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WHAT BIOETHICS QUESTIONS DOES THE RISING LEVEL OF ATMOSPHERIC  
CARBON DIOXIDE POSE FOR HUMAN CIVILIZATION?

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Abstract. William H. Calvin has developed a thesis that the ice-age cycles of the last 2.5 million years have acted as a pump to favor the genetic mutations in homo erectus coded for the development of larger brains leading to homo sapiens and the cromagnon man. The last glacial period ended 10,800 years ago. Six thousand years ago a sociological change took place which eliminated half the high IQ people from the decision making processes of humankind, namely the women who were reduced to becoming property of the men. Estimated curves of the relative influence of men and women on laws, customs, and mythology are drawn for the last 13,000 years. At about 4000 BC female gods were replaced by male gods and partnership decision processes were replaced by male patriarchal decision systems. Using a quasi-completeness theorem, we ask whether the Calvin theory is complete enough to describe human pre-history. The answer is no, there must be a complementary process of environmental stress cycles in Africa over the same 2.5 million years in synchronism with the glacial cycles. It appears that the Black Peoples of Africa searched for their own individuals with high IQ's to promote them to be philosophers to invent humanitarian technologies to survive severe drought. Humankind has choices to make as to whether to maintain the past form of glacial and environmental cycles, set a new climate equilibrium point, or let things drift into an unexplored hotter world. Can the centers studying bioethics help us decide which of the three paths to follow?

Keywords Carbon-Dioxide Climate Glaciation Intelligence Partnership  
Patriarchy Women Quasi-Completeness (Exploratory Research)

The Last Ice-Age Cycle

The full hierarchy of glacial eras, glacial epochs and ice-age cycles has been described at the 1990 ISSS annual meeting [21]. The present interglacial warm period that we are currently in can be seen in Fig. 1 [11] from 10,800 to 0 years before the present (BP). The previous interglacial can be identified from 133,000 to 123,000 years BP. Note that the atmospheric carbon dioxide concentration and the temperature stay close together in the variation with time. Hamaker, an engineer, working independently from the climatologists proposed a theory that the carbon dioxide concentration drives the ice-age cycles in the present ice epoch [7].

Current Climate Changes

The most spectacular feature of current climate change is the exponentially rising concentration of carbon dioxide in the atmosphere [1]. This is shown in Fig. 2. Data on the other greenhouse gases are contained in the OTA Report [4]. The present climate is becoming more

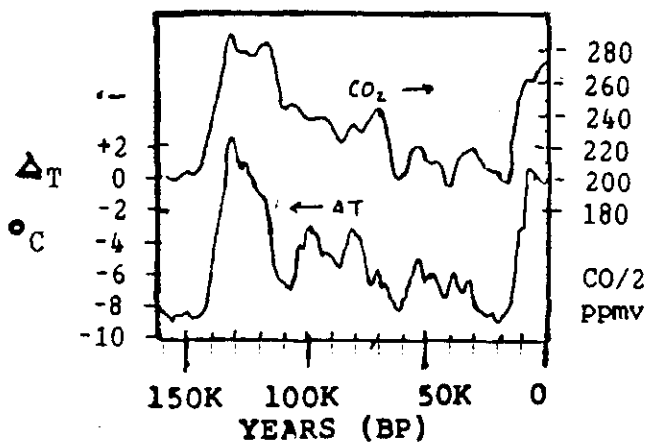


Fig. 1. Smoothed Vostok Antarctic Ice-Core Determination of Temperature and CO<sub>2</sub> Concentration for last 160,000 years. (Vostok) [11]

