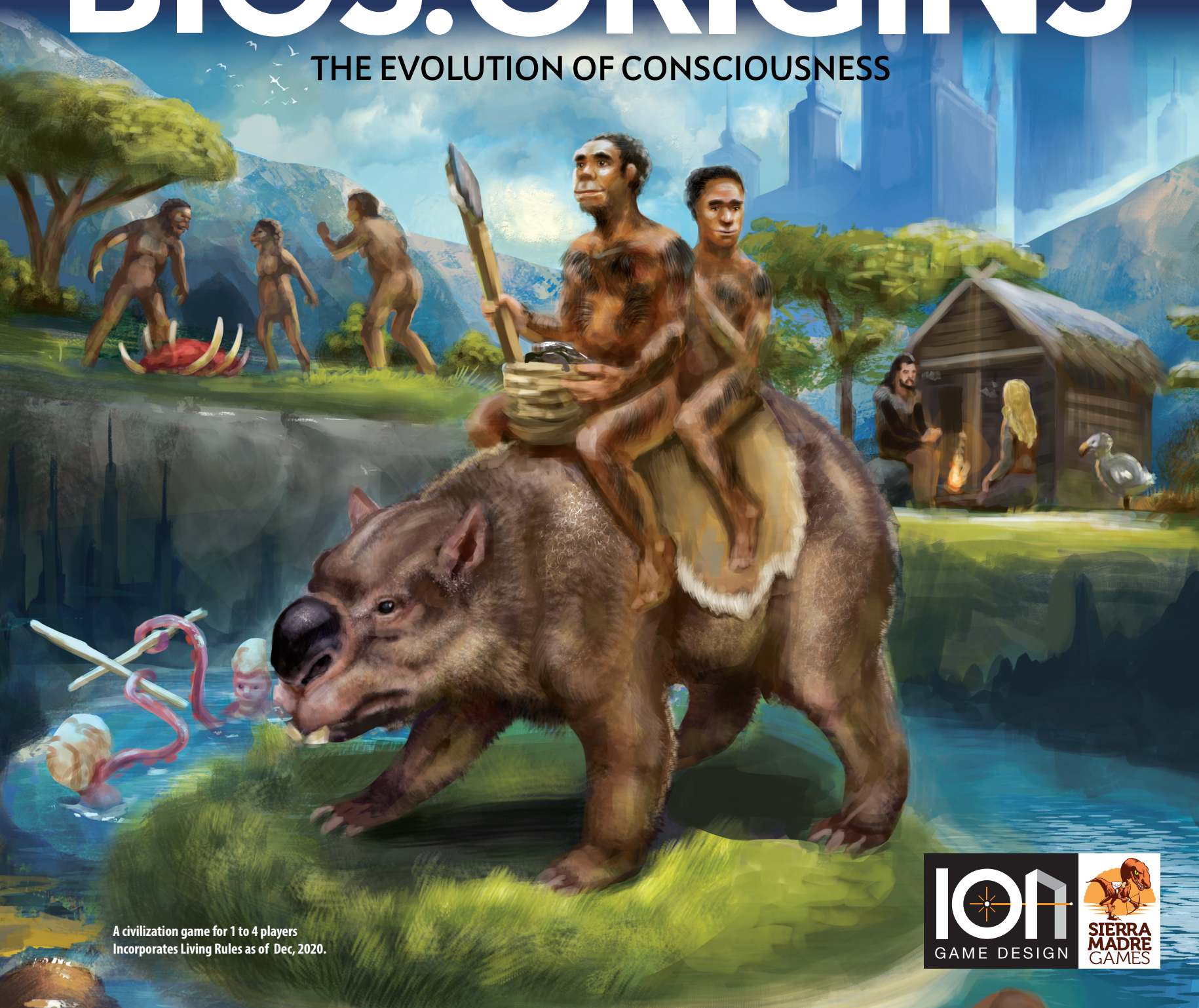


SECOND EDITION

BIO: ORIGINS

THE EVOLUTION OF CONSCIOUSNESS



A civilization game for 1 to 4 players
Incorporates Living Rules as of Dec, 2020.



INTRODUCTION

You are one to four subspecies of predatory apes, traveling through four Epochs of syntactic language development.¹ At first, your calls are merely for external signaling (Epoch I). But then your words become internalized, to organize what you observe, solve problems or to store memories.² Epoch II marks the sudden appearance of art: music, cave paintings, jewelry, figurines, and grave goods. In Epoch III, the origins of consciousness, you are able to reconstruct mental scenes with yourself as an actor: the first fantasies, free will, and sense of time.³ By Epoch IV, you are able to set your own goals for victory, which can be in religious, political, or industrial disciplines.

As you progress through the Epochs, you set foundations and technological milestones for your civilization. If you suffer too much chaos, your core foundations become shutdown by dissidents. If they revolt, either religious, political, or industrial groups become the new ruling class.

VICTORY

At the dawn of each new Epoch, accumulate victory chits according to how well your mysticism (Epoch II), urbanization (Epoch III), or diversity (Epoch IV) compares with those of your opponents'. These chits are added to your final endgame scoring in three categories: cultural (for which environment and mysticism are important), political (for which welfare and cities are important), or industrial (for which economy and diversity are important). You will normally be graded only on your highest score, so if you do well in all three disciplines (cultural, political, and industrial), you will lose to someone who does great in just one. However, a token on the map's philosophy track can, for all players, restrict which disciplines are scorable. So if you manage to change the global philosophy to shutdown your opponent's best score, you may win after all!

THE BIOS: TRILOGY

This edition of *Bios:Origins* is an evolutionary descendant of *Origins*, but reworked to be the third game in a trilogy that starts with *Bios:Genesis* (origins of life on Earth), and continues either with *Bios:Megafauna 2* (life gets big and invades the land) or *Bios:Mesofauna* (life stays small and invades the land). Play *Bios:Origins* either as an independent game or as the concluding part of a trilogy campaign, called *Bios:Earth*, covering the entirety of life on Earth, or even hypothetical histories of life on Mars or Venus (if you played with those variants in *Bios:Megafauna 2* or *Bios:Mesofauna*). You can even extend the trilogy into space by adding a *High Frontier* game (see Part M).

¹ LANGUAGE is a verbal code of visual-auditory signals reducing entities to units that can be arranged in a mental space to indicate possibilities, counterfactuals, or fantasies. Contrary to popular belief, language is primarily a tool of cognition, not communication. Among living species today, only humans have this method of cognition. Language makes possible technology (the science of visualizing a tool and its potential use before it is made), philosophy (the art of making value judgments), culture (the art of recreating reality according to those value judgments), and politics (the science of applying those value judgments in a social setting). The uniquely human capacity for an internal monologue of thoughts is disabled until one learns language. Language is modality-independent, which means that words can be expressed in spoken, sign-language, or written format without loss of meaning. No vocally impaired insect, whale, dolphin or songbird could express its song repertoire equally in visual display, while a child's capacity for language can express itself by signing if it is speech-handicapped.

² IN THE BEGINNING was the word... This game's thesis is that words are the unique survival secret of humans, who alone in the animal kingdom uses them as cognitive units. If Rover comes when called, this is Pavlovian training, not because Rover refers to itself as "Rover" in its thoughts. The first abstractions were words. Human progress can be seen as a series of software upgrades as words supplanted emotions and other instincts. At first (Epoch I) words were only used in human communications: warnings, blusters, lullabies. But in the cultural explosion that heralded Epoch II (Age of Polytheism), words formed the basis of voices and reconstructed visions of cave painters, shamans, and oracles, which influenced human decisions in novel situations. These were the first gods, but early humans could not be said to "believe" in them, since the abstraction "belief" had not yet been discovered. The gods simply were.

³ WHAT MAKES US HUMAN? Previous games in the *Bios*: series explored what we have in common with other life, but this game explores everything that makes us different. Other creatures utilize decision-making modes called emotions, but only we are capable of suppressing them, as in lies, deceit or sycophancy. All other creatures are slaves to the selfish gene, but we have the free will to set other goals and moralities, even those with no or negative Darwinian survival value. No other creature uses fantasies, poetry, music, art, suicide, treachery, metaphors, magic, mysticism, schizophrenia, dice rolling, guilt, earworms, rituals, prayers, celibacy, technology, imagination, tombstones, idols, mummies, temples, or any of the other Ideas or Foundations found in the game. The game's thesis is that all these otherwise inexplicable phenomena are artifacts of the serendipitous way that we acquired consciousness by way of metaphoric words in a syntactic language.

PLAYER ROLES

Bios:Origins is unlike a typical civilization game that sets you into the role of a supreme dictator, whose task is to rule the world by commanding legions of obedient pawns. You are not going to build stadiums if your pawns are bored, or schools if they are ignorant. Instead, you are the pawns, and your goal is to advance your welfare, set your own goals, and suppress any dictator that may arise from your own people.

You start as an emotional, social, promiscuous, and communicative subspecies, but this player role changes with each new Epoch. As interbreeding makes the differences between the various subspecies unimportant,⁴ the players become distinguished by different languages in Epoch II. The interchange of ideas leads to different religions in Epoch III,⁵ and different ideologies in Epoch IV. These roles are integrated in the mechanics of the game, in particular the Ideas and Foundations. The game features two possible timelines: the first wave of *Homo erectus* who migrated out of Africa 2 million years ago, or the second wave of humans who migrated out of Africa around 100,000 years ago.

METARULES

- Terms** being defined are listed in **bold**, or *italicized* if defined elsewhere. Capitalized terms or all caps (e.g. CONSEQUENT) are defined in the glossary. These terms are general ones that appear throughout the process-oriented rules.
- Sequential Processes** are presented in the order listed in the sequence of play, and are introduced by a simple overview followed by specific bullet points.
- Variants**. There is a *merfolk* (entirely marine) variant (**C3**) and a *Yrr* (landfolk versus merfolk) variant (**C4**). Variants for custom maps, marine realms, the advanced game, and the first dispersal long game and more are listed in **C1**.
- Solitaire, Cooperative and Map Alternatives**. Mix and match *solitaire variants* (**C7**), a *Bios:Earth solo campaign* (**C8**), and a *cooperative variant* (**C9**).
- Advanced Game (C1)**. Text with a **blue font** is for the advanced game, which adds *Emissaries* (**B4c**), *dictators* (**E1j**), *NEGOTIATION*, *inventions* (**J2**), *transactions* (trade, preach, war, or enslave, see **J3**), *morality* (**J4**), *Foundation requirements* (**B2a**), *Tableau Idea cards* (**B2b**), *Cull* (**G2b**, **G9f**), *Lore Deck* (**G2d**), *Milankovitch cycles* (**J1**), *MENOPAUSE*, and *elder actions* (exogamy, racism, cold war, artisan, constitution, invent, science, or pseudoscience, see **J5**). These rules can be combined with the other variants.
- The Golden Rule**. If these rules contradict a card, the card text has preference.
- Learning this Game**. See www.ionsmg.com under the "Video" tab for the link to a YouTube video tutorial produced by Heavy Cardboard.

A. SEQUENCE OF PLAY (3 phases per player turn)

On your turn, perform the following 3 phases: *challenge* (**A1**), *activities* (**A2**), and *footprint & restore market* (**A3**).

Easily Missed. You must play all the Epochs (no early game end), and there is no player elimination.

⁴ HUMAN RACIAL DIFFERENCES were pronounced during Epoch I, with subspecies only episodically mobile and locally evolved. However, the second dispersal of *Sapiens* out of Africa met cousins in Eurasia flourishing from the first dispersal, and infrequent interbreeding was possible despite 100,000 years of separation. Such admixtures have made human evolutionary roots multi-regional: Europeans still have Neanderthal genes and Indonesians still have Hobbit genes. *Sapiens* was not the only wanderluster - in 2018 the remains of a 50 kya teenager nicknamed Denny were found to have had a Neanderthal mother and a Denisovan father.

⁵ RELIGION. "...how it was that religion had acquired its hold over human life in the first place. How did an incubus so easily dislodge ever get into the driver's seat, and occupy it unchallenged for so long? A question to be asked, indeed. For Enlightenment critics, there are only two answers to it (broadly speaking) that anyone has ever been able to think of. One is the imposition theory: religion is a racket. The other is the madness theory: that religion is a form of insanity. Of course there have been many variants of these two broad theories. The 19th century, for example, furnished a Marxist variant of the imposition theory, and the 20th a Freudian variant of the madness theory. Unfortunately, all of the known variants of either theory are nearly worthless. The two theories are genuinely at odds with one another: a madman can hardly be a successful racketeer, or even a source of profit for racketeers. The trouble is that each theory is also at odds with most of the facts." —David Stone, "The Oracles and Their Cessation, a Tribute to Julian Jaynes", 1989.

a. First Player. The player with the #1 crown number (C2i) takes the first turn. Then go to the next player clockwise, in round robin fashion, until a player claims the 4th and final Comet in the challenge deck, which ends the game immediately and triggers *final scoring (I)*.

A1. CHALLENGE (PART E).

To begin your turn, either skip this phase and go to **A2**, or choose one of these 3 options:

a. Challenge the Gods? If no Comet is visible on the top of the Challenge deck, reveal the top Challenge Card and apply its event icons to all players, performed left to right (E1). Then *auction (E2)* the Challenge Card as a Foundation. Each player needs at least 1 Elder or 1 Emissary to participate in the auction. The player winning the auction receives the Eureka (an immediate perk) and, if he meets the *tech requirements (E2f)*, places the Foundation into his Tableau.

b. Claim Comet. If a Comet is visible, the challenger claims it without an Auction, performs its steps (E3), and then proceeds directly to his *activities phase (A2)*. The challenger does not need an Elder or Emissary to take the Comet.

c. Globalization (E4). Discard a Bellwether and move the Philosophy 1 or 2 steps.⁶

A2. ACTIVITIES (PARTS F & G).

Choose and perform up to one Action (G1-G4, G6, G7, J3, J5) or *advancement (G9)* visible on each card in the Ruling Class Column of your Tableau. Actions can be on Species, Idea or Foundation cards. You may skip cards, but Actions/advancements must be selected beginning with the bottom card and proceeding to the uppermost in the splayed Column.

a. The Species Placard can't be shutdown, and has two rows. You can perform one Action in each row.

b. Shutdown. A Foundation is shutdown and its Actions can't be used if its Rainbow is Occluded by a Dissident figure (F0b).

A3. FOOTPRINT & RESTORE MARKET (PART H).

To finish your turn, check all your tokens on the map (Migrants and Cities) and choose which ones to destroy if any Hex has more tokens than you have *footprint (H1)*. Migrants or Cities so destroyed create *Chaos (D2)*. Then, if there are any Gaps in the Market, fill them per **H2**. You may also in this phase ask for other players to adjust their cubes in Diversity to accurately reflect the number of unoccluded Rainbows in their Tableau (**H3**).

B - COMPONENTS & ANATOMIES

- **1 Mapboard (double-sided).**
- **2 Sheets Punchouts.** 32 Climate Chits (16 seas/ice, 16 deserts/jungles), 4 Crowns (numbered 1 to 4), 18 Victory Chits (double-sided), 26 Hex Chits.
- **207 cards.** 4 Comets, 84 Challenge Cards, 119 Idea Cards.
- **4 Brain Placards.** 1 each of the 4 player colors.
- **4 Species Placards.** 1 each of the 4 player colors.
- **1 Player Aid - Process Flow**
- **28 Elder/Domain Pawns.** 7 each of 4 player colors. Represents cognitive capacity and Elders.
- **48 Migrant Figures.** Hunter-gatherers if on the map, and Dissidents if in a Tableau.
- **40 City Cuboids.** 10 each of 4 player colors. Represents Cities.
- **29 Cubes.** 7 each of the 4 player colors, plus 1 purple for Philosophy.

