed arrows). The map also shows an alternate, northerly route (No. 2 and a yellow-dashed arrow) taken by hominins while within east Africa which was favored by other investigators and is known as the NDR (see text). A detailed look at H. erectus' journey up north once he was in Eurasia is shown in Figure 4. No. 1 = somewhere in east Africa; No. 2 = somewhere in east Africa. Point A = Ubeidiya, Israel; point B = Dmanisi, Georgia; point C = Majuangou, north China. Based on Lahr (2010); Korisettar (2016); and Zhu et al. (2004).

Figure 4 – Close-up view of the Middle East route taken by H. erectus hominins (1.8 – 1.6 mya) after migrating over the Bab el Mandeb-land bridge at a time of lower sealevel during the Pleistocene Epoch, followed by their northward migration along the western coastline of the Arabian Peninsula, and then up to Ubeidiya, Israel, and further northward to Dmanisi, Georgia. The optional route where hominins elected to take when they were within the southern part of Eurasia is not shown in this figure but is shown in Figure 3.

Henceforth, the SDR is embraced in this study which also points to once H. erectus hominins were inside Eurasia, travel by them was to the north while hugging the extreme western side of the Arabian Peninsula's coastline, leading to further migration up to Ubeidiya, Israel, followed by relocating much farther north to Dmanisi, Georgia (Lahr, 2010, fig. 3.10) (Fig. 4). This was besides one other optional route chosen by other H. erectus hominins once they were on the Arabian Peninsula who headed towards the Far East, ca. 1.8 – 1.6 mya (Korisettar, 2016) (Fig. 3).

When hominins emigrated through the SDR during hypothetical, widespread wildfires burning in east Africa, their paleo-route up north on the western Arabian Peninsula was protected from those fires by the enormity of the juxtaposed, NW-SE oriented, Red Sea (Figs. 3 and 4) which is 2,250 km long with an average width of 280 km. Specifically, it would have acted as either a natural shield or retardant to any easterly-spreading wildfires in east Africa (due to slow, reverse-directional advancement of wildfires) that happened to progress up to the west side of the Red Sea. That particular, geo-physical barrier to fire, was most likely the springboard for hominins to initially gravitate towards the north at anytime during their existence within the 1.8 – 1.6 mya timeframe. Corroborating this, is the concentration of H. erectus archaeological sites in east Africa which bunch together in a slightly, curving, imaginary line leading up to near Djibouti, Africa where the Bab el Mandeb Strait connects to it (Fig. 5), collectively pointing to the juncture of the SDR. There are no remains of H. erectus found far north from the Horn of Africa which is within

Figure 5 – The presence of many H. erectus' archaeological sites in east Africa proving the existence of hominins within the Horn of Africa, not very far from the Bab el Mandeb Strait while other sites prove their existence near or adjacent to the Horn of Africa. Granted, some of those sites are younger than the study's ca. 1.8 – 1.6 mya timeframe, but nevertheless, it's a good indication of H. erectus preferring east Africa near the equator as their living zone since no other fossilized remains of H. erectus are found anywhere else outside of that zone within Africa. This geographic constraint combined with the inevitable widespread paleo-fires most likely influenced hominins quickly (relatively in time) funneling or bottlenecking themselves through a narrow corridor such as the Bab el Mandeb Strait during the time of Pleistocene lower sea level, while literally three quarters of the remaining space within the continent of Africa was supposedly waiting to accommodate H. erectus. This also argues against the NDR as a possible route. The ages of the archaeological sites on this map are as follows: Koobi Fora, Kenya, 1.8 – 1.4 MYBP; Nariokotome, Kenya, 1.6 – 1.5 MYBP; Konso, Ethiopia, ca. 1.4 MYBP; Daka, Ethiopia, ca. 1 MYBP; Buia, Eritrea, ca. 1MYBP; Olduvai Gorge, Tanzania, 1.2 MYBP – 700 KYBP. Based on Lockwood (2013).

east Africa. Thus, the present study follows Lahr (2010, p. 42 – 43) who negates an early Pleistocene, northerly, migrational route from the Horn of Africa up to the NDR based on no H. erectus bones found along that route nor anywhere within northeastern Africa including any eco-regions of the Sahara Desert during its wet, climatic paleo-phase between 2 – 1.6 mya (Larrasoana et al., 2013). Plus, the oldest artifacts (i.e., tools) ever found in north Africa were dated from only 1 mya, as reported by Raynal et al. (2001) and concurred by Lahr (2010). Those reasons leave this study to favor and focus mostly on H. erectus' entrance into the extreme southwestern end of the Arabian Peninsula and then blazing a trail up its western coastline in the north direction.