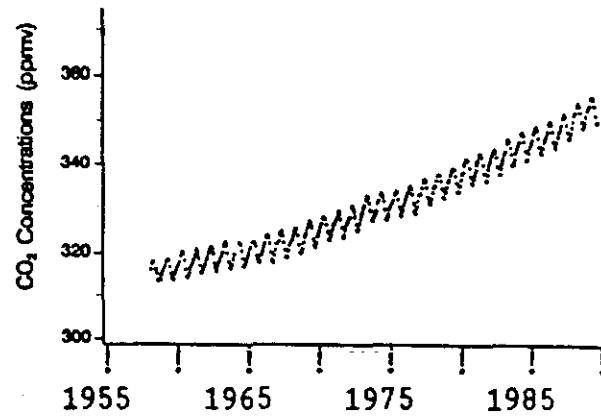


Fig. 2. Atmospheric Carbon Dioxide Concentrations for 1957 to 1988 by month. (Mauna Loa) [1]

extreme. The yearly average temperature is the highest in a hundred years. In many parts of the earth, both the maximum and minimum temperatures have recently set 100-year records. In the past twenty years the annual mean temperature of the northern region is oscillating widely about the five-year running mean. The climate change problem is being researched by the International Geosphere-Biosphere Project [9] and has been recently evaluated by the Intergovernmental Panel on Climate Change [8]. F. B. Wood, Jr, in researching the data on climate theory estimates the net effect of all the complex feedbacks in the climate system will override the glacial cycle, leading to warming during the next few decades [15,16,17,18]. F. B. Wood, Sr, thinks that the climate system is so complex that there can be non-linear and bistable components in the system that could flip-flop, leading to glaciation. Both agree that it is very urgent to remineralize the Earth [22].

### Ice-Age Cycles and Evolution of Intelligence

#### Events during Human Evolution

David Loye and Riane Eisler have reviewed the possibilities of systems theory and related fields helping develop a better understanding of society and possible social action [12]. William H. Calvin, a neurobiologist at the University of Washington, Seattle, who has maintained close contact with the Quaternary Research Center at the University of Washington, has shown how cooperation between two fields such as geophysics and neurobiology can lead to important advances in understanding [2]. He has developed a theory of why there was such a rapid increase in man's brain size and intelligence during last 2.5 million years. This is illustrated in Fig. 3 and Fig. 4. The hierarchy of ice eras, ice epochs, and ice-age cycles is defined by Fred B. Wood, Sr in a previous paper [21]. At 2.5 million years before present the planet entered the 6-th ice epoch characterized by climate oscillations between glacial periods and interglacial warm periods. We are now in the interglacial warm period of the 23-rd ice-age cycle.

### Glaciation Pumping of Increased Brain Size

The glaciation pumping of increased brain size is illustrated in Fig. 4. Winter-type humans are people adapted to living in the cold regions close to the Northern glaciers. They use their high IQ's to devise ways to survive the winter type weather of the north. The Winter-type include many individuals descended from individuals who experienced mutations for larger brains and hence potentially higher intelligence.

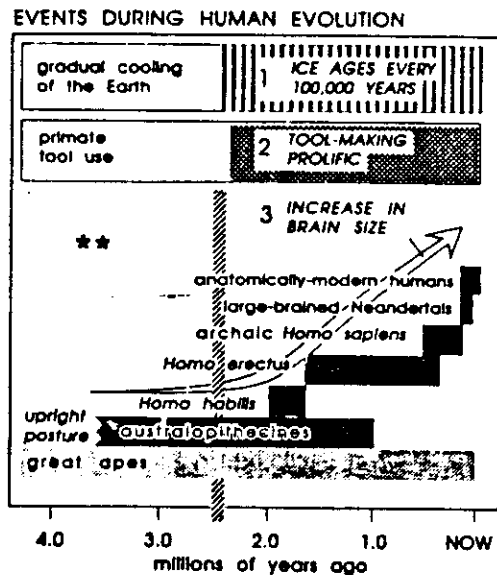


Fig. 3. Events during Human Evolution: Ice Ages; Tool-Making Prolific; and Increase in Brain Size [2]