⁶ GLOBALIZATION is the world-wide enforcement or persuasion of moral standards on human transactions. This has only been possible since the reign of Charles V of Spain during the Renaissance. The game's system is modeled on the emancipation of the slaves enforced globally by the British Navy in the 19th century (see my game *Pax Emancipation*). However, good ideas, i.e. the ones that appeal to reason and accurately reflect the reality of human nature, are more effectively spread by cultural diffusion rather than force. This is how Enlightenment ideas have become the standard of globalization today.

B1. PLACARDS (8)

Each player starts with 2 Placards of his color: **Brain** and **Species**:

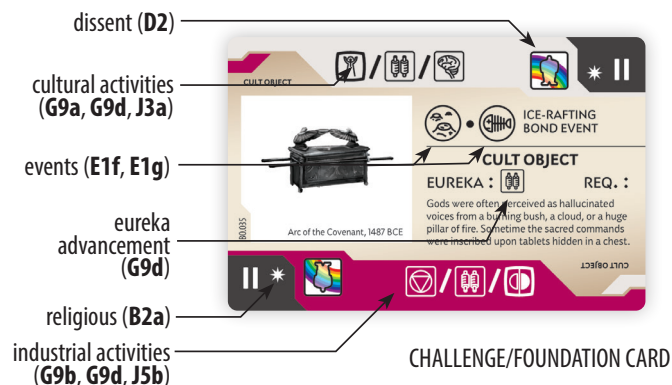
a. Brain Placard. This is divided into 3 domains to store pawns as **emotions, vocabulary, or Free Will.**⁷ As shown, **encephalize, abstraction, expend, artisan, exogamy, specialize, art, and prayer** move pawns between these domains, and to and from either the map's **Mysticism pool (D1d)**, or the Market. See **C2a.**⁸

b. Species Placard. This organizes the three Columns comprising the Tableau of each player. This card is permanent and its Actions can't be shutdown. A crown-shaped chit on a player's Species Placard, called a **Crown**, indicates what his Ruling Class is. The Crown contains a Dissent icon which can hold one Dissident.

B2. CARDS (207)

The 3 types of cards are **Challenge (Foundation), Idea, and Comet**:

a. Challenge Cards. A Challenge Card appears during the challenge phase and can become a Foundation if bid upon.⁹ It is marked in the upper right as to what Epoch it is in (I, II, III, or IV). If the **religious icon (★)** appears here, you can use *mystical bid augmentation (E2b)* to help win this card.¹⁰ Each also contains two events which occur when the card is challenged, and a "Eureka" which is awarded if you win the auction for the card. **If an icon follows the "REQ. :", this is a requirement which must be met to take the card into your Tableau.**



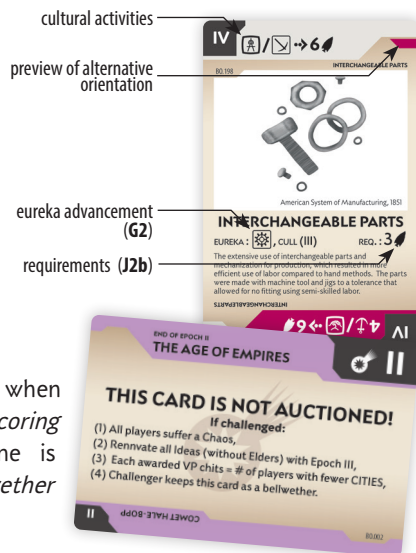
⁷ NON-VERBAL CONSCIOUSNESS, sometimes called reactivity or primary consciousness, is a state of being aware of things in the world as a result of data reduction of sensory input. With sufficient memory and vocabulary, it can become free will. "Primary consciousness is a kind of 'remembered present'...limited to a small memorial interval around a time chunk I call the present. It lacks an explicit notion or a concept of personal self, and it does not afford the ability to model the past or the future as part of a correlated scene. An animal with primary consciousness sees the room the way that a beam of light illuminates it. Only that which is in the beam is explicitly in the remembered present; all else is in darkness. This does not mean that an animal with primary consciousness cannot have long-term memory or act on it. Obviously it can, but it cannot, in general, be aware of that memory or plan an extended future for itself based on that memory...Creatures with primary consciousness, while possessing mental images, have no capacity to view those images from the vantage point of a socially constructed self."—Gerald Edelman, 1994.

⁸ BRAIN PLACARD recognizes three categories of decision-making processes: emotions, vocabulary, and free will. This "Russian Doll" geometry follows what the great primatologist Frans de Waal dismisses as "vener theory": our cognition and a verbally-enabled free will are but a veneer upon our ancient emotional programming. Our free will is enabled by vocabulary since words are proxies for strategic calculations or conscious reflections.

⁹ FOUNDATIONS reflect the founding principles of a culture, which in turn decide what ideas will be conceived, enacted, and accepted. Foundations define who is in power, and those in power are reluctant to face changes which may upset that power. The secret of Western prosperity is often attributed to science and inventions - the game's Ideas. Yet, if this was alone sufficient, what happened to China and the Islamic nations, who led the world in the technology of printing, mathematics, science, and medicine for most of history? Even though gunpowder was a Chinese invention, the Chinese leaders ignored the rapid firearm development in the West. To admit that the outside world was ahead in any way would shake faith in the existing order. The West led the world, not in science and invention, but in political foundations.

¹⁰ ORGANIZED RELIGION with a monotheistic God served to justify a central authority, which in turn possessed the right to collect taxes in return for providing social and security services to the state. The empires of India and Mesopotamia were theocracies, with chiefs, kings and emperors empowered by divine sanction. The personal pantheon of gods that characterized Epoch II were replaced by monotheism in Persia and Canaan, Platonism in Greece, Buddhism and Jainism in India, and Confucianism and Taoism in China.

b. Idea Cards.¹¹ Ideas enter the game via the Market, and if you invent or copycat invent an Idea, you gain its *eureka* advantage (G2b,c). Each Idea added to your Tableau as an Invention (G2, J2, J5g) adds more activity options. Unlike Foundations, which are fairly stable, ideas often get discarded from your Tableau as obsolete.



c. Comets. These four cards are placed into the challenge deck and indicate when the Epoch advances and *comet scoring* (E3d) occurs. After use, each one is awarded to the challenger as a *Bellwether* (E3e).

B3. WORLD MAP

The map is double-sided: the **custom side** features an archipelago and the **classic side** depicts the continents in their present configurations. Both sides have these features:

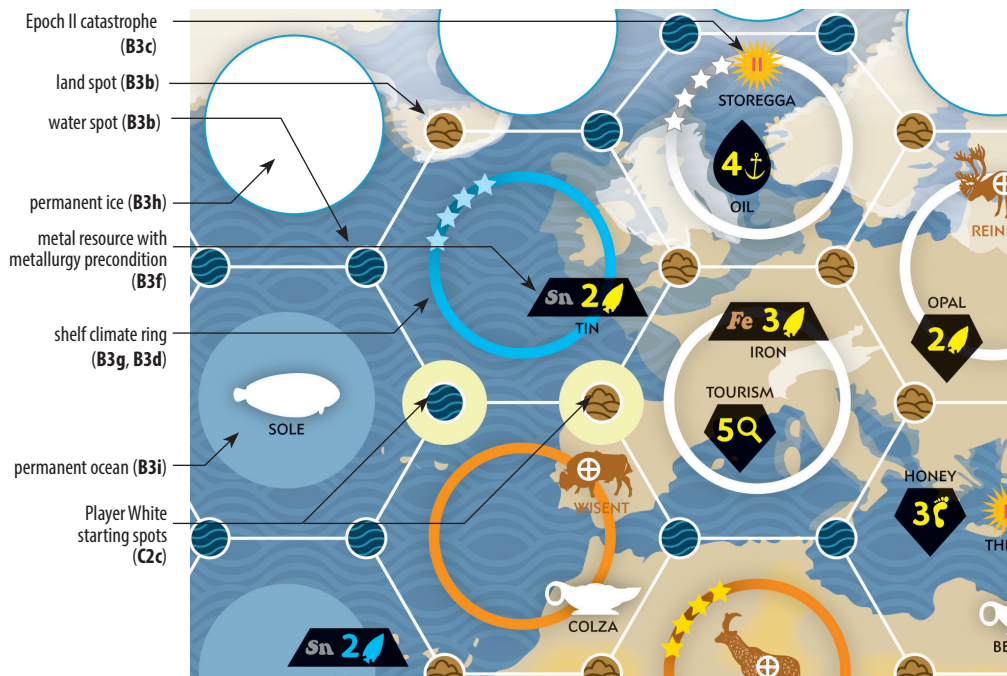
a. Hex. The map is composed of **Hexes** (occasionally truncated to 4 or 5 corners). Each Hex can contain 1 City or 1 climate chit.

b. Spots. Each of the corners of a Hex contain **Spots**, and each can hold 1 Migrant figure. There are 2 kinds of Spots: **land** (light brown) and **water** (wavy blue). Eight Spots have a colored backdrop to show the starting location for each player's Migrants (4 Spots are for the merfolk variant, 4 for the landfolk variant). Landfolk Migrants can cross water spots (with maritime technology) but cannot end their move on them.

c. Catastrophe. Some Hexes contain a 20-pointed yellow star. This indicates a *catastrophe* (E1b). The roman numeral in the center indicates in which Epoch the catastrophe might strike.

d. Climate Rings. A Hex containing a white, blue, orange, or green ring indicates that it can contain an ice, sea, desert, or jungle climate chit, respectively. If there are star icons on the ring, then the Hex may start with a climate chit during C2f.

e. Resources.¹² Each Habitable Hex contains one or two resource icons. If this icon is white, it is a horticulture¹³ or biofuel which can be exploited by a *cultivate action* (G7b). If this icon is brown, it is an animal which can be exploited by a *domesticate action* (G7a). If this icon is black, it is a mineral, luxury, oil, or uranium which can be exploited by a *prospect action* (see next bullet).



Note: Animals with an earth icon are work animals, and with a mars icon are war animals. Some ideas require either a work or a war animal. War animals are further distinguished because they enable *blitzkrieg* (G6c).

f. Tech Requirements for Resources. You can prospect black resources with a *prospect action* (G7c), but only if you meet the tech requirements listed on the luxury, metal, oil, or uranium icon. For instance, you need metallurgy stage 4 before you can prospect middle east oil.

g. Ocean, Shelf, & Continent Hexes. Each Hex is either **permanent ocean**, **shelf**, or **continental**. A permanent ocean hex always contains a blue circle (B3i). A shelf hex always contains a blue ring, indicating that it can contain a sea climate chit if flooded.¹⁴ A **continental hex** is any other Hex, either with a white, orange, or green ring, or with no ring at all.

h. Permanent Ice. Immediately north of the north row of Hexes is a row of white filled circles indicating **permanent ice**.¹⁵ These are not Habitable, and are shown because they can prohibit movement in the far north per G6h.

i. Permanent Ocean. A Hex with a central blue-filled circle is a permanent ocean hex. No landfolk City is allowed in this Hex. A permanent ocean hex, like a permanent ice hex, behaves as if it contained a *climate chit* (B8a).

¹¹ DISCIPLINE refers here to the Basal Societal Unit (BSU), which identifies the fundamental collective that a society acts to promote or preserve. It identifies the individual. If a man fights in an army, is he a soldier of god, a conscripted pawn of the state, or fighting in his own interest? These correspond to the cultural, political, or industrial disciplines respectively.

¹² RESOURCES assume a relatively minor role in the progress of civilization, since we are the only species that significantly produce our own resources, rather than simply consuming that what is provided by nature. Many significant modern empires, such as Portugal, England, USSR, and Japan, stem from regions poor in resources but rich in political foundations. As of this writing, the people of socialist Venezuela are starving despite being the nation with the highest oil reserves in the world. "Clearly, the only effective limit on the supply of *economically usable* natural resources - that is, natural resources in the sense they constitute *wealth* - is the state of scientific and technological knowledge and the quantity and quality of capital equipment available." —George Reisman, *Capitalism*, 1990.

¹³ HORTICULTURE includes aquaculture in this game. Societies fed by fishing could have founded a civilization. Evidence for this is in the first urban complex in the New World, the 5.5 kya Peruvian site of Norte Chico. Here irrigation and agriculture developed, not for food, but for the cotton and textile industries. This site features pyramids and irrigation, but no ceramics or visual arts.

¹⁴ SHELF HEXES indicate locations that are flooded today but which were dry land during the last icehouse when sea levels were 125 meters lower. There is undoubtedly a treasure trove of flooded archeological sites that are inaccessible in today's technology. Such sites may give support to the aquatic ape theory that humans evolved as habitual waders, swimmers, and divers, obtaining food more from the seashore than the savanna. Evidence cited in favor of this theory is the human hairlessness (similar to whales and hippos), swimming capacity (other apes are helpless in the water), bipedalism, face-to-face copulation, brain size (requiring marine omega 3 fatty acids), and vernix (similar to sea lions). —Alister Hardy, *Was Man More Aquatic in the Past?*, 1960.

¹⁵ ARCTIC ICE-SHEETS first appeared around 2.6 Mya, about the beginning of the long game. The world had been largely ice-free for hundreds of thousands of years, but this appearance started the Ice Age which continues today. Arctic ice grew during each glacial, and retreated or even disappeared during each interglacial, in climate changes so abrupt the climate record resembles a square wave. We live today in one of these brief warm interludes, called the Holocene interglacial, and if it follows the pattern of many previous interglacials, the arctic ice will melt entirely before the arrival of the next glacial.

B4. PAWNS (28)

You start with 7 pawns of your color to represent the intelligentsia of your civilization. Depending upon location, they can be either Domain Pawns, Elders, or Emissaries:



a. Domain Pawns are stored in the 3 domains on your Brain Placard. Those in Free Will may be specialized into Elders.¹⁶ Through prayer, the pawns in any domain are able to be transferred to the Mysticism pool on the map.¹⁷

b. Elders are located on Idea Cards in the Market.

c. Emissaries are located on Ideas in an opponent's Tableau; imagine a foreign queen or a diplomat.¹⁸

B5. MIGRANT FIGURES (48)



These represent migratory hunter-gatherers while on the map, or striker-protestors while on Dissents. Move them from your pool to the map during *spread* (G5). If lost from the map, return them either to your pool or (during Chaos) to one of your vacant Dissents in your Ruling Class as a Dissident. If you Quell a Dissident, return its Migrant figure from its Dissent to your pool and suffer a loss (see QUELL).

B6. CITY CUBOIDS (40)



These are stored along the Urbanization track of your color on the lower-center of the map. If you create a City (G7), move the leftmost cuboid in this track to the Hex where you have created the City, so as to cover the appropriate resource icon there. If one of your Cities is Destroyed, move it back to the rightmost empty square in your Urbanization track.¹⁹

B7. CUBES (29)

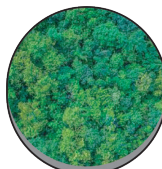


Cubes are used on the 6 Tech tracks to track which Stage you are at, plus one on the Diversity track. A purple cube goes on the PHILOSOPHY.

B8. PUNCHOUT CHITS (80)

a. Climate Chits are placed on the map to indicate Hexes that are not Habitable due to climate. If the climate changes (E1c,d,e,f), choose one of these to move from the map, flip it to its other side, and place it in a new Hex with that color ring.

b. Victory Chits are assigned during *comet scoring* (E3d).