Circumstantial evidence serving as additional support for the above, would be a particular pattern of the spatial habitat occupied by pre-H. erectus hominins and H. erectus of Africa. The earliest of them, which were australopithecines or the "apelike, bipedal hominins", are found in east Africa, south Africa and central Africa (country of Chad) (Lewin and Foley, 2004, p. 282). After them, is the rise of the genus "Homo", namely H. habilis and H. rudolphensis who were contemporaneous with each other while they occupied only east Africa and south Africa (Lewin and Foley, 2004, p. 292). The early "Homo" are then immediately followed by late "Homo", or H. erectus, and as previously discussed, they only occupied east Africa (Lewin and Foley, p. 336). Obviously, during progressive time within the preceding chain of evolution, one would easily expect an expansion of H. erectus into most parts of continental Africa (such as east, south, west, central and north Africa), since their ancestors were well-distributed on the African continent, but instead, we only see a contraction or shrinkage of the geographic, living zones of H. erectus, confined only to east Africa, ca. 1.8 – 1.6 mya. We may blame an environmental reason for that, namely, widespread paleo-wildfires mobilized by wind while not pointing to a factor such as climate. For the sake of argument, if there were any hypothetical, H. erectus hominins living in south Africa, then one can envison the forward advancement of hypothetical fires forcing them to move to east Africa when correlating this with the southeasterly trade wind direction (Fig. 2). Likewise, any hypothetical, H. erectus hominins living in central Africa would be forced to move to east Africa because of northeasterly trade winds advancing, hypothetical fires (Fig. 2). In both of the preceding, two cases, the interpretation is, that the remaining amount of H. erectus hominins surviving in east Africa were paleo-positioned behind the advancing fires while they only had to worry about the very slow, backward progress of paleo-fires which was previously discussed (superimpose Figure 2 over Figure 5). The study considers that particular area of east Africa as a "pocket" of temporary safe refuge (refugium) since those H. erectus hominins were "behind" the hypothetical, forward advancing, paleo-fires mobilized by wind. Thus, the previously-mentioned "fast exit" of the hominins from Africa (1.8 – 1.6 mya) was most probably triggered by a very abrupt or "fast" environmental condition such as the widespread, mobilized wildfires because an immediate disintegration of the hominins' edible vegetative food would have prompted constant emergency conditions that forced an urgent hominal escape from it. It becomes clear that the "fast exit" from Africa by hominins was not caused by climate such as a gradual increase in aridity because then only a corresponding, gradual exit by the hominins from Africa would have been induced.

4. Adaptation to Low Paleo-Temperatures and a Different Paleo-Environment.

Relevant to the study's theory, is the circumstance of "going from out of the fire and into the frying pan" which is a twist of an old European expression being used here whenever movement goes from a hellish situation to a less harsh but still bad situation, such as the different, general, paleo-temperatures and paleo-enviroments confronted by H. erectus during his transition from Africa to Eurasia, 1.8 – 1.6 mya. This not only complements the study's theme but also provides insight into specific, new challenges presented to tropically-derived H. erectus hominins during their migration to the mid-latitudes. African H. erectus' fossilized remains were found proximal to the equator (Fig. 5) while the fossilized remains of Dmanisi's H. erectus (dated at 1.8 mya) were found at the 41° N parallel in Eurasia (Figs. 3 and 4), which simply indicate a very substantial and magnanimous, nomadic climb up north by tropically-derived, hominins. The extremely, large latitudinal difference promulgates the fact of low temperatures and environmental change, since the sun's radiation of the earth always and swiftly diminishes at latitudes above 30° (Jury & Horton, 2004). That change was the transition of grasslands to woodlands (Gabuina et al., 2001; Belmaker, 2010). Belmaker (2010) also designated a woodlands paleo-environment for the hominal, archaeological site in Ubeidiya, Israel (dated at 1.6 mya) at the 32.6° N parallel. The existence of paleo-woodlands there would also indicate that the hypothetical wildfires may not have stretched far into nor surpassed the northernmost point of east Africa, evidenced by whenever grasslands are protected from fire, they usually convert into woodlands (Keeley & Rundel, 2005).