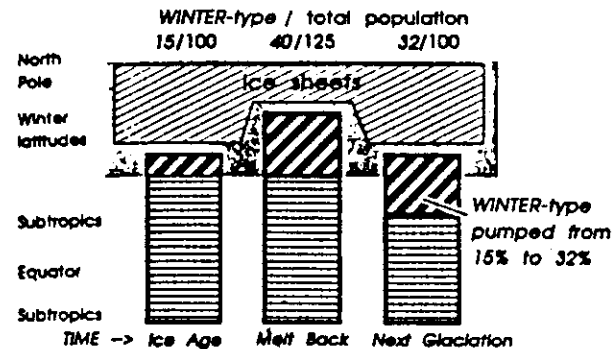


Fig. 4. Illustration of the pumping effect of the cycle of glaciations on increasing the percentage of Winter-type humans (higher IQ) [2]

★★ Though upright posture evolved early, brain size and tool-making only increase when the ice ages start 2.5 million years ago.

When the glaciers melt back exposing a vast unpopulated land area, the Winter-type charge north and repopulate the territory. When next glacial period starts the glaciers advance south pushing the Winter-type to migrate south and to kill off other tribes who get in the way. Through 23 cycles like this in 2.5 million years the brain of the modern humans became four times the size of the great apes of 2.5 million years ago. In parallel with this rapid increase in intelligence there was a prolific development of tools. Now that we have our large brains and high intelligence, let us see what major events happened at earlier stages of the present interglacial warm period.

### Quasi-Completeness Test of Glacial Sociology Theory

Using a quasi-completeness theorem [19], we ask whether the Calvin theory is complete enough to describe human pre-history. The answer is no, a search must be made for a complementary process of environmental stress cycles in Africa over the same 2.5 million years in synchronism with the glacial cycles. A partial search gives clues that the Black Peoples of Africa searched for their own individuals with high IQ's to promote them to be philosophers to invent humanitarian technologies to

survive severe drought and other catastrophes, while the Winter-type tended to kill off the highest IQ individuals as subversive non-conformists. By N. Rashevsky the high invention rate in Europe was due to a high shoreline to area ratio that permitted high IQ individuals to escape to port cities. It is probable that the Black African cultural systems utilized individuals with IQ's as high or higher than the top IQ groups of the northern peoples. The research of Nancy Tanner on inventions made by women also needs to be integrated into these studies. It would be useful to know how many 100,000 year cycles of glaciation it took for the Winter-types to lose their black skin pigment.

### Current Interglacial Warm Period

The last 15,000 years of the temperature variation curve in Fig. 1 is expanded in scale by a factor of 30 to show more details of other related phenomena in Fig. 5. This is a smoothed average temperature variation curve. Curves of Figs. 5, 6, & 7 all have the same time scale and are aligned together on one page for easy comparison.

The estimated ratios between male influence and female influence in mythology, customs, and laws are shown as dashed lines since I don't have any mathematically measurable data on the subject. For these curves in Fig. 6, I am estimating from verbal descriptions in archaeological and anthropological books. Near 4000 BC there was a shift in which all three factors changed to at least 95% male influence. This transition is described by Riane Eisler [5] as the Kurgans sweeping through the villages on horses, killing everyone who continued to worship the goddesses. Eisler accounts for the difference between her analysis and those of Friedrich Engels [6] as due to recalibration of the archaeological time dating with modern radioactive isotope analysis.

This transformation of women from the role of partners to being property of the men has lasted almost 6000 years. In the last century women have regained many rights, but the patriarchal psychology remains very dominant in our culture.

Having developed larger brains with higher intelligence the human race at about 500 BC embarked on a high rate of inventing new tools and making scientific discoveries as shown in Fig. 7. Greece and Rome each made substantial scientific and technological advances, but each in turn became disorganized after a few centuries. Then the Arabs took the lead in science and technology for a few centuries. After a gap of a few centuries Western Europe took the lead.