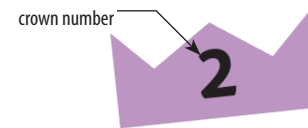
¹⁶ MYSTICISM is a measure of the percentage of people who believe that the universe is run by supernatural forces beyond human comprehension or control, versus those who understand that the universe is run according to Natural Law capable of reason-based comprehension through the offices of logic and science. Mysticism had a major role in formulating human consciousness, but since the Enlightenment/Age of Reason no longer dominates human knowledge or understanding.

¹⁷ TRIUMPH OF THE CITIES. "A modern combine harvester, driven by a single man, can reap enough wheat in a single day to make half a million loaves. Little wonder that as I write these words (around the end of 2008), for the very first time the majority of world's population lives in cities - up from just 15 per cent in 1900. The mechanization of agriculture has enabled, and been enabled by, a flood of people leaving the land to seek their fortune in the city, all free to make for each other things other than food. Though some came to town with hope and ambition, and some with desperation and fear, almost all were drawn by the same aim: to take part in trade. Cities exist for trade." —Matt Ridley, *The Rational Optimist*, 2010.

¹⁸ FOREIGN QUEEN. Marrying into royalty is a means to rule an empire without invading it. This is how the Hyksos foreigners reigned as Egypt's 15th dynasty from 3.6 to 3.5 kya.

¹⁹ TRIUMPH OF THE CITIES. "A modern combine harvester, driven by a single man, can reap enough wheat in a single day to make half a million loaves. Little wonder that as I write these words (around the end of 2008), for the very first time the majority of world's population lives in cities - up from just 15 per cent in 1900. The mechanization of agriculture has enabled, and been enabled by, a flood of people leaving the land to seek their fortune in the city, all free to make for each other things other than food. Though some came to town with hope and ambition, and some with desperation and fear, almost all were drawn by the same aim: to take part in trade. Cities exist for trade." —Matt Ridley, *The Rational Optimist*, 2010.

c. Crown Chits.²⁰ One side determines which Discipline starts as your Ruling Class, and the #1 crown indicates who is the starting player in the first turn (C2i). During setup (C2i), flip it to its other side with a Dissent where one Dissident can be stored. The Crown is always in one of the 3 Columns of your Species Placard to indicate the Ruling Class.



d. Hex Chits start on the hexsheet side of the map if using the *custom map variant* (C1b). Note that the spots in the 6 corners are either land or sea spots, and this supersedes whatever spot it partially covers printed on the hexsheet. A spot formed by 2 or more contradicting hex chits is considered land.

B9. COMPONENT LIMITS

All components are limited to what is supplied.

a. Migrant Figures. If you run out of Migrants in your pool, you may still perform a *transaction* (J3). Imagine the figure created but vanishes after the transaction.

◇ **Example:** During your activities, you run out of Migrants in your pool. There is an enemy Migrant outside your city, and you are higher in metallurgy. You may attack the enemy, but after your victory you cannot place a victorious Migrant since you have no Migrant tokens available. If instead you were tied in metallurgy, both players lose and suffer Chaos, and no tokens would occupy the Spot.

b. Idea Cards. If a draw deck for the Market runs out of ideas, simply stop refreshing that Market Column.

c. City Cuboid. If you *urbanize* (G7) but have no more cuboids, you must take the cuboid from one of your established Cities (this is an Act of God). You are not allowed to *siege, preach, or enslave* a City (J3) if you have no cuboids.

C. SETUP & VARIANTS

C1. VARIANT CHOICES

a. Basic or Advanced Game? The **basic game** ignores rules in blue font and icons with a thick border (recommended for your first game or if you want a shorter play time). The **advanced game** includes the blue font rules, including Part J (culling, Negotiation, Milankovitch cycles, inventions, transactions, morality, elder actions), and skips G8 which is basic game only.

b. Classic, Custom, or Custom-Craton Map? Players decide if they wish to use the *classic* or the *custom* map. The classic map, depicting the continents in their present configuration, is the standard option. For the custom map, either use cratons per C5, or use the 26 hex chits arranged on the hexsheet found on the flip side of the classic map. Arrange either side of these hexes in any way the players choose. If using hex chits, each player starting with the player with the #1 crown number (C2i) chooses his starting spot among the visible orange, white, black, or green start spots. This defines the player color instead of C2a. For merfolk players, choose a water spot closest to a start spot.

c. Land or Marine Realm? Decide if you jointly wish to play as **landfolk** (C2) or as **merfolk** (C3). This decision is the same for all players (exception: *Yrr variant* C4) and will restrict the entire game to being either on land or in the sea.²¹

²⁰ RULING CLASSES were established in the Mesolithic between the Cultural Revolution (40 kya) and the Agricultural Revolution (10 kya). Social differentiation is indicated by the rich graves of two adolescents discovered in Sungir, Russia (32 kya). The grave goods included ivory lances, belts composed of hundreds of fox teeth, and around 10,000 beads. These ornaments would have required thousands of man hours to create.

²¹ OCEAN REALM assumes that terrestrial life is primitive or restricted, possibly due to excessive UV radiation from a hyperactive sun.

d. Advanced Game is First or Second Dispersal? The standard advanced game starts with the **second dispersal** out of Africa 100,000 years ago. The longer advanced game begins far earlier, during the **first dispersal** out of Africa 2 million years ago. This long advanced game starts with more pawns in emotions (6 instead of 4, see **C2b**) and more cards in Epoch I (2 per player plus 2, see **C2g**).

Historical: In the first dispersal variant, the players are: **Player Black Sapiens = habilis**, **Player White Neanderthal = heidelbergensis**, **Player Orange Denisovans = erectus**, and **Player Green Hobbits = floresiensis**.

e. Solitaire or Cooperative? See setup exceptions in **C7, C9**.

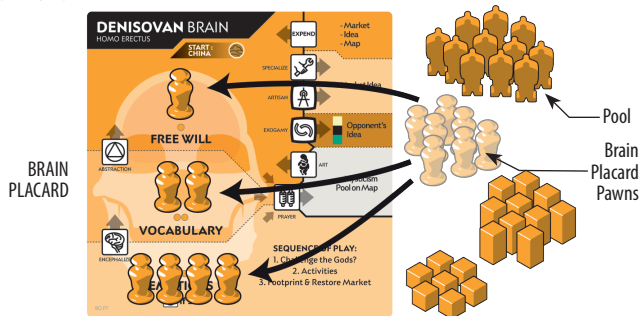
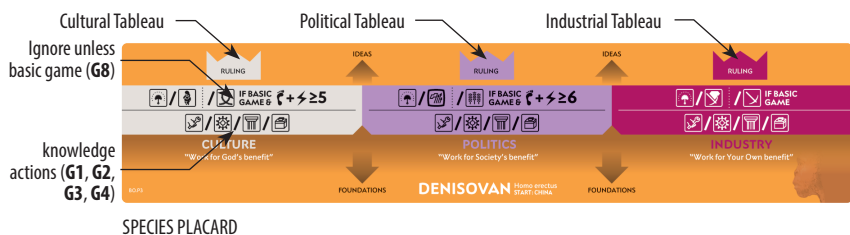
f. Campaign? If continuing from a *Bios:Megafauna* game, see **C6** (multiplayer) or **C8** (solitaire).

g. Phasing Player Arrowhead. It can be helpful to pass around an artifact as a reminder whose turn it is.

C2. SETUP (LANDFOLK NON-CAMPAIGN).

a. Player Color. Each player is randomly assigned a color, and receives his color's 10 cuboids, 7 cubes, 12 migrant figures, and 7 pawns. He also places his color's Species Placard and Brain Placard in front of him, with the appropriate realm (land or sea) faceup. Next to these he places his Migrants into a **pool**.

- **The 2-player game** plays best either as sapiens vs. hobbit, or neanderthal vs. denisovan.



b. Brain Placard Pawns. You start the game with all 7 pawns on this placard.²² In the Standard Game, 4 pawns start as emotions, 2 as vocabulary, and 1 as Free Will.

²² **BICAMERAL BRAINS**, divided into right and left hemispheres, are a feature of all vertebrates. Because brains are so biologically expensive to develop and maintain, there must be some selective advantage having brains with two redundant halves. What this advantage is remains unclear, but some sort of specialization or division of labor is implied. In modern humans, all functions in the brain are redundant to both halves, except sections of the neocortex in the left hemisphere involved in language processing, speech production and comprehension. It is unknown why the language centers, called Wernicke's area and Broca's area, are normally found only in the left hemisphere. If this section of the brain is damaged after a certain age, a permanent loss of meaningful speech results. According to the bicameral theory of preconscious authorization, "the right and left halves of ancient minds had far more distinct roles than today's mind, despite being physiologically identical. Prior to the software upgrade called language, information processed on the right or "god" side of the brain was communicated to the left side in the form of audio hallucinations, or "voices". These "voices" came from the right brain counterparts to Wernicke's area and Broca's area, and were transmitted via the anterior commissure. Some studies of modern schizophrenics show that auditory hallucinations cause increased activity in these areas in the right brain. This suggests that schizophrenics, rather than suffering a modern disorder, are throwbacks to a prehistoric time when everyone employed schizophrenia for self-communication." —Julian Jaynes, *The Origins of Consciousness in the Breakdown of the Bicameral Mind*, 1976.

- **First Dispersal Game.** For this early variant (**C1d**), start 6 pawns as emotions and 1 as Free Will.

c. Starting Migrant Figures. Each player places one of his Migrants on the **land** spot on the map marked with his player color. Land spots are brown in color. These land spots are Zimbabwe (Player Black Sapiens)²³, Spain (Player White Neanderthal),²⁴ China (Player Orange Denisovan),²⁵ and Indonesia (Player Green Hobbit).²⁶ Place the 11 remaining Migrants into your **pool** (next to Brain Placard).

d. Technology, Diversity, & Urbanization Tokens. Place a cube for each player in the game on the first Stage in each of the 6 Tech tracks and in the number 1 spot of the Diversity track. Place the 10 cuboids for each player into the Urbanization track for his color on the map, in the squares numbered 1 to 10. The Mysticism pools start empty.

e. Philosophy Cube. Place the purple cube in the center of the Philosophy track on the map, in the spot labeled "START PHILOSOPHY".²⁷

f. Place Climate Chits. Some Hexes have *climate rings* (**B3d**) with star icons. On the center of each of these Hexes, place a climate chit of the same color as the ring (white, blue, orange, or green), as modified by the bullets below:

- **4-Player Game Setup.** Place chits only on rings with 4 stars (16 total).
- **3-Player Game Setup.** Place chits only on rings with 3 or 4 stars (20 total).
- **2-Player Game or Solitaire Setup.** Place chits on all rings with stars (32 total).

◇ **Example:** The orange ring in California has 3 stars. Therefore, place an orange chit in California in a 2- or 3-player game, but not in a 4-player game.

g. Form Challenge Deck. Sort the Challenge Cards into 4 decks by Epoch, and for each Epoch randomly select as many cards as shown in the table below, depending upon the number of players **P**. For example, there will be a total of 12 cards for a 3-player basic game (3 Challenge Cards from each of 4 Epochs). Stack these four decks facedown on top of each other, with Epoch I on top and put a

²³ **HUMANS** in the game represent subspecies of *Homo erectus*, the first hominins to migrate out of Africa into Eurasia around 2.12 Mya. Suspected derivatives of *H. erectus* include *H. heidelbergensis*, *H. antecessor*, *H. neanderthalensis*, *H. denisova*, *H. floresiensis*, and *H. sapiens*. All of these also migrated out of Africa between 170 to 30 kya, to form admixtures with extant *H. erectus* populations in Eurasia. These hybrids, discovered by mitochondrial DNA measurements on living populations, are represented by the Sapiens, Neanderthal, Denisovan, and Hobbit players in the game. "Sapiens" is the game term for "modern humans" as distinguished from other migratory races of *H. sapiens* such as Neanderthal. Sapiens migrated out of Africa and by 70 kya was interbreeding with Denisovans in India and Australia, and by 40 kya with Neanderthal in Europe. The genome of modern Eurasians are 1.8%–2.6% Neanderthal, while indigenous Oceanic and Southeast Asian populations contain 4–6% of Denisovan genes. The oldest *H. sapiens* skull, found in Morocco in 2017, is dated to 400 kya.

²⁴ **NEANDERTHAL** is an adaptable hominin who exploited a great variety of climates and biomes in Europe and Asia, beginning around 115 kya and going extinct suddenly during the great Cultural Revolution that ended Epoch I. They employed crude stone tools, hide-making, woodworking, and rudimentary shelters. Like the Maori of New Zealand, Neanderthals relied on short-range ambush with thrusting or thrown spears. They used the Levallois technique for their spear points, later refined by Aurignacian techniques borrowed from Sapiens. Neanderthals were physiologically adapted to a cold climate, with a large braincase, short but robust builds, large noses, and presumably light skins. They seldom (if ever) buried their dead or used grave goods, used no bone or antler tools (and thus no fitted clothes which require bone needles), hardly ever developed new tools (let alone farms or the wheel), and expressed almost nothing in the way of art or religion. Neanderthals are an example of how an animal can be super-intelligent and yet lack imagination.

²⁵ **DENISOVANS** split from *H. sapiens* in Africa around 744 kya and diverged from Neanderthal 300 generations after that. They migrated throughout Asia and made their last stand in Wallacea, then a peninsula but since flooded to become the Indonesian archipelago. They are not completely extinct: interbreeding with Sapiens have created the present peoples of Asia, Australia, and Oceania. Indeed, the gene found in Tibetans adapting them to low oxygen at high altitudes is of Denisovan origin. A second Sapiens-Denisovan interbreeding episode seems to have produced the Han Chinese, Japanese and Dai peoples.

²⁶ **THE HOBBIT**, the nickname given by the dig workers who in 2003 unearthed *Homo floresiensis*, a dwarf form of *H. erectus* that lived on the Indonesian island of Flores. These hominins stood only about a meter tall with a very small brain size of 417cc. The skull has human-like teeth with a receding forehead and no chin. Archaeological evidence suggests that these hominins used stone tools and fire to hunt the Komodo dragons, juvenile pygmy elephants, and giant rats found on Flores. *H. erectus* may have arrived on Flores by 1000 kya, become hobbit-sized by 700 kya, seem to have survived 15,000 years of coexistence with Sapiens without interbreeding, but eventually became extinct 50 kya.

²⁷ **ECONOMICS/POLITICS VS. PHILOSOPHY.** Economics is the science of maximizing human values given limited resource realization, as simulated here by elder management. Politics is the science of maximizing human values in a social setting, as simulated by the disciplines. Philosophy is the science of determining what those values are.

Comet between each deck and on the bottom of the deck. Rotate each Comet to be 90 degrees with respect to the Challenge Cards. (This is so the players can see how soon before the next Comet arrives.)