Warmth was needed by tropically-derived H. erectus hominins when migrating to mid-latitudinal locations such as Ubeidiya (32.6° N) and especially Dmanisi (41° N), 1.8 – 1.6 mya, but evidence of any form of clothing was never archaeologically detected for them (Neanderthal Man was the first to wear clothing). This signifies that small, controlled, campfires were most probably used for warmth in combination with cave-dwelling while the retainment and the growth of more body hair over time, also figure into that equation. This is even whenever any journeys up to the far north experienced a limited time-window of interglacial conditions (Leroy et al., 2011) which still would have seen low temperatures, although not as low as when it was under full glacial conditions. Yet, Dennell (2012) claims that hominins such as H. erectus of Dmanisi, did not have to endure cold temperatures because he assumed that they only settled into their mid-latitude environment (at latitude 41° N) during the summer months followed by their evacuation from Dmanisi when cold temperatures arrived. However, his assumption is unconvincing because he didn't take into account of what the estimated temperatures were like in the last and first one-third leg of H. erectus' journey when they entered and exited Dmanisi, respectively. In other words, there would have been some specific time interval during the linking of the last leg of travel to Dmanisi and their settlement in Dmanisi, along with the first leg of their return trip to the south, that would not have seen the summer months since summer months generally range from May to September. This credible perception was calculated by determining what the temperatures were like when tropically-derived hominins migrated through different temperature zones during their journey in a direction either to or from Dmanisi. Starting from the northernmost point of travel, the coldest temperature at Dmanisi would have reached 5° C (Dennell, 2012) while generally south of that, cold temperatures still dominated according to the Koppen-Geiger climate classification (Peel et al., 2007). Specifically, the latter authors characterized the climate zone almost immediately south of Dmanisi as an arid, cold steppe zone (Bsk) located presently in east Turkey bordering with the northwestern edge of Iran. The aspect of aridity in that steppe environment would have still been conducive to living by tropically-derived hominins since they originated from the arid grasslands of east Africa (deMenocal, 2004) [4]. Directly south of that, is a cold-temperature zone with a dry and hot summer (Dsa), within present-day Iran (Peel et al., 2007). Those authors then identified, directly south of that, the beginning of the Temperate Zone which has dry and hot summers (Csa), located between present-day north Iraq and west Iran at the 37° N parallel. The northern edge of this last zone is considered here as the margin between the preceding cold zone of the above and a less harsh, temperature zone while this Csa zone may have or may not have been agreeable or hospitable to the tropically-derived hominins. In addition here, we must also factor in any escalatory, cold temperatures experienced by them which always occur with increased elevation or altitude, whenever hominins crossed highly-elevated, topographic, montane barriers.

In an attempt to simply illustrate the above, we may assign numerical values within a theorem that resonate with some degree of accuracy. A sum of approximately 444 km would have been traveled by hominins between Dmanisi (at the 41° N parallel) and the 37° N parallel (the northern edge of the Temperate Zone) whether journeying to or from Dmanisi. From that, we may estimate the total amount of days spent in nomadic, forward-motion, migration. Within reason, it is suggested here that it would have taken roughly, 222 days or > 7 months to cover the distance of 444 km at a rate of speed, let's say, averaging 2 km/day of hominal, nomadic, forward-motion walking when either trekking to or trekking away from Dmanisi. That rate of speed entailing the nomadic daily travel is computed by factoring in occurrences that inevitably happened, such as: stoppages made for rest or while foraging for food/water; slowdowns resulting from climbing over high topographical relief and crossing bodies of water (i.e., swamplands); slowdowns also occurring when eluding carnivores; and punctuated, forward-motion progress from whenever walking in a general zig-zag pattern for whatever reason (i.e., evading general obstacles, etc.). We should also take into consideration any further, inevitable lags such as whenever a hominal individual/family/tribe settled into a specific, comfortable (convenient) setting or lodging for over a day's or week's time at any physical, geographic point during their trek to/from Dmanisi. Thus, the net result is, that an approximate constant of > 7 months of cold temperatures was experienced by H. erectus hominins either during the last leg of the journey to Damanisi, Georgia, or the first leg of the journey heading away from there.