### Epochs of Force, Power, Communication & Negentropy

The curves of inventions and scientific discoveries show levels of qualitative change at certain points. The first part is in the force era or epoch in which the predominant tool type is force amplifying. The second part is in the power era or epoch in which the main feature of the newest tools are that they are power amplifiers. The third part is called the communication era or epoch since the most prominent

# GLACIATION, INTELLIGENCE & BIOETHICS

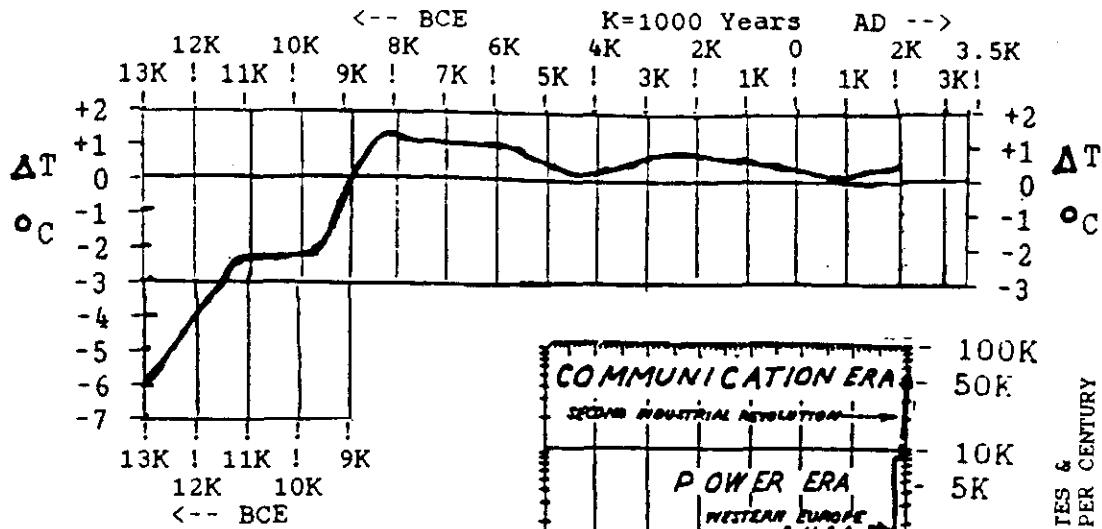
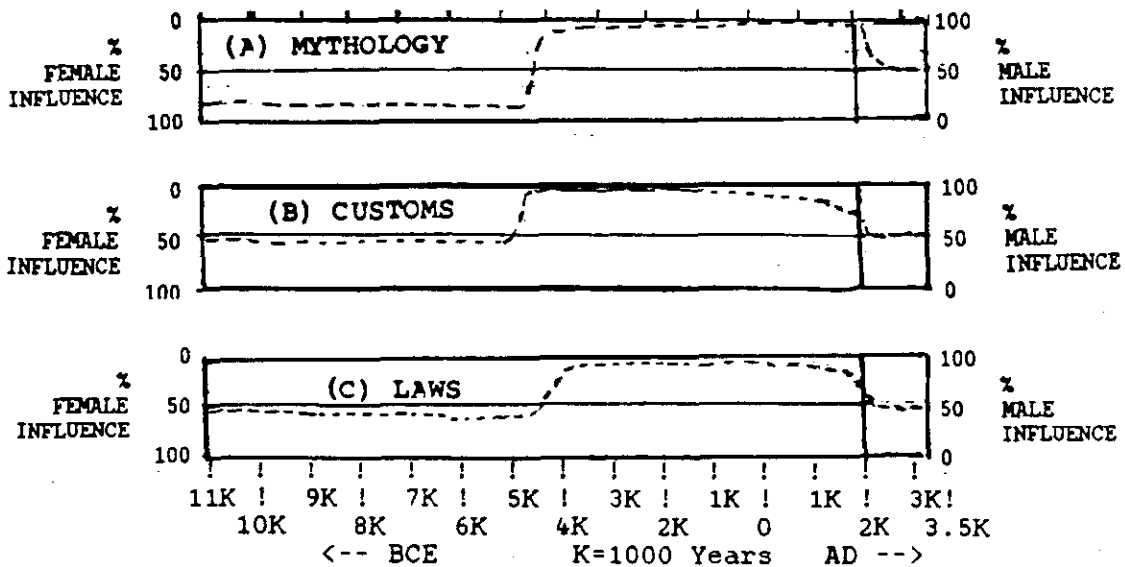
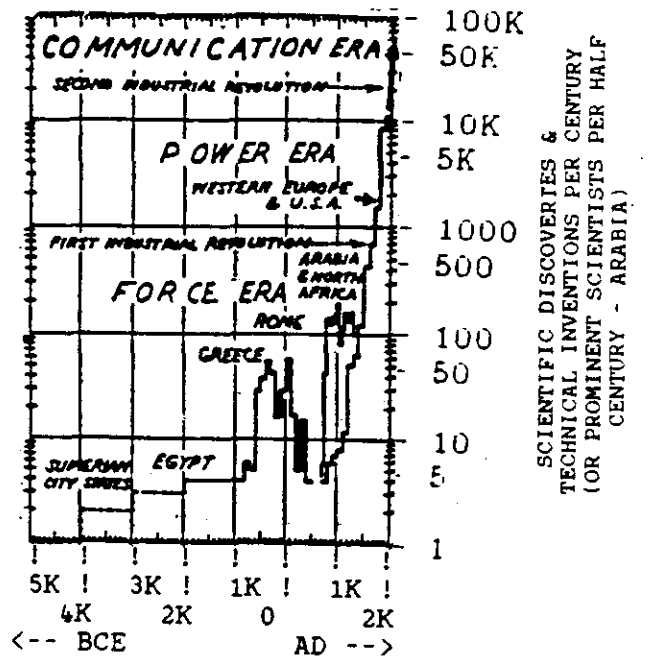