Number of Challenges (P = number of players)	Epoch I	Epoch II	Epoch III	Epoch IV
Basic Game	P	P (max 3)	P (max 3)	P (max 3)
Advanced Game (C1a)	2P	P (max 3)	P (max 3)	P (max 3)
First Dispersal Game (C1d)	2P + 2	P (max 3)	P (max 3)	P (max 3)
Solitaire (C7c) Basic/Advanced/First Dispersal	5/8/10	4/4/4	4/4/4	2/2/2
2-Player Coop (C9a) Basic/Advanced/First Dispersal	4/6/8	3/3/3	3/3/3	2/2/2
3- or 4-Player Coop (C9a) Basic/Advanced/First Dispersal	3/4/6	2/2/2	2/2/2	1/1/1

◇ **Example:** In a 3-player basic game, the challenge deck will be (from the top down): 3 Epoch I events, 1 Comet, 3 Epoch II events, 1 Comet, 3 Epoch III events, 1 Comet, 3 Epoch IV events, and finally the final scoring card. If playing the advanced game, Epoch I will have 6 instead of 3 events, and the other epochs will still have 3 each.



h. Form Idea Market: Sort the Idea Cards in the 3

Disciplines – culture, politics and industry – and further divide into the 4 Epochs. This leaves you with 12 small piles. Shuffle each of the 12 piles facedown and place them in a 4 X 3 matrix as shown (D1a), with the 3 draw decks of Epoch I in the left-to-right order: culture, politics and industry. Draw 3 cards from each of these decks and place them in a column below each draw deck. This forms a 3 X 3 matrix called the Market.

i. Crown Chit. The Crowns are numbered 1 to 4. In a 2-player game, use only Crowns #1 and #2, in the 3-player game use Crowns #1, #2, and #3, and in a 4-player game use all 4 Crowns. Randomly assign each

player one of the Crowns. Each has a Discipline color, and each player places the Crown on the Column with this color. Then all players flip their Crowns to the other side, so that its Dissent is visible. All crowns remain on this side for the remainder of the game. The player who received the #1 Crown takes the *first turn* (A0a), then proceed clockwise.

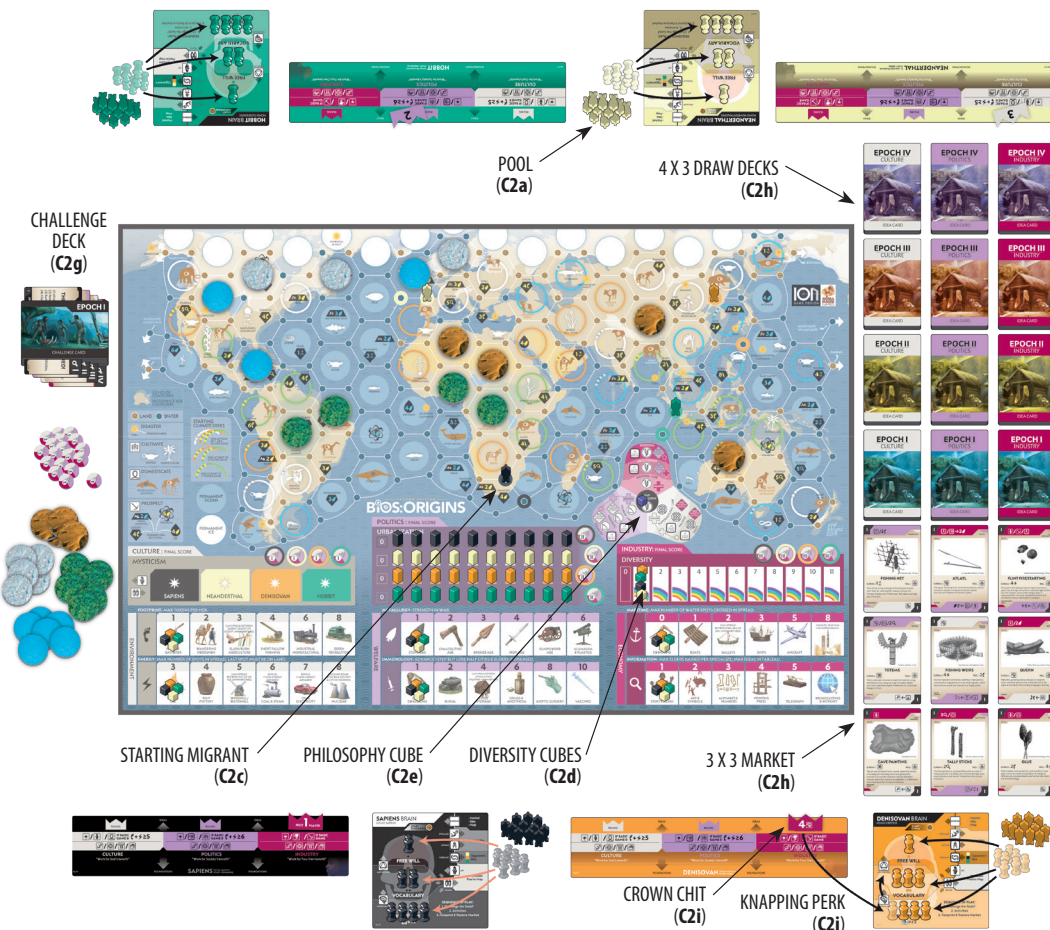
j. Knapping Perk. If you received the #4 Crown, which indicates you start with a Ruling Class in industry, immediately take one free *encephalize action* (G9a). This starts you with one less in emotions and one more in vocabulary, and simulates a 2 million year tradition in the knapping industry.

C3. SETUP (MERFOLK NON-CAMPAIGN).

Your starting species lives in the water, and although it is air-breathing, it requires vehicular technology to maneuver on land. You can use any of the 3 map configurations (C1b). Play with these exceptions to the rules:

- Starting Migrant (C2c).** The merfolk setup puts their first Migrant on the water spot indicated with their color on the map (instead of the land spot in the same Hex).
- Spread (G6).** The maximum number of land spots merfolk can cross is equal to their maritime stage.
- Climate Chits.** When spreading, if a merfolk Migrant enters one or more land spots (using maritime, see previous bullet), it has the same restrictions as Landfolk have (G6f). But if it spreads only on water spots, it is unrestricted from bassing between two climate chits.
- Urbanize (G7).** Merfolk create underwater Cities. Therefore, merfolk can only create their Cities in *permanent oceans* (B3i) or in a *shelf* (B3g) that contains a sea climate chit. A merfolk city on a shelf is destroyed if the water dries up during cooling (E1c).

Easily Missed. Merfolk can build Cities only in a Hex with a permanent ocean, or in a blue-ring hex that has an ocean climate chit.



C4. THE YRR VARIANT (LANDFOLK VS. MERFOLK).

This variant combines land and sea intelligences. Some species (**landfolk**) use the standard rules; others (**merfolk**) use rules **C3a,b**. If you use the *custom-hex map setup (C1b)*, flip all Hexes to their blue-ring or white-ring side to maximize available city-sites. If using the classic map setup, players (beginning with merfolk) take turns placing chosen blue/white-ringed hex chits on any ocean or blue-ring on the main map in any alignment desired, provided the target location has exactly 6 spots. Stop placing when the 5th hex chit is placed.

- a. Static Climate.** No climate chits are used in this variant, and thus there is no climate change. Ignore the events *cooling (E1c)*, *warming (E1d)*, *deforestation (E1e)*, and *forestation (E1f)*.
- b. Littoral Resources.** This world only has resources in the **shelf hexes** (with blue-rings) the **arctic hexes** (with white rings). All resource icons in other Hexes, including green-ring, orange-ring, no ring, and permanent ocean, are ignored. Accordingly, Cities can only be built, by either landfolk or merfolk, using resources in shelf or arctic hexes.
- c. Transactions.** Landfolk and merfolk can preach, trade, war, or enslave each other, or move to establish a city, as long as the number of land/sea spots entered does not exceed their maritime stage. If after one of these transactions a landfolk migrant would be left on a water spot, or a merfolk migrant is left on a land spot, that Migrant is lost (without Chaos).

Note: Exogamy (J5a) is allowed, but since the two species cannot interbreed, interpret this as an ambassadorship rather than marriage.

C5. CUSTOM-CRATON MAP SETUP

This variant requires access to a game of *Bios:Megafauna 2* or *Bios:Mesofauna*. Populate the *custom map (C1b)* with the 4 Earth cratons that come with this game. If playing the *landfolk non-campaign (C2)*, use all the cratons containing starting hexes of the player colors in the game to form one continent. Each player places a starting Migrant in their starting hex. Merfolk start in a water spot as close as possible to their starting hex. With the remaining cratons (if any), form a second continent to the west (called "America"). The starting player makes the arrangement, and then every other player may change the position of one craton of his choice, without switching between the two continents. Note that the cratons will not hereafter move in this game (no more continental drift). For setup using the craton map, use rules **C5a-f**, and during play use rule **C5g**.

- a. Latitude Strip.** Take a random strip from the *Megafauna* game and place it over the latitude icon to the left of the hexfield. Alternately, skip this step and play with the default latitude strip (too cold) depicted on the map. Note that wind is not used.
- b. Place Climate Chits.** Beginning with the starting player and going clockwise, each player places two climate chits on his starting craton. "America" starts without climate chits. White can only be in white latitudes (as marked with white dice), green can only be in green latitudes, blue only on craton seas, and orange only in latitudes 2 or 5.²⁸
- c. Warming or Cooling.** As a first step during climate change (**E1c,d**), replace the latitude strip with one warmer or cooler, as appropriate. Then change ice to seas, or seas to ice as appropriate, per the previous bullet. If playing with *Milankovitch Cycles (J1)*, instead of turning into Icehouse or Ice Age, move the climate strip two steps colder if Icehouse and two steps warmer if Ice Age.

- d. Swamp, Weed, & Sea Resources.** All swamp hexes are biofuel, all weeds hexes are horticulture, and all sea hexes are metal hexes with a *tech requirement (B3f)* of metallurgy stage 2. For each central craton hex, roll a dice and set it in the hex. This indicates a luxury hex with a tech requirement (**B3f**) of metallurgy stage equal to the dice roll. Re-roll once if the result was 4-6.
- e. Domestication Creeples.** On each craton, on two random non-central Hexes place one creeple of an unused color and/or shape to represent animals able to be domesticated. Use the dice-faces printed on each craton for this randomization. These two creeples are different shapes: one is armored (war animal) and the other archetype (work animal).
- f. Intersections.** All intersections on the cratons (including on the craton perimeter) are land unless the intersection is depicted as entirely sea, in which case it is water. Offshores are not used.
- g. Climate Change Rules with the Craton Map.** If an event changes the climate, invert and move an existing chit and place it according to the following rules. Always place the chit on land if possible, otherwise on a shelf. White chits must be placed in a white latitude, and green in a green latitude (as indicated by the colored dice on the latitude strip). Orange can only be in latitudes 2 or 5. Blue can only be on an island hex, or on a craton's sea hex.

C6. SETUP (BIOS:EARTH CAMPAIGN - CONTINUED FROM BIOS:MEGAFUNA).

Bios:Earth is the name of the campaign game that stretches from life's origins in *Bios:Genesis*, continues to *Bios:Megafauna/Mesofauna*, and concludes in *Bios:Origins*. If *Bios:Megafauna* ended with at least one surviving species and no runaway greenhouse, use a custom-craton *map setup (C5)*. Players keep their same player color. Note that Era IV in the *Bios:Megafauna's* rules encompasses an entire *Bios:Origins* game session (Epochs I-IV) in a *Bios:Earth* campaign. Observe these additional rules:

- a. Player Color (landfolk).** Player Black becomes a chitinous sapiens, Player Orange becomes a molluscan denisovan, Player Green becomes a fungal-animal hobbit, and Player White becomes a vertebral neanderthal.
- b. Latitude Strip.** Place the ending latitude strip from *Megafauna* over the latitude icon to the left of the hexfield. Note that wind is not used.
- c. Craton Arrangement.** Arrange the cratons on the hexfield in the same relative positions as they were in the *Megafauna* game. Maximize the distance between cratons while avoiding the edge and the Philosophy diagram.
- d. Climate Chits.** First, discard any offshore disks, as these are not used. Then, for every climate disk on a craton in the ending game of *Megafauna*, swap out an Origins climate chit: white disk → white chit, green disk → green chit, black disk → orange chit. Furthermore, place a blue chit over every sea. Alternatively, see **K1**.
- e. Starting Metabolism.** When at energy stage 3, your *spread reach (G6a)* is equal to your action limit (gear icon) as listed on the Oxygen Reservoir (or Atmosphere Reservoir in the case of plants). As soon as you advance to energy stage 4, your spread reach becomes 4 as per standard rules. For instance, at 5% oxygen, starting animal players are able to spread by one space only.
- f. Starting Encephalization.** Each player starts with 6 pawns as emotions, and one pawn in the Free Will. For each emotion you achieved for that species in the *Megafauna* game, move one pawn from emotions to vocabulary.²⁹

28 HORSE LATITUDES range from 25 to 35 degrees in both hemispheres. With subsiding air masses under continual high-pressure conditions, they are almost windless. The world's arid and CO₂ deserts are found in these latitudes.

29 NON-HUMAN LANGUAGE. Despite early enthusiasm in training chimpanzees to communicate via ASL, the chimps never initiated conversations, rarely introduced new words, showed no grasp of syntax, and normally imitated what the humans did. The chimps learned to communicate verbally, but not to use the words they learned as cognitive tools in an internal monologue. It remains a mystery how and why humans became lingual. "Much of the apes' behaviour is pure drill. Language still stands as an important definition of the human species." —Animal Researcher Herbert Terrace of Columbia University.

g. Ecomorph Migrants. Keep your same color, and choose your creeple shape that developed language first or (if none has language) that has more emotions. You choose if tied. Use this number of creeples in place of the 12 Migrant figures (which means you play with fewer). On the map, each creeple has special abilities:

- **Archetype.** None
- **Burrower.** Start at immunology stage 2.
- **Armored.** Wins ties in war and siege during Epoch 1.
- **Flyer.** Start at maritime stage 2.
- **Swimmer.** Start either as *merfolk* (C3) or optionally at maritime stage 2.

h. Starting Creeple. Starting with the winner of *Bios:Megafauna/Mesofauna*, each player places one creeple on a spot in a hex that he occupied in the previous game. You cannot place your creeple in a hex that exceeds your Footprint.

i. Mixed Terrestrial/Merfolk. In any game with players both on land and in the sea, allow merfolk with Maritime 2+ to end their move on a land spot (and vice versa for the terrestrials). It is recommended to use Yrr Variant rules (C4a,b,c).

j. Victory. At the end of each game except the final one, each player gains one victory chit (or other marker) for each opponent who has fewer VP in that game. For the final game, count half your final score, then add the victory chits. Winning players share victory if tied.

C7. SOLITAIRE VARIANT (HOMO HABILIS NON-CAMPAIGN).

Only one human subspecies (*Homo habilis*) starts as landfolk or merfolk Player Black.³⁰ This *advanced game* (C1a) uses *inventions* (J2) but skips the advanced rules (J1,J3-J5). Setup is as per C2, with these exceptions:

a. Map & Realm. Suggest using the *classic map* (C1b) in either the land or marine realms (C1c). However, you may choose other maps (such as the Merfolk or custom maps, or the terrestrial, martian, or venusian maps) from *Bios:Megafauna/Mesofauna*.

b. Dispersal Start. Use the first dispersal long start with 6 pawns in emotions and 1 in Free Will. Modify this per C6f if in a campaign.

c. Challenge Deck Setup. See C2g.

d. Special Climate Rule. Setup climate chits as per the 2-player game (C2f). Whenever you move a climate chit, you must destroy a City if you can.

e. Act Of God Rule. Each destruction of a City or Migrant token by an Act of God causes a Chaos, just like an Act of Man.

f. Relentless Challenge Rule. Skip the challenge phase for the first turn. Thereafter, you are not allowed to skip the challenge phase, which means you must either *challenge the gods* (A1a) or *claim comet* (A1b) each turn.

g. Solitaire Auction Rule. To win an auction during a challenge, you must bid a number of Elders equal to the Epoch plus the number of your Dissidents. This is regardless of *augmentation* (E2b,c). Otherwise it only enacts its two events and is discarded. Dictators (E1j) are awarded to you without an auction.

h. No Bellwether Rule. You as the phasing player claim a Comet as normal, but there is no *comet scoring* (E3d), and the Bellwether's power to move the *Philosophy* (10b) is disabled.

i. Victory Conditions. You must end with at least 13 victory points in each of the 3 Disciplines: *cultural VPs* (I1), *political VPs* (I2), and *industrial VPs* (I3). However, you do not have to count victory in a Discipline shutdown by *Philosophy* (10b). For a decisive win, you must reach space (maritime stage 8).