In order for H. erectus to protect himself against the encounter of low temperatures and environmental change, he had the herculean task of enduring and adapting to those adverse conditions that were forced upon him. Physiological adaptation by a group of hominins means, in the sense, that consequently there would have been a high number of casualties within the group during the short term, while only the strongest (i.e., possessing a very good immune system) and smartest or wisest (i.e., by being adroit) survived. An example of when only the shrewdest hominins were most likely to survive, is when we justifiably speculate about how hominins may have managed fluctuating cold temperatures. When Dmanisi's coldest temperature would have reached 5° C (Dennell, 2012), the combination of a thick layer of body hair and daytime, physical activity would have self-generated sustainable body heat. But since caves were only intermittently available to H. erectus during his leg of the 444 km journey to and/or from Dmanisi, then cold nights may have seen only adept H. erectus hominins improvising a homemade sleeping bag by scooping out a shallow pit within dry, vegetated soil, and then piling and hand-compacting the loosened soil upon themselves, horizontally from toe to neck, for the sake of keeping warm during sleep. This is because a vegetative cover acts as an insulator, reducing heat loss from the soil that earlier absorbed and gained heat from the sun during daytime (Jury & Horton, 2004). While asleep, any bothersome insects within the soil would have been buffered by the hominins' veneer of thick, body hair. A nearby lake or stream would have provided wash of the soil from off the body when awake. Further insight into relationships to the soil by nomadic hominins may include: storage of unspoiled food by burial and subsequent refrigeration within 'cold soil' or soil lacking a vegetative cover (such as soil always in the shade) while the food is wrapped in a big, fresh leaf (or leaves) to prevent moisture absorption from any groundwater infiltration; and a self-plastering of mud upon their naked bodies for the sake of camouflaging or masking their human scent to evade carnivores (Sorensen, no date).

Thus, it is realized that H. erectus survivors undoubtably struggled against nature's elements during forced, physiological adaptation. This parallels Palmer's (2010) assertion that hominins at that time had a low tolerance to adverse conditions, but at the same time, it is still counter to Dennell's (2012) assumption, as previously discussed.

Lastly, since the low latitude (13° N) of the extreme southwestern corner of the Arabian Peninsula was the first point of migration after H. erectus hominins left Africa, it was also the pivotal point of where they made the choice of either: traveling up north (as previously discussed); or traveling somewhat within more or less the same low lines of latitudes towards the Far East (Fig. 3). The latter route did however, eventually split up (Fig.3), since evidence of H. erectus' handiwork was found far up north at the 40° N parallel in Majuangou, north China, in the form of stone tools and modified animal bone, dated from 1.66 mya (Zhu et al., 2004). A possibility was raised by Ao et al. (2013) claiming that these hominins initially arrived in Majuangou, north China by originally and laterally migrating from faraway Dmanisi, Georgia, 1.7 – 1.6 mya, based on the similarity of their lines of latitude. However, the claim by Ao et al. (2013) is dubious because they contradicted themselves by adopting Dennell's (2012) assumption as a reason why H. erectus hominins vacated their far northern settlement of Majuangou. This would imply that their hypothetical, very long, lateral paleo-journey directly from the west in Dmanisi to the east in Majuangou, was repeatedly detoured whenever cold temperatures correspondingly forced H. erectus hominins to divert deeply to the south, which precluded them from repeatedly returning to the 40° N parallel for the sake of resuming their migration towards Majuangou.

5. Future Research

It is worth mentioning here for the purposes of future research, that the very same reason for the hominins' 'Out of Africa Event 1' may be also further extended to the lineages of African H. erectus hominins that are much younger than the timeframe of 1.8 – 1.6 mya, a theme which is outside the scope of the present study

Almost just as interesting as the above, is a thought-provoking, ironic, twist of fate concerning a facet of the theme in this study, which may be elaborated upon in potential, future research. Fires are deliberately set upon the African grasslands by mankind today under a controlled setting (called biomass burning) for the sake of: grassland replenishment; for halting the spread of bush vegetation; and for controlling the path of an existing wildfire, by destroying its fuel (vegetation) before that fire approaches it (termed as 'backfire'). These same controlled fires have been a practice of mankind dating back 300 kya (Archibald et al., 2012) which raises a question: does a correlation exist in an odd way, between the accidental misusage of fire upon the grasslands by H. erectus of 1.8 – 1.6 mya, and the deliberate practice of burning up the grasslands by both H. erectus of 300 kya and H. sapiens? In other words, was this mother nature's way of both those human species 'inheriting' a process of grassland burning in Africa, that was originally, constantly and accidently ignited by Africa's H. erectus from 1.8 – 1.6 mya? Or perhaps, the coincidences are only a natural outgrowth of persistent, fire ignition upon the grasslands by lightning when it ruled Africa, even before the rise of Early Man.