Fig. 5. Change of temperature for current interglacial warm period.

Fig. 7. Logarithmic plot of inventions and scientific discoveries 5000 BC to 2000 AD.

Fig. 6. Distribution of Male and Female Influence in Society for period of 11,000 BC to 2,000 AD. (A) Mythology, (B) Customs, and (C) Laws.



product of this era is the computer as an intelligence amplifier.

Bioethics Questions Summary

The historical issues of bioethics are described in a book by Kiefer [10]. The Hastings Center is currently moving into environmental ethics issues. Peter Checkland's book on systems thinking offers ways that systems analysts could do consulting to social science groups [3]. Peter Senge shows how a simplified version of systems theory can be used to help an organization to become a learning organization [14]. Milbrath's book, Envisioning a Sustainable Society, shows ways to include values in analyses of the future of civilization [13].

The following questions should be reviewed by appropriate bioethics committees, institutes like the Hastings Institute of Briarcliff Manor, NY, The Institute for Policy Studies of Washington, DC, and be reviewed through public study and discussion throughout the world:

1. Is it agreed that the human race should give up on further glaciation pumping for increasing brain size and intelligence, and work to utilize our high intelligence to save the people of the world from the mass starvation that would accompany either the simple greenhouse warming scenario leading to a hotter world or the warming-cooling cycle leading to glaciation?
2. Instead of pushing for further evolution to higher intelligence, should we attempt to utilize the untapped brain power of the women of the world, the workers of the world, the people of the third world and people of the fourth world?
3. Should we replace the natural glaciation function of remineralizing the soil by people-engineered remineralization systems to insure that life will continue on planet Earth?
4. Should we attempt to change the glacial cycle system of the 6-th Ice Epoch to an almost stable equilibrium around 280 ppmv of carbon dioxide?

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