³⁰ HOMO HABILIS is a human species that appeared in Africa at least 2 Mya. They are the presumed forefathers of all five subspecies in the game. Despite the rapid encephalization of their skulls, and their use of stone tools such as the handaxe, they are noted for technological stagnation on the level of most tool-using animals.

j. Events. Whenever you suffer a famine or pollution, suffer a Chaos and move your footprint or energy up one, just like with immunology and diseases. You will also suffer a Chaos after a disease.

C8. SOLO CAMPAIGN (GENESIS-MEGAFUNA-ORIGINS CAMPAIGN).

You can string your solitaire games together in an epic campaign, trying to stay alive from protolife to language-based consciousness (in *Bios:Origins*).³¹ See C6 for your starting *Bios:Origins* characteristics. Play with the solitaire rules of C7. See C3 in the *Bios:Megafauna/Mesofauna* rules for transition rules from *Bios Genesis*. If using Mars or Venus cratons, see C6k.

a. Victory Conditions. Win per C7i.

C9. THE COOPERATIVE VARIANT (CAMPAIGN OR NON-CAMPAIGN)

This advanced game plays with 2 to 4 players on any map. Setup is normal except per C9a. Start with 4 pawns in emotions, 2 pawns in vocabulary, and 1 pawn in Free Will.

a. Challenge Deck Setup. See C2g.

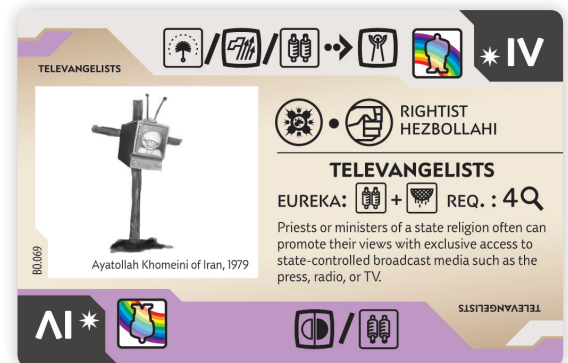
b. Relentless Challenge Rule. This is the same as C7f, except that only the player with the #1 Crown (C2i) must challenge the gods. During their turns, all other players must skip the *challenge phase* (A1).

c. No Bellwether Rule. Bellwethers are not used, see C7h.

d. Xenophobia. If during activities a player has the option to do a winning *preach* (J3b), *war* (J3c), or *enslave* (J3d) transaction, he must perform this option. Cities can be preached, sieged, or enslaved if within normal spread range without needing an adjacent Migrant.

e. Victory Conditions. At least one player must end with at least 13 cultural VPs (I1a,b,c), the same or a different player must end with at least 13 political VPs (I2a,b,c), and the same or a different player must end with at least 13 industrial VPs (I3a,b,c). However, you do not have to count victory in a Discipline shutdown by *Philosophy* (10b). For a **decisive win**, one player must reach space (maritime stage 8).

👁️ **Example:** In a 3-player coop game, you suffer a televangelist dictator (#69) on its cultural Discipline. During activities, your options on this Foundation are: *spread*, *war*, or *prayer with a preach Consequent*. Another player has a City 2 spots distant from one of your Cities, and unfortunately this opponent is behind you both in metallurgy and Urbanization. Because of the xenophobia, you must choose either the 📺 or the 🗣️ → 🗣️ to convert this City to your color. You choose the latter, because the preach does not add Chaos to your partner.



³¹ CONSCIOUSNESS is the culturally-acquired ability to mentally store verbal abstractions, including concepts about oneself, and to reconstruct images from this verbal format. Consciousness begins blank, the *tabula rasa*, but is enabled as a child acquires vocabulary and syntax. Thus every parent witnesses the origins of consciousness for herself. This ability allows a child to narrativize, (i.e. visualize himself as a causal agent), and run through his mind alternatives to actions. It enables introspection, volition, fantasies, suicides, treachery, nostalgia, or cruelty, and yet is not necessary for problem solving, signal learning, listening, writing books, building cities, or ruling empires. "A whole kingdom where each of us reigns exclusively alone, questioning what we will, commanding what we can. A hidden hermitage where we may study out the troubled book of what we have done and may yet do... This consciousness that is myself of selves, that is everything, and yet nothing..." — Julian Jaynes, *The Origins of Consciousness in the Breakdown of the Bicameral Mind*, 1976.

D. ARENAS, CHAOS, & REVOLUTIONS

D1. THE SIX ARENAS OF PLAY

a. Market.³² This matrix has 3 columns and 3 rows. Thus there are (almost) always 9 Ideas visible in the Market, as shown below. During your activities phase, use *specialize (G1)* to place Elders on the Ideas you are interested in. Alternatively, claim into your Tableau an Idea that has enough Elders on it, by using a knowledge action called *invent (G2)*. The numbers in the illustration below indicate the minimum number of Elders that must be on the card in order to claim it.

CULTURE DRAW DECK	POLITICS DRAW DECK	INDUSTRY DRAW DECK
3	3	3
2	2	2
1	1	1

b. Map. Your Migrants represent hunter-gatherer tribes or transitory populations and are stored in your pool. Use Actions listed on your idea cards to place them on the map, move them from Spot to Spot (either land or water), or convert them into Cities in a Hex. Each Hex interior depicts the animal, mineral, and/or plant resources that can be urbanized to form Cities. When a City is built in a Hex, place it so it covers the resource exploited to build the City. A Hex may only contain one City. Building a City increases your Urbanization by one, as shown on the track on the map.



c. Technology.³³ Each player marks his progress in six tech tracks on the map. The tech tracks are **footprint** (how many Migrants and Cities you can support in a Hex), **energy** (how many Spots your Migrants can spread), **metallurgy** (how powerful your Migrants are in war), **immunology** (your resistance to disease),³⁴

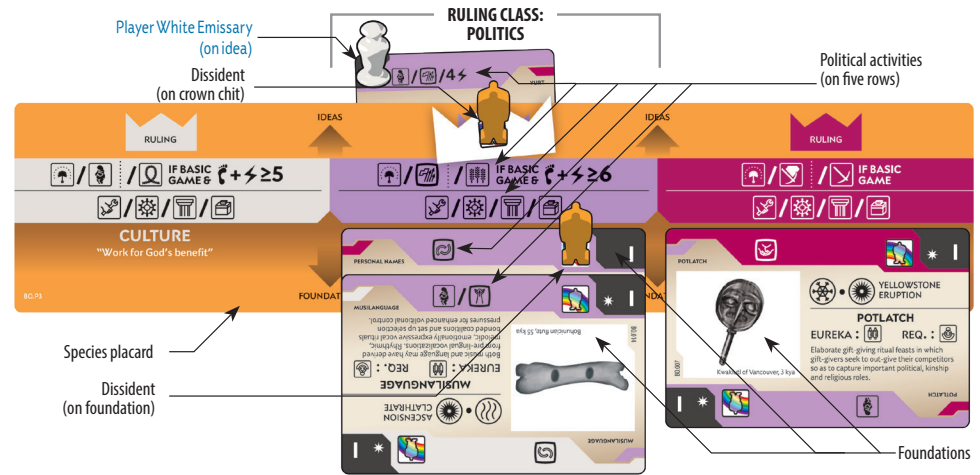
32 THE MARKET is not a particular set of institutions, but rather the options for each individual to choose among existing institutions, or fashion new arrangements to his taste. *"The advantages of market institutions over government institutions are not so much in their particular characteristics as institutions but in the fact that people usually make a better choice out of numerous options than by following a single prescribed process."* —Thomas Sowell, *Knowledge and Decisions*, 1980.

33 TECHNOLOGY indicates a tool invented, not from accidental tinkering or learning, but because it was envisioned as an abstraction in the mind's eye before it was made. Such visions require an abstract language, and accordingly handaxes (#116) and other stone tools are not inventions or technologies because they were developed by prelingual peoples. This explains how the same monotonous design could endure for a million years. Although handaxes require both high intelligence and knapping skills to manufacture, the motivation to do so comes not from an envisioned product, but by natural selection and/or female preference, so that humans were genetically hard-wired to produce the handaxe shape. *"The conservatism of Acheulean handaxes may be evidence, not of cultural transmission, but of genetic transmission."* —Raymond Corbey, *The acheulean handaxe: More like a bird's song than a Beatles' tune?*, 2016.

34 IMMUNOLOGY as a science is very recent. Before the advent of germ theory and antibiotics, the only way to become resistant to a disease was to catch it. Major health advances during the Industrial Revolution were non-medical. By devolved enforcement (eliminating central control in favor of local control) and improved drainage, reformers such as Florence Nightingale (#76) increased the life expectancy in the British empire by 20 years between 1871 and the mid-1930s, during which time medical science made no impact on the most fatal epidemic diseases.

maritime (how many Spots your Migrant can move across water), and **information** (how many Elders you can produce with a specialize action, also the maximum number of Ideas you can have in your Ruling Class Column).³⁵

Note: Each track is divided into 6 numbered Stages, and you always advance forward on these tracks, never backwards.



EXAMPLE TABLEAU. Ruling class = purple (POLITICS) with 1 Idea. Dissidents = 2, Diversity = 2. Your most recent foundation will always be at the bottom and first eligible for activities, while your most recent idea will always be at the top and last eligible.

d. Victory Tracking. Your Mysticism pool, Urbanization track, and Diversity track are on the lower third of the map. Use them both during the game and for final scoring. The number of pawns in your Mysticism pool is your **Mysticism**, which can increase through prayer or decrease through art.³⁶ The highest number revealed in your urbanization track is your **Urbanization**, which is also the number of your Cities. Each City built removes a cuboid from this track, and each City destroyed adds a cuboid. Each player uses a cube to track **Diversity** (number of rainbows) in the far right field.

e. Tableau. This consists of your Species Placard plus three columns of cards, representing the cultural, political, and industrial sectors of your civilization.³⁷ The cards are either Foundations (landscape orientation) or Ideas (portrait orientation). A ruling class chit indicates which column is active for your *activities phase (F)*.

Tip. Your Foundations are the most important elements of your Tableau, because they can be lost only by genocide or purge. Ideas are constantly getting discarded as obsolete.

35 INFORMATION tracks how well you can store, retrieve, and share data across the generations.

36 MYSTICISM is a claim to knowledge outside of evidence of one's senses or reason. A mystic claims to alter reality, either psychologically or through physical force. Because reality is logical and non-contradictory (this is why science works), mystical ways to deal with reality have negative survival value. So why is it still around? While useless as a source of knowledge, mysticism is important as the original source for concept formation and consciousness. It got an entrenched start as the interpretation of remembered verbal instructions of one's parents or authority figures. These spiritual memories might be perpetrated by hallucinated "voices" (#98), "earworms" (#19), or art such as singing, dancing, painting, or figurines. The "Hmmm" theory of Steven Mithen postulates a musilanguage (#14) as the precursor to both art and language during the Cultural Revolution of 40 kya, when flutes, paintings, and Venus statues first appear. I have expanded this idea in this game by making art the bridge between mysticism (blind obedience to the gods), and free will (conceptual faculty to evaluate and even disobey the gods).

37 INDUSTRY evokes images of modern factories, yet is also an archaeological term denoting a typological classification of stone tools. So the first industrialists were knappers. The oldest known industry is Lomekwi (#120), flakes dating to 3.3 Mya. The later Acheulean industry produced the handaxe (#116), a tool produced unchanged for a million years.

f. Brain Placard stores pawns in 3 domains: emotions, vocabulary, and Free Will.

Any number of pawns may be stored in these domains. The dark arrows indicate the Action or operation required to move a pawn from one domain to another.³⁸ Pawns in your Free Will indicate inventive specializations, while those remaining in your emotions indicate that a physically small brain.³⁹

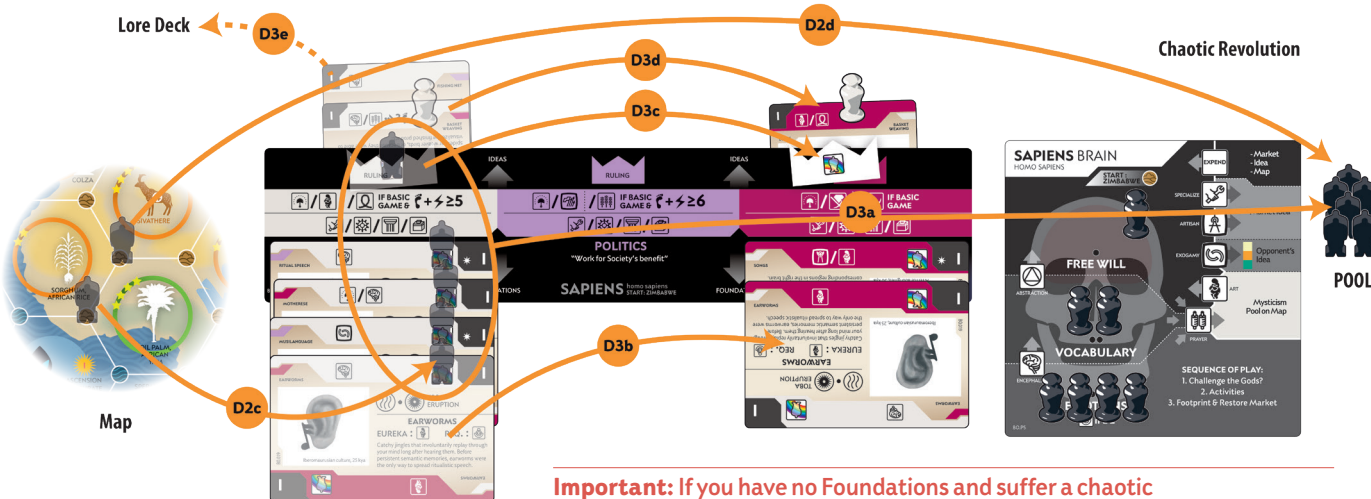
D2. CHAOS



Chaos strikes during certain events or transactions. For each Chaos suffered, take a Migrant from either the map or your pool (D2b) and move it as a Dissident onto an empty Dissent space in your Ruling Class Column. If the Chaos generates more Dissidents than you have spaces for, then interrupt the game to resolve *Quell and Revolution* (D2d). Afterwards, if a chaotic revolution occurs during your activities phase, resolving the Revolution ends your turn. If you suffer Chaos, follow this procedure:

- Acts Of Man.** Migrants and Cities destroyed by Acts of Man —war (J3c), *enslave* (J3d) and *starvation* (H1a)— generate Chaos, while those destroyed by Acts of God do not. See DESTROY (ACTS OF GOD), DESTROY (ACTS OF MAN).
- Source.** Withdraw the required Dissident figures from the map (your choice, except during City destruction you must choose the Refugee). If there are not enough figures on the map, take from your pool. If there are still not enough figures, then you must move all that you can. However, never take more figures than necessary to fill the number of Dissents in the Ruling Class.
- Dissents.** Store all Chaos as Dissidents on empty Dissent icons on any Foundation of your choice in your Ruling Class Column. Your Crown also has a Dissent on which you can store 1 Dissident. You choose which Dissents in the Ruling Class to put Dissidents on.
- Quell & Revolution.** If there are not enough Dissents, first store as many Dissidents in the Ruling Class as you can. Expend any remaining Migrants that were destroyed by Acts of Man, and leave others, including Refugees, on the map. Then *Quell* all your stored Dissidents per D3a, and finally suffer a *chaotic revolution* per D3b,c,d,e.