6. Conclusions and Summary

The advent and positive effects of fire-usage by H. erectus hominins are well established in the literature, while the negative or consequential effects of it were never reported by authorities. Thus, this study takes the opportunity to present a novel theory or perspective concerning the reason for H. erectus' forced, displacement from Africa and their concomitant entrance into Eurasia, commenced by the accidental misusage of fire, leading to the threat of mobilized, widespread wildfires associated with winds. The migrational direction favored by this study regarding H. erectus, during ca. 1.8 – 1.6 mya while at a time of sealevel lowering, was through the Horn of Africa (which is at present, Djibouti) and into the Arabian Peninsula (the southwestern end of Yemen) where they then traveled north along its western coastline up to Ubeidya, Israel, followed by relocating further north to Dmanisi, Georgia. This was besides the optional route taken by other H. erectus hominins which was towards the Far East. The challenges facing tropically-derived, H. erectus hominins at that time were titanic, not only because of the hypothetical, widespread wildfires in Africa but also because they endured a forced adaptation to low temperatures and environmental change during their migration north up to the 41° N parallel. A secondary but exciting conclusion generated by the study, is H. erectus possibly utilizing the soil in different ways to his advantage for many reasons such as: when he hypothetically dug a shallow pit in dry, vegetated soil ('warm soil'), and then refilling the pit while he lied in it, for the sake of creating a natural sleeping bag, which allowed him to cope with cold nights of the mid-latitudes in Eurasia.

The study is correct in verbally amplifying while not dramatizing a case for the grim paleo-situation in Africa but only because it is justified to portray it in this light. The central perspective doesn't replace the popular paleo-climate hypothesis, but instead, provides an alternative comprehension and original interpretation about the past events in Africa related to the theme of the present study.

We may now summarize the main points made by this study in order to justify its perspective:

(a). The past discovery of an archaeological site showing evidence of H. erectus' usage of fire, 1.5 mya, which was very coincidental with his first exit out of Africa, 1.8 – 1.6 mya, especially since other investigators theorize that the first actual usage of fire was more likely 1.8 mya. That correlates to H. erectus' accidental, inevitable misusage of fire combined with the ignition of fires by lightning-strikes in causing paleo-widespread, wildfires that pushed H. erectus out of Africa.

(b). The archaeological sites of H. erectus' fossilized remains are aligned in a slightly curving, south to north line in east Africa, adjacent to the Bab el Mandeb Strait's temporary, land bridge during the Pleistocene Epoch which is coincidental with H. erectus' point of escape when he fled from the hypothetical, widespread wildfires of east Africa, followed by his initial entrance into Eurasia.

(c). Modern-day, widespread wildfires that occurred in 1987 within Russia and China, which charred > 72,000 km² of land area while raging on for over one month's time, is compared here to the study's advocation of paleo-widespread wildfires in Africa. That serves as a small glimpse into the time of paleo-Africa because the 1987 widespread wildfire was most probably only a microcosm of paleo-Africa's wildfire regime, especially during droughts and long dry seasons in Africa, ca. 1.8 – 1.6 mya.

(d). The absence of H. erectus fossils above central Africa within north Africa bracketed by the study's timeframe, reflects some sort of generalized impediment to equatorial H. erectus that prevented him from moving to the northern part of Africa. This happens to be coincidental with the underestimated, geographically NW-SE, oriented, Red Sea acting as a fire-retardant to the hypothetical widespread wildfires of east Africa that caused hominal evacuation from the continent of Africa, which then allowed them to finally migrate safely north, eventually routing them up to, at least, Ubeidiya, Israel at the 32.6° N parallel.

(e). The abstruse, relatively quick exit of H. erectus hominins from Africa is now comprehended when we blame widespread, mobilized paleo-wildfires as the agent in quickly destroying natural resources such as their food which forced their urgent escape from a fiery, paleo-Africa. This is in contrast to a gradual, climatic condition such as increased aridity that would have only caused a corresponding gradual exit by the hominins, which was not the case.

(f). The characterization of Africa as being the 'most fire-prone country', is also taken into consideration here.

(g). Spatial paleo-wildfires within any given timeframe of world history, is ultimately proven by correlating them to a sedimentary layer of charcoal but because macroscopic charcoal is practically almost impossible to identify in the Cenozoic rock record (Scott, 2010), then we must rely on other collective proof such as the established facts of the literature, circumstantial evidence, and indirect evidence to help us suspect and conclude that the threat of widespread, paleo-wildfires was a feasible, motivating factor in forcing particular paleo-migrations by H. erectus hominins, ca. 1.8 – 1.6 mya.

(h.) Supplementing the thesis of the study, is an inclusion of relevant information identifying the inevitable challenges encountered by tropically-derived hominins after their evacuation of Africa when they were in the process of relocating to the mid-latitudes such as Dmanisi, Georgia at 41° N, ca. 1.8 – 1.6 mya. They reluctantly and ingeniously had to adapt to adverse temperatures and different environmental conditions because their only option was to either experience and overcome their new and unfamiliar plight, or else, face a repulsive 'Africa on fire'.

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