◇ **Example:** In your Ruling Class you have 4 Dissidents, including one on your Crown, plus one empty Dissent on EARWORMS (see right). You suffer 2 Chaos, so you fill the empty Dissent with 1 Dissident. Then quell all 5 Dissidents (D3a), undergo a Putsch (D3b), move the Crown (D3c), transfer one Idea (D3d), and discard the other Idea (D3e) since it had no industrial orientation.



D3. REVOLUTION

A revolution is any change to your Ruling Class, moving your Crown to a new Column. There are 2 types of revolution: (1) **quiet** (a voluntary change of Ruling Class after either an *election* (G4) or a successful auction during the challenge of the gods)⁴⁰ or (2) **chaotic** (an involuntary change of Ruling Class because you received more Chaos than Dissents in your Ruling Class Column, see D2d). The new Ruling Class Column is either **chosen** (E2g,i) if the revolution is quiet, or **forced** (D3b) if the revolution is chaotic. Follow this procedure:

- Quell Dissidents (Both Quiet & Chaotic Revolutions).** You must Quell (violently suppress) each Dissident, which returns it to your pool. For each one quelled, you must choose one **loss**:

- **Elder Loss.** Expend one of your Elders or Emissaries.
- **City Loss.** Destroy one of your Cities (no Chaos).

Easily Missed: If your City is DESTROYED, you must add a Refugee taken from the pool. If the pool is empty, take it from somewhere on the map.

- **Migrant Loss.** Expend one Migrant on the map. However, you cannot Expend a Migrant if you have any Cities or Elders to lose (previous bullets). Furthermore, your last Migrant on the map is *sacrosanct* per D4a.

- Putsch (Chaotic Revolution Only).**⁴¹ If the revolution was chaotic, the lowermost (most recent) Foundation in the Ruling Class Column has revolted. Remove it from the Column, reorient it 180 degrees so that its other color is uppermost, and place it into the new Column corresponding with this other color, placed to half-cover the lowermost Foundation as shown. All other Foundations in the former Ruling Class remain in place.

Easily Missed: In a Chaotic Revolution, transfer only the lowermost Foundation. All other Foundations remain in place.

Important: If you have no Foundations and suffer a chaotic revolution, first Quell the Dissident on your Crown, and then choose one of the other 2 columns to move the Crown to.

³⁸ REVOLUTION OF THE SYMBOLS, an idea championed by archeologist Jacques Cauvin, provides evidence that the Neolithic Revolution, including agriculture and religion, was a change of thinking rather than environment. —Jacques Cauvin, *Naissance des divinités, naissance de l'agriculture: La révolution des symboles au Néolithique*, 1994.

³⁹ HALLUCINATIONS were perhaps the way the brain first handled information processed by the new software of language. Consciousness was needed to tame the hallucinations into harmless imaginations and fantasies. "Suppose two people sitting in a room (Jack and Jill) are both asked to imagine a lion. Jack nods his head, closes his eyes, and says, 'Yes, I see the lion, it has a mane and a long tail, it's brown, it's wandering around the room, now it's roaring'. Jill runs screaming from the room. For Aristotle, Jill would be truly imagining the lion. Jack, on the other hand, is imagining not a lion but perhaps a picture of a lion or a movie of a lion or a story of a lion." —Howard Rachlin, *Behavior and Mind*, 1994.

⁴⁰ QUIET REVOLUTION is a peaceful accommodation of new ideas on the road to modernization. Like a chaotic revolution, a quiet revolution changes the ruling class, but without the mess of a putsch or coup. As contrasted to chaotic revolutions, generally beneficial to the coup leaders, quiet revolutions benefit the populace as represented by the game players. Often they are bottom-up upwellings of civil disobedience, such as Rosa Parks-style civil rights, the fall of the Berlin Wall, and the recent collapse of hukou serfdom in China's great migration.

⁴¹ CLASS WARFARE is a defining feature of the *Pax* series of games, in which persons of different disciplines, and thus differing ideas about what defines a society and its goals, vie for power.

c. Crown. Move this chit from the former Ruling Class Column to the new one.

d. Transfer Reoriented Ideas. Check all of your inventions. If any of them have an Orientation that includes the color of the new Ruling Class (indicated by a colored rectangle to the right), you must import them into this column, oriented so that the revolutionary discipline is visible. Maintain the same order of cards in the column. Any Emissaries remain in place.

e. Obsolete Ideas. Any Ideas that do not have an Orientation of the new Ruling Class (see previous bullet) are discarded onto the top of the Lore Deck, which expends any Emissaries on them. Therefore, all ideas will be in your Ruling Class Column.⁴²

Easily Missed. A quiet revolution never rotates or displaces any Foundations, while a chaotic revolution always rotates and displaces one Foundation, assuming there is a Foundation in the Ruling Class Column.

◇ **Example:** You suffer 2 Chaos from an event, but with no empty Dissents in your Ruling Class, you must suffer chaotic revolution. As the first step, you must quell the 4 Dissidents that you had stored in your Tableau from previous turns. You choose to kill off both of your Elders and Destroy your only City, replaced with a Refugee. You still have one more loss, and since you don't have any more Elders or Cities, you choose to kill off the Refugee you just created. Then the Revolution changes your Ruling Class. Because both your Ideas don't fit the new Ruling Class, they get discarded into Lore. One has an Emissary, which gets returned to his owner.

f. Resume Game. A revolution interrupts the game until it is resolved. If you have a chaotic revolution during your activities phase (A2), conclude the Action that caused the Chaos, including its Consequents, and then end the phase without being able to perform any further Actions.

D4. DIASPORA

If your last map token is lost, destroyed either by an Act of God or removed as a Dissident by an Act of Man, instead of it being lost, spread it to an empty Spot on the map as a Migrant per below. You can also invoke 1 diaspora per spread action if all your map tokens are trapped, so they can neither move nor be spread from without entering starvation.

a. Sacrosanct. Your last Migrant is immune to being taken as a loss during *Quelling* (D3a) or Chaos (D2b).

b. Emigrant Destination. If possible, spread to a Habitable Spot using *spread* rules (G6) but ignoring limits due to maritime, climate chits, and enemy Migrants. If not possible, take the closest empty and Habitable Spot. In addition to being Habitable, the spot chosen must not exceed your *footprint* (H1a).

c. Discouraged? Never give up! See L2 for tips on winning if suffering continuing diaspora.

◇ **Example:** On the map, you have only one City in France and no Migrants remaining. This last City is attacked by a preacher and converted, and its Refugee cannot find a Habitable spot in the Hex. Diaspora occurs immediately. The two closest Habitable spots to the French Hex are Iceland or the Canary Islands, and you choose to send your Diaspora Migrant into the latter. Note that you are allowed to reach the Canaries even though your maritime is zero, and can't cross water. It is assumed that the desperation of the situation allows you to perform heroic deeds.

42 CREATIVE DESTRUCTION, a term coined by Austrian economist Joseph Schumpeter, is the ongoing process of annihilating old and bad institutions in order to generate better ones. This allows diverse, inclusive societies to flourish, providing an incentive structure that allows talents and creative ideas to be rewarded. Ruling elites who depend on the old institutions for access to economic resources are particularly afraid of the new groups generated by creative destruction. —Daron Acemoglu & James A. Robinson, *Why Nations Fail*, 2012.

E - CHALLENGE THE GODS

During the first phase of your turn, you decide whether to make a **challenge**, **claim comet**, **globalization**, or skip this phase and proceed to your activities phase (F).⁴³

a. Challenge. You may only do this if (1) the top card of the challenge deck is a Challenge Card and (2) you have at least 1 Elder or Emissary to bid with. If so, draw the card, apply its events to all players (E1), and auction the card itself as a Foundation (E2). See (Fa) for the advantages of acquiring a new Foundation.

b. Claim Comet. You may only do this if the top card of the challenge deck is a Comet Card. If so, each player suffers Chaos, renovate and restore the Market (E3b,c), then award victory chits (E3d).

c. Globalization. You may only do this if you have one or more *Bellwethers* (E3e). If so, discard one of them and move the Philosophy 1 or 2 steps (E4).⁴⁴

E1. CHALLENGE: EVENTS

Each Challenge Card lists two **events** (circular icons), which can be **disease**, **catastrophe**, **cooling**, **warming**, **deforestation**, **forestation**, **pollution**, **famine**, **crisis**, or **dictator**. Perform these from left to right as shown on the card. The events are global, affecting all players starting with the challenger and going clockwise. Lost Cities go to the victim's Urbanization; lost Migrants go to the pool (or to an empty Dissent if a Dissident); and lost Elders go to Free Will. All natural events, i.e. *disease* (E1a), *catastrophe* (E1b), *climate change* (E1c,d,e,f) and *famine* (E1h), are Acts of God and so do not generate Chaos. If you lose a City, you must place a REFUGEE.

a. Disease. There are two kinds of disease: **crowd** and **zoonotic**. They both have the same effects (see below), but differing conditions for infection:



Crowd Disease.⁴⁵ A pandemic infects each player with an Urbanization greater than his immunology stage.



Zoonotic Disease.⁴⁶ An animal-vector disease infects each player with a footprint stage greater than his immunology stage.

- **Effects.** If infected due to low immunology, you must suffer a loss of half your Cities (no Chaos) plus half your Elders. Round all fractions in your favor. To represent the acquired immunity of an active immune system, advance your immunology 1 stage (to its maximum of 10).

◇ **Example:** You have one Elder and one City and suffer zoonotic disease. You don't lose either of them because rounding is in your favor, yet you still advance one in immunology.

43 CHALLENGE THE GODS is a metaphor for undertaking a heroic quest, such as the mythical demi-gods Krishna, Hercules, and Gilgamesh (#34) were supposed to have undertaken, partly against their own elders.

44 PHILOSOPHY studies the foundations of existence, and man's relationship to existence. It is required for game design, in order to arrive at history's enduring essentials while discarding unimportant details. "Only the widest abstractions can integrate all the motives, passions, and headlines necessary to make history understandable. Philosophy determines essentials, not details." —Leonard Peikoff. "...law represents the opinion of the majority, whereas the philosophers speak according to the standard of nature and the truth." —Aristotle, *Sophistical Refutations*, 322 BCE.

45 CROWD DISEASES thrive on frequent contact among persons who have not yet developed an adequate immune response. To persist in scattered hunter-gatherer populations, a pathogen must either be chronic or zoonotic (residing in an animal population that lives close to humans). Otherwise, crowd diseases can only directly target masses of humans, and so natural selection will weed out a germ that harms its own reproductive potential by being too lethal. Thus zoonotic diseases such as bubonic plague, which dwell in animal reservoirs and for which humans are only incidental targets, tend to be more virulent than crowd diseases.

46 ZOONOTIC DISEASES jump from animals to humans. In some, such as rabies, anthrax, tularemia, and West Nile virus, humans are accidental "dead-end hosts" of pathogens coming from wild animal reservoirs. But the world's major pandemics are those shared between humans from the animals they domesticate, and include measles, tuberculosis, and smallpox (from cattle), flu and pertussis (from pigs, dogs, or ducks), falciparum malaria (from chickens), and COVID 19. At the Gombe reserve, 55% of chimps die of disease, mostly infectious zoonotic diseases. Peoples isolated from the crossroads of Afro-Eurasia, such as those indigenous to the New World and Australia, are particularly vulnerable. Hard data is lacking, and the 50% death rate assumed in this game is but a guess. Zoonotic epidemics raced ahead of European immigration, so actual tolls were unrecorded. Zoonotic epidemics can reinforce tiny political differences. The Black Death of 1346 led to the dissolution of serfdom in Western Europe, and led to its resurgence as the "Second Serfdom" in Eastern Europe.



b. Catastrophe.⁴⁷ Locate the epicenter hex on the map with the same name as the catastrophe (it can be under a climate chit). It is indicated by a 20-pointed star icon. Destroy the City in this Hex (if any) plus any Migrants (other than Refugees) on its Spots. All losses are without Chaos.

- **Catastrophe Climate Change.** If the Hex of a catastrophe has a climate chit, the challenger removes it, inverts it to its other side, and adds it to another Hex with that color ring.

Easily Missed. Unlike climate change (Elc, Eld, Ele, Elf), a catastrophe destroys both Migrants and Cities in its Hex.



c. Cooling. The challenging player removes 1 blue (sea) chit from the map, inverts it to its white (ice) side, and places it on any Hex with the white climate ring that does not already have ice. This destroys (no Chaos) any City present.⁴⁸

Important: If you run out of places to put a climate chit, or do not have enough chits of that color, see J1d,e.

Note: If playing with the custom map, see C5g for placement options for climate chits.



d. Warming. The challenging player removes 1 white (ice) chit, inverts it to its blue (sea) side, and places it on any Hex with the blue climate ring that does not already have a sea. This destroys (no Chaos) any City present.⁴⁹



e. Deforestation.⁵⁰ The challenging player removes 1 green (jungle) chit, inverts it to its orange (desert) side, and places it on any Hex with the yellow climate ring that does not already have a desert. This destroys (no Chaos) any City present.⁵¹



f. Forestation. The challenging player removes 1 yellow (desert) chit, inverts it to its green (jungle) side, and places it on any Hex with the green climate ring that does not already have a jungle. This destroys (no Chaos) any City present.⁵²



g. Pollution.⁵³ If your Urbanization is greater than your energy stage, then suffer 1 *Chaos (D2)* plus either Expend 1 Elder or Destroy 1 City (no extra Chaos).



h. Famine.⁵⁴ If your Urbanization is greater than your footprint stage, you must suffer a loss of half your Cities (no Chaos) plus half your Elders. Round all fractions in your favor.⁵⁵



i. Crisis. Check the icon shown in the current position of the Philosophy (C2e). This determines the nature of the crisis:



Genocide (right). All players check to see if their number of Dissidents is greater than their Mysticism. If so, they must choose a Foundation (if they have any) in their Tableau to discard out of the game and Quell its Dissident (if any).⁵⁶



Civil War (upper & center).⁵⁷ All players should first adjust their cube on the Diversity track to reflect the number of unoccluded Rainbows in their Tableau. Then any players with Dissidents greater than or equal to their Diversity suffer 2 *Chaos (D2)*.



Economic Crisis (left).⁵⁸ All players check to see if their number of Dissidents plus Mysticism is greater than their Urbanization. If so, they suffer 2 Chaos.

47 CATASTROPHES include geophysical events such as clathrate guns and supervolcanoes. Clathrates on the ocean floor store methane under pressure, but this pressure is reduced as when the ocean floor isostatically rebounds after an ice cap melts. Subsea methane releases may warm the Earth through the greenhouse effect. The supervolcano in Toba, Indonesia had an erupted mass of 2800 km³, 100X greater than any other volcano known in the last 100,000 years. This may have caused a volcanic winter (see climate diagram page 29), and genetic bottlenecks of humans (as well as chimps, orangutans, macaques, cheetahs, and tigers) date from this time. Because of the wind direction (the eruption occurred during the summer monsoons), six meters of ashfall buried every living thing in India. However, recent studies concluded the effects were mainly local rather than global.

48 SEA LEVELS drop during cooling, as ocean water is sequestered as ice sheets and glaciers. Conversely, sea levels rise as the ice melts. For historical interest, the map shows the shorelines and ice lines during an icehouse, when the continental shelves (light blue) are dry, and during a somewhat warmer ice age, when the ice retreats back to the poles.

49 ATLANTIS refers to the fabled civilization(s) lost to the worldwide flooding of the continental shelves when the ice-sheets melted. Enough water was sequestered by the Pleistocene glaciers for sea levels to be 125 meters lower than today. One of the largest regions now inundated is Sundaland, twice the size of India, today submerged in the Java Sea. Another is the Black Sea, which during the Pleistocene was a much smaller freshwater lake. C14 dating of fresh- and saltwater shells of the Black Sea strata has revealed that the waters swelled and rapidly grew salty around 5500 BCE. This dramatic flood occurred as rising Mediterranean waters breached a dam in the Bosphorus. Whatever cities thrived on the shorelines of the lake were lost in the deluge, which possibly inspired the flood stories of Gilgamesh, Noah, and Plato's Atlantis.

50 DEFORESTATION has progressed since the Eocene due to the sequestering of carbon dioxide from the atmosphere into the crust. Some carbon gets returned by volcanoes, but not enough. Because grasses are better adapted to low CO₂ than trees, the first consequence is replacement of forests with savannas and prairies. But as levels dip towards 150 ppm, the threshold at which C4 photosynthesis shuts down, even grasses are gasping for breath. To try to catch the occasional CO₂ molecule that happens by, molecules so rare they are measured in parts per million, leaves open their stomata as wide as possible. This unfortunately facilitates water loss, and a combination of low water and low CO₂ converts grasslands into "CO₂ deserts". An example is the Sahara, lush and green throughout pre-Ice Age Cenozoic and again in the wet Holocene (Epoch II), but uninhabitable by 4.2 kya (Epoch III). The last icehouse dipped down to 180 ppm, uncomfortably close to photosynthesis shutdown, and if the next one goes even lower, it could be the end of macroscopic life on Earth. —Peter Ward & Donald Brownlee, *The Life and Death of Planet Earth*, 2003.

51 DEFORESTATION TODAY. The world's temperate forests have been expanding for a century, a result of increasing anthropogenic carbon and better lumber technologies such as tree farms. Furthermore, as the Green Revolution shrinks the agricultural footprint, more and more former farmland is reverting to forestland. In the developing world however, the tropical forests are still being chopped down for high-footprint agriculture or burned for energy. As it was for the temperate forests, this can be reversed by technology and a politics that favors entrepreneurship.

52 JUNGLES such as in the Amazon marginally survived even the most arid portion of the LGM (Last Glacial Maximum), as pollen studies have shown. Indeed, the equatorial belt has become a sanctuary jammed with the world's warm-loving trees during the long general cooling since the dinosaur days. But because of disease and lack of big game, jungles have been historically avoided by hunter-gatherers, although a fisher-gather site dated to 12 kya has been discovered along the Amazon River.

53 POLLUTION is any significant health hazard caused by the processes of life. All life pollutes; it is in the definition of life that desirable substances are converted into undesirable ones. In human societies, pollution is *inversely* linked to rising energy technology: the higher the energy tech stage, the more units of energy per units of pollution. Contrary to modern myths, low tech energy such as burning firewood pollutes more than an equivalent energy from burning oil or gas. See "A Tale of Two Islands", page 27. In societies powered by low tech wood combustion, the deforestation and smoke pollution is greater than from combustion of cleaner fuels such as oil and gas. Sometimes wind or solar energy is touted as "clean" energy, yet because of the high real estate required per unit of energy, these sources require many more forests cleared than an equivalent wattage of oil or nuclear energy. The pollution and waste per person is less in a high tech society than in the developing world. The average household in Mexico City produces one third more garbage than its American counterpart. Another common myth is that household waste per capita is on the rise. In New York City of 1900, the amount of waste was over 4kg/person/day, mainly from horse manure and coal ash. This is double that of New York City today. Air and water pollution remain largely a developing world problem, yet one soluble by technology, not politics.

54 FAMINES are mainly caused, not by drought, but by centralized and authoritarian political systems that heavily regulate agricultural distribution. Free-market economics do not produce famines. —Amartya Sen, 2016.




55 SOIL SALTIFICATION is an accumulation of soluble sodium in the soil, which is detrimental to crops. It can be caused by generations of irrigation, as evaporated water leaves its salts behind. Most ancient agricultural civilizations eventually abandoned their fields due to high soil salinity, the result of footprint technology outpacing energy technology. With enough command of energy resources, saltification can be reversed.

56 GENOCIDE can erupt suddenly even in a multi-ethnic society with a long history of domestic tranquility. "There was not a single race riot between the Sinhalese majority and the Tamil minority in Sri Lanka during the first half of the twentieth century and the relations between the two groups at mid-century were regarded by many observers as a model for how different ethnic groups could coexist in harmony. ... Sri Lanka was not unique. Neighbors who lived in peace for years, or even generations, turned on each other murderously in Indonesia, in the Balkans, and in sub-Saharan Africa." —Thomas Sowell, *Black Rednecks and White Liberals*, 2005.

57 LATE BRONZE AGE COLLAPSE beginning in 1200 BCE obliterated in just a few decades every significant city in the Mediterranean and Near East, many of them doomed to never be occupied again. Many advanced writing systems seem to have been forgotten. The civilizations lost included the Mycenaean, Levantine city-states, Minoan, Assyrians, Hittites, the Egyptian New Kingdom, Mitanni, and the Kassite kingdom of Babylon. Further east, dark ages followed the fall of the Harappan and Shang dynasties in 1300 and 1046 BCE respectively. The trigger may have been that the civil structures were unable to cope with a language sufficiently developed to allow subjective consciousness.

58 ECONOMIC CRISIS has disintegrated empires such as the Roman Empire. Rome lost her Republic in 31 BCE, placing Rome under central planning and increased corruption. By c. 150 CE, the imperial government increased taxes and economic controls, confiscated land to build large estates, and diluted the gold and silver in the coins. With the fall of Rome, Europe entered a millennium-long Dark Age of illiteracy and chaos.



j. Dictator. Skip the *challenge auction (E2)*. Instead, award this card to the player with the most Mysticism (if its a rightist dictator ) or Dissidents (if its a leftist dictator ).⁵⁹ If tied, start with the challenger and go clockwise to see who wins. As noted on the card, dictators come with a special Eureka called *purge*  (**G9g**).

Example: You challenge, revealing the rightist dictator Napoleon (#79). After resolving the crisis event, you skip the auction and check to see who has the most Mysticism. You have 1 mystic, and so does one of your opponents. The others have none, and you are awarded Napoleon since you go first in the tiebreaker. You decide to place Napoleon on its white Orientation and purge the other Foundations in this column.



E2. CHALLENGE: AUCTION

The Challenge Card is auctioned. Each player makes one bid for it or passes. Win the auction by having the highest bid, using Elders and Emissaries as the bid media.⁶⁰ If you win, Expend the Elders and Emissaries that you bid. In certain cases, your bid is augmented by your Mysticism (**E2b**) and/or by 1 during favorable *globalization (E2c)*. Regardless of augmentation, you must expend at least one pawn to win a bid. The winner gains the Challenge Card as a new Foundation. Follow this procedure:

Easily Missed. Winning an auction is the only way to gain a Foundation. Unlike inventions, which can become obsolete and get discarded, once a Foundation is gained, it can be lost only by purge or genocide.

Easily Missed. Pawns on your Brain Placard may never be used for bidding.

a. Once-Around Auction Procedure. Starting with the challenging player and proceeding clockwise (ending with the player on the challenger's right), each player may make one bid or pass. The minimum bid is one, and you must include at least one Elder or Emissary to bid with. Each bid must be higher than the last (including *augmentation E2b,c*). You may not bid more than you can afford to pay. The highest bid wins the auction. All players with at least 1 Elder may bid, regardless of the tech requirements of the Foundation being auctioned.

Note: If nobody bids on a Challenge Card, discard it from the game.

59 DICTATORS demand paternalistic control over human behavior and accordingly hate freedom of any kind. Modern totalitarians particularly hate capitalism; the social system which holds that all transactions should be of force or threat of force. Both Hitler and Stalin came into power preaching anti-capitalism, and quickly nationalized or otherwise subjected their industries to state control and sent their owners, especially Jewish ones, to death camps. They differed, however, in the utopian ideal they claimed to pursue. Rightist dictators like Hitler march under the spiritualism of "unity", under which all inadequate cultures and races are suppressed. Advocating state worship and fascism as formulated by the Enlightenment philosopher Hegel, they use legal force and censorship to impose state standards of morality, duty, and intellectual control. Leftist dictators like Stalin march under the materialism of "equality", the populist notion that capitalist elites should be suppressed in a classless society overseen by a supreme central planner. They use both formal legal force and extralegal secret police to impose state control of business, employment, wages, profits, and physical property.

60 BID MEDIA represent a particular authorization for decision-making. Prior to this game (Epoch 0), hominids were not verbally conscious and used emotional authorizations. But as proto-humans accumulated a vocabulary, new decisional authorities came from calls, commands, motherese, and other external communications. At first these were merely part of the I/O and not units of cognition, so the resulting decisions were "trained animal acts". This changed around 40 kya, with the sudden appearance of representational art, burials, technology, and social complexity in the Cultural Revolution, indicating a software upgrade of long term memory and multimedia consciousness. The spoken or sung words, normally quickly forgotten, might persist as earworms or imagined "voices", manifested through dance, paintings, figurines, and musical flutes and drums. By the Age of Polytheism (Epoch II), conscious decisions were mediated by a personal pantheon of hallucinations often interpreted as "gods". During Epoch III, written concepts of time, space, and self, enabled what Edelman calls "higher-order consciousness", with free will, morality, and centralized monotheistic authorities for decisions. The final software upgrade heralding Epoch IV is the discovery of logic and reason as an authorization of decisions.

Easily Missed. The bidding proceeds for just one round, so everyone has only one chance to bid.

Tip: If you have "deadwood" Elders or Emissaries sitting on an Idea which has become useless, you can recall them in one of three ways: (1) use them to bid with in auctions, (2) expend them using library or elect, or (3) sacrifice them during Quelling.

b. Mystical Bid Augmentation. If the Challenge Card is religious (i.e. it has an ✨ in the corner, see **B2a**), then each player automatically adds his Mysticism to his bid (unless he passes).⁶¹


Example: You choose to make a challenge and the Challenge Card is "grave goods" (#9), a religious card. Your Mysticism is 2. You bid 1 Elder which is augmented by 2. Therefore, your opponent would need to bid 4 in order to claim the card.

c. Globalization Bid Augmentation. If the Philosophy is off the center point, then each player with a Ruling Class equal to the Discipline favored by the position of the Philosophy automatically adds one to his bid (unless he passes). The favored Discipline is indicated by the color of the "+" icon on the Philosophy Diagram.

Example: In the challenge of the previous example, the Philosophy is on "NATURAL LAW" which is one of the spots marked with a red "+". Your Ruling Class is industry, so this augments your bid by one. Since your bid is already augmented by 2 for your mysticism, your opponent would need to bid 5 in order to claim the card.

d. Winning & Payment. If you have the highest bid in an Auction, you win and pay for your bid by expending all Elders or Emissaries used in your bid to your Free Will. You pay nothing for any *augmentation (E2b,c)* to your bid. If you lose the auction, pay nothing.

e. Eureka. After winning and payment, you must make the "EUREKA" Advancement or Advancements (**G9**) listed on the card.

f. Tech Requirement. If a card lists a tech stage or brain requirement (e.g. REQ.: ) listed which you have not achieved, then you can still take part in the auction. If you win, you still receive the Eureka benefit, but must discard the Challenge Card out of the game (instead of adding it to your Tableau).

Easily Missed. If you win the auction, and the Eureka on the card gives you its Tech Requirement, you now meet the requirement and can keep the Challenge instead of discarding it.

g. Orienting the Foundation. If you meet the *tech requirement (E2f)*, the card that you won in auction must now be placed into your Tableau as a Foundation. Choose one of its two Orientations. The abilities placed upside-down are deactivated for now. If you do not meet the tech requirement, discard the Foundation from the game.

h. Propping Up Ruling Class. If the chosen Orientation is the same as the Ruling Class, put the card half-over the lowermost Foundation as shown in the example tableau (**D1**), so as to add a new layer.

Example: You decide to challenge and win. You choose an Orientation for your new Foundation that is the same as your Ruling Class. All Chaos remains unchanged. You place it and continue to the activities phase of your turn.

61 MYSTICAL AUGMENTATION first influenced human decision-making with burials, mummification, grave goods, feeding the dead as if alive, royalty, and other ancestor worship. Tombstones are witness that this strange reverence still lingers. Manifestations of dead ancestors seem to have been the first symbolic memories, allowing us to remember the verbal lessons of persons now dead. Other animals, lacking symbology, act upon their memories but are unable to visualize them.

- i. Quiet Revolution.** If the chosen Orientation is not your Ruling Class Column, a **quiet revolution** occurs that changes your Ruling Class to the chosen column. Interrupt the game and perform the sequence in **D3**. Then put the card half-over the lowermost Foundation as shown on page 10 or 11.

Easily Missed. You must Quell all your Dissidents during a revolution, whether quiet or chaotic.

- ◇ **Example:** You win a Challenge Card and choose an Orientation for it that is not your Ruling Class. You have one Dissident, which you Quell by expending an Elder not used in your bid. Then you place the new Foundation, shift your Crown, and continue to the activities phase of your turn.

E3. CLAIM COMET

There are 4 *Comet cards* (**B2c**) in the challenge deck, called Comet I, II, III, and IV.⁶² These are double-sided, and oriented differently, so all players will see when one is revealed as the next card in the challenge deck. If a Comet is the next card, the first to challenge it is automatically awarded the card (skipping the auction) and starts the next Epoch! Follow these steps (as listed on the card):

- a. Future Shock Chaos.**⁶³ Beginning with the claimant and going clockwise, each player suffers 1 *Chaos* (**D2**).
- b. Renovate Market.** Discard out of the game (not into Lore Deck) all Market cards that have no Elders on them. Also discard out of the game all three market draw decks and replace them with new draw decks from the next Epoch.
- c. Restore Market.** Restore the Market per **H2**. This fills Gaps caused by the previous bullet with cards from the next Epoch.⁶⁴

- ◇ **Example:** You claim the first comet, ending Epoch I. Every player suffers a Chaos, and your opponent goes into chaotic revolution as a result. The game is interrupted to resolve this. Then you remove all the cards and draw decks that are Epoch I, excepting only one Market card that has a pair of elder pawns on it. This card is slid to the first row, and then the entire market is restored with Epoch II cards.

- d. Comet Scoring.** Each player claims *victory chits* (**B8b**) as described on each Comet. For Comet I, which arrives at the end of Epoch I, each player compares his Mysticism with the other players and claims one victory chit for each opponent in the game with less Mysticism. He places these chits over the circle of his color labeled I on the map, in the culture: final score. For Comet II, the procedure is the same except players compare Urbanization instead of Mysticism, and the chits go on the politics: final score. For Comet III, it is Diversity that is compared, and the results go into industry: final score. **Each victory chit provides 1 victory point during the final scoring (I).**

62 COMETS are the traditional harbingers of upheavals in the *Pax* and *Bios* series of games. Comet I in this game represents the Cultural Revolution, with the first appearance of bone and ivory tools, representational art and music, organized settlements, elaborate burials with grave goods burials, and social hierarchy.

63 FUTURE SHOCK heralds each new epoch in the bumpy road to modernity. This chaos can be compared to a change of software or operating system on a computer. In Epoch I, the Age of Speech, words are only used for person-to-person communications, such as warning calls. In Epoch II, words are starting to be used as tools of cognition. This is the first time words are used in thoughts and internal monologues, and humans doing so were alienated from their instinctive brethren. By Epoch III, self-referential metaphors have generated an identification of self relative to the universe, so the first consciousness and the breakdown of previous instinctive authorizations interpreted as commands from a personal pantheon of gods. By Epoch IV, logic and reason have started to replace religion as a new ideological authorization for decisions. Each sweeps away the old ideas, as what authorizes human decisions is realigned.

64 THE INDUSTRIAL REVOLUTION "started and made its biggest strides in England because of her uniquely inclusive economic institutions. These in turn were built on foundations laid by the inclusive economic (and) political institutions brought about by the Glorious Revolution. It was the Glorious Revolution that strengthened and rationalized property rights, improved financial markets, undermined state-sanctioned monopolies in foreign trade, and removed the barriers to the expansion of industry."—Daron Acemoglu & James Robinson, *Why Nations Fail*, 2013.

Easily Missed. There is no comet scoring during final scoring.

- ◇ **Example:** As neanderthal in a 3-player game, during Comet I you have more Mysticism than either of your opponents. Therefore you claim 2 victory chits, which you stack over the white (neanderthal) circle in the lower left (cultural final scoring) region of the map.

- e. Bellwether.**⁶⁵ The challenger automatically receives the Comet Card, inverted to its **Bellwether** side. He keeps this card for possible use to **globalize** (**E4**).

- ◇ **Example:** The first Comet is on top of the challenge deck, and you claim it in your challenge phase.

Everyone suffers a Chaos. Your Ruling Class has a Foundation with an empty Dissent which accepts the Chaos. But Player Green has all Dissent filled and must go into chaotic revolution, changing his Foundation from culture to industry. The Market is flushed, replacing all draw decks with Epoch II draw decks and replacing all Market Cards without Elders with Epoch II cards. You have one Mystic, Player Green has three, but Player Black has none. Therefore, you claim 1 victory chit and Player Green claims 2 victory chits. You keep the Comet as a Bellwether.



E4. GLOBALIZATION

As an alternative to making a Challenge, if you have one or more *Bellwethers* (**E3e**) you may discard one out of the game and move the Philosophy by 1 or 2 steps from one adjacent space to another.

F - ACTIVITIES PHASE

During this phase, you perform the **activity icons** listed on the visible colored portion of the cards in your Ruling Class Column. These Actions (**G1-G8**) and advancements (**G9**) are voluntary and applied to you only. You may skip a card row.

- a. Bottom To Top Order.** Perform Actions and advancements in the order in which they appear in the Ruling Class Column, read from bottom card to top card. These cards include Foundations, Species Placard (one Action from each row in the Ruling Class), and **invented Ideas**.

- ◇ **Example:** Refer to the Tableau with a political ruling class illustrated on page 10. It has two Foundations, a Species (2 rows), and finally one Idea. Performing your activities from the bottom up, you (1) perform art on the 1st foundation, (2) skip the 2nd foundation (because it is shutdown by the Dissident), (3) choose the invent on the lower row of your species card, (4) choose the spread on the upper row of your species card, and (5) advance your energy from stage 3 to stage 4. Player White gets a Negotiation because of his Emissary.

- b. Dissident Shutdown.** A foundation is shutdown, and its Actions can't be used, if it has a Dissent icon which is Occluded by the presence of a Dissident. A Dissident on the Crown's Dissent has no effect on shutting down Actions.⁶⁶



65 BELLWETHERS are the vestiges of the old epochs that linger after they are supplanted by new ones. Epoch I, the age of emotions, is long gone, yet emotions still cloud our decisions. Epoch II is not dead either, as evidenced by the otherwise inexplicable behavior of humans under hypnosis or the power of suggestion. Vestiges of Epoch III linger as religious trances, schizophrenia, transcendence, speaking in tongues, occult and astrological fascination, religious ecstasy and rapture.

66 DISSENT represents dissatisfaction against the use of force of arms by the ruling class to impose its will on other members of society. This is in no way alleviated in a democracy, which legitimizes the use of force to impose the interests of the majority on the minority. Only in a pure business society is the use of initiatory force always prohibited, defining business as a transaction involving persuasion without force or threat of force.

●➔ **c. Conjunctions.** Typically, a card will have several options, separated by the “/” icon. For instance, A / B / C is to be read as: you may choose activity A or activity B or activity C.

d. Consequents. After certain Actions this symbol ➔ appears followed by an Action, usually either an advancement icon or the Chaos icon ☒. This advance must be awarded or the Chaos suffered if you perform the Action, and is applied after any other effects of the Action such as Negotiation or war losses. Actions that can have Consequents include prayer, urbanize, **exogamy**, **war** (regardless of outcome), or **trade**.

◇ **Example:** You have the UNITED NATIONS (#67) foundation in the cultural ruling class. Its activity icons are: ☒ / ☒ ➔ 6♣. During activities, you have a choice: either perform an abstraction, OR an exogamy. If you perform an exogamy, you increase your footprint by a step as a Consequent.

e. Revolution. If during your activities you suffer a chaotic revolution, then your activities phase abruptly ends after the Revolution (D3f).⁶⁷

f. Emissaries. If during your activities you use a card that has an opponent's Emissary on it, then he immediately gains a NEGOTIATION.

g. Diaspora. If you completely eliminate an opponent from the Map, he immediately performs *diaspora* (D4).

G - ACTIVITIES LIST

Each Action has a specific icon. The four most important, found on the lower row of each Species card and sometimes as *elder actions* (J5) on Ideas and Foundations, are called **knowledge actions** (G1, G2, G3, G4). These move Elders to and from the Market.⁶⁸

G1. SPECIALIZE ACTION



This creates new Elders in the Market.⁶⁹ Take a number of pawns from your Free Will and choose which Idea or Ideas in the Market to place them on. Once there, these pawns are called **Elders**. You may place on Ideas where you or opponents already have Elders. The maximum number of pawns you can place as Elders per specialize action is equal to your information stage (D1c).

Easily Missed. Your information is not the maximum number of Market Elders, but rather the maximum number of Elders you can add to the Market during each specialize. There is no limit on pawns you may have in the Market.

Easily Missed. You may only specialize pawns from your Free Will. You may not specialize other pawns on your Brain Placard, nor Mystics, Emissaries or other Elders (they are already specialized in something else).

⁶⁷ REVOLUTION was rare in the polytheistic age, with its blind obedience to the gods. Perhaps the first recorded premeditated mutiny and parricide was against King Tukulti of Assyria (the Biblical King Nimrod) in 1207 BCE. This was part of the Late Bronze Age collapse, see footnote 57.

⁶⁸ KNOWLEDGE is a reason-based grasp of reality, either by direct perception or an apprehension of natural laws, achieved by language-based scientific induction. It represents an upgrade beyond and independent of intelligence, the problem-solving programming that has been around since the dawn of animals. Inductive knowledge is economically valuable because it increases the work skills and entrepreneurship of innovators and industrialists. This produces the food, housing, medical care, infrastructure, and all the other elements of a higher standard of living, and not the green paper used to transfer this wealth around its population. "After all, the cavemen had all the natural resources at their disposal we have today, and the difference between their standard of living and ours is a difference between the knowledge they could bring to bear on those resources and the knowledge used today." — Thomas Sowell, *Knowledge and Decisions*, 1980.

⁶⁹ SPECIALIZATION OF LABOR introduces new classes of artisans, warriors, and political elites. It was made possible by the pottery, pastoralism and agriculture of the Neolithic (Agricultural) Revolution. Many more specialists were fathered by the industries and factories of the Industrial Revolution. "The production of wealth vitally depends upon a division of labor. ...The division of labor, as a country's dominant form of productive organization...is a relatively recent phenomenon in history. It goes back no further than eighteenth-century Britain. Even today it is limited to little more than the United States, the former British dominions, the countries of Western Europe, and Japan. The dominant form of productive organization in most of the world has been largely self-sufficient production of farm families and, before that, of tribes of nomads or hunters." — George Reisman, *Capitalism*, 1990.

◇ **Example:** Your information is 3 and you have 2 pawns in Free Will. You are allowed to specialize 3 pawns, but only have 2 to place. You decide to place both in the culture column, one in the 1 cost row and the other in the 2 cost row.

G2. INVENT ACTION



Invent takes a Market Card which you have at least one Elder on and removes it from the Market, either to discard or to add to your Tableau. In either case, you claim its Eureka, and any opponents with an Elder on the card also copycat its Eureka. There are 4 steps to invent: (a) Expend Elders, (b) Eureka (an instant advancement, see G9), (c) Copycat Eureka (an opponent's instant advancement), and (d) discard the Idea. If playing the advanced game, instead of (d) the card goes into your Tableau as an *invention* (J2) if you meet its *elder* (G2a), *menopause* (J2a) or *tech* (J2b) requirement (if any) and the Idea has an Orientation that matches your Ruling Class.⁷⁰

a. Expend Elders. To invent, the card must have at least as many Elders (of any color) as its matrix row number in the Market (D1a). Expend all Elders.

Easily Missed. These Elders can be a mixture of yours and opponent's Elders, but at least one of the Elders must be yours.

b. Eureka. As stated in the lower part of the card, invent always comes with an instant *advancement* (G9) called a **Eureka**. This bonus is mandatory and achieved whether or not you meet the listed *tech requirements* (J2b) and also whether or not you add the Idea to your Tableau as an *invention* (J2).

● **Conjunctions.** The + icon reads as a mandatory "and". For instance, the Eureka on the televangelists (#69, see page 9) requires both prayer and purge.

● **Cull (I), (II), or (III).** If a cull is stated as part of an Idea's Eureka, then you must discard from your Tableau onto top of the Lore Deck one Idea of the stated Epoch or earlier. For instance, "CULL II" means that you must discard your choice of Ideas from among the Epoch I or Epoch II Ideas in your Tableau. This Expend any Emissaries on the card. Nothing happens if you do not have any Idea cards from those Epochs.

c. Copycat Eureka. If one or more opponents have an Elder on the Idea, those players also get the Eureka bonus. If the Eureka is a *demagogue* (G9h) or *invent* (J5), the player to the left of the challenger or inventor goes first, then proceeds clockwise.

Easily Missed. You get Eureka only once, even if you have multiple Elders.

d. Discard/Invent. Discard the Idea on top of the Lore Deck unless J2 allows you to claim the Idea as an *invention*. If you have too many Ideas, see J2e.

◇ **Example:** An Idea in the second row of the culture market column has one orange and one white pawn. As Player White, you invent the Idea. Both you and Player Orange receive the Eureka (abstraction). Both pawns get expended to their Free Wills. Then discard the Idea onto the Lore Deck. If you meet the requirements J2a,b,c, orient the Idea to the color of your Ruling Class (purple), and place it half-under any existing Ideas.

⁷⁰ INVENT is a form of technological concept-formation, in which a tool is visualized before it is made, using words mentally converted to pictures. Every word we use is a denotation of a concept that stands for an unlimited number of concretes of a certain kind. Prior to word-based concepts, tool-making advanced only by random tinkering at the slow pace of natural selection. In contrast, verbal concepts categorize abstractions and classes of concretes, allowing for rapid inventive ingenuity.

G3. LIBRARY ACTION



Expend to your Free Will a number of Elders equal to your information stage, and advance your information stage by one step (to a maximum of 6).⁷¹

◇ **Example:** You are at information stage 3 with 5 Elders in the Market. As a knowledge action, you return 3 of them to the Free Will, and advance to information stage 4.

G4. ELECT ACTION



If you have one or more Elders plus Emissaries, expend all of them to your Free Will, set your Ruling Class to any desired Discipline, and Quell all Dissidents. Each Dissident Quelled entails the loss of a City, or a Migrant if you have no Cities.⁷² If the Ruling Class is unchanged, continue your actions with the next row upwards.

a. Class Dealignment. If your Ruling Class changes, all Ideas either transfer (D3d) or become obsolete (D3e). Continue in the new Ruling Class starting with the Placard.

b. President For Life. You are only allowed one elect action on your turn.

◇ **Example:** It is close to the scoring round at the end of Epoch III and, in order to increase your diversity, you perform elect by expending your only Elder in the Market. You quell all three of your dissidents, but decide not to change your ruling class.

G5. MIGRANT ACTIONS

There are 3 kinds of migrant actions: spread (G6), urbanize (G7), or transactions (J3). These Actions either create a new Migrant and move it on the map, move an existing Migrant on the map, or replace a Migrant on the map with a City:

a. Create Migrant. Take a Migrant from your pool (see B9a if the pool runs out) and place it on top of any existing map figure of your color (either Migrant or City). Then spread it according to the spread rules (G6).

b. Move Existing Migrant. Instead of creating a New Migrant, you may move an existing Migrant who has not moved this turn. Spread it according to the spread rules (G6).

c. Replace a Migrant with a City. When you urbanize (G7), replace a Migrant (returning it to your pool) with a City, covering one of the resources in one of the 3 Hexes the Migrant was adjacent to.

G6. SPREAD ACTION



During a spread action, you move either (1) one new Migrant (G5a) or (2) one existing Migrant (G5b) from Spot to Spot following the white Hexsides.⁷³ Your Cities can never move from one Hex to another.

71 SYMBOLOGY. Humans had long responded to a variety of verbalisms, such as warning calls and admonishments. But these were mere conditioned reflexes. In a cognitive breakthrough, some genius was able to retain an audio hallucination of a communicated word and use it as part of her decision-making algorithm. Perhaps the first "inner voice" was an adjective such as "sharper", repeated to keep her attentive to a task long after her non-hallucinating counterpart had wandered off. Or perhaps the first thought was a hallucinated noun such as "bison" or "mama". Words became the first symbols. A further refinement was visualization, the ability to form a mental image of what a word represents, and somehow distinguish that hallucination from the real thing. Hallucinations both audio and visual are aided by drugs and chanting, and so shamanism was born. The cave paintings were likely the results of vision quests of shamans trying to recreate their visions. This would explain why they have been retouched over centuries, as generations of shamans participated in this ritual in the dark. A final refinement was for others to view the painting or sculpture, and mysteriously visualize that marks on a plane surface could stand for an animal, a talent no other species can duplicate. The first art critic may have represented the biggest cognitive leap ever accomplished.

72 ELECTORAL VIOLENCE. There is nothing fundamentally fair, just, or peaceful about the majority using force of numbers to impose its will on the minority.

73 SPREAD is the Malthusian imperative for all life, including humans until Epoch II. Humans liberated by the development of free will are capable of non-Malthusian behavior such as deliberate celibacy, birth control, suicide, ideological altruism, or other behavior that spreads neither their genes nor their relatives' genes. Today all Western Nations have birth rates below the replacement rate, and as parents choose to have fewer kids, worldwide falling populations are inevitable. Indeed, the number of children alive today (2 billion) is likely as high as it ever will be. Falling populations will bring its own problems to be faced by the next Epoch.

a. Spread Reach. A Migrant can spread up to as many Spots as your current energy stage.⁷⁴ If spreading from a City, the first Spot must be one of the Spots that are part of that City's Hex. Except for merfolk, the last Spot moved to must be a land spot (B3b).

b. Maritime.⁷⁵ A Migrant can spread over as many water spots as your maritime stage. Thus, at the game's start, you cannot cross any water.

Note. It is possible for a Migrant to become trapped by climate change, surrounded by uninhabitable chits, unable to move until his technology increases or the climate changes again.



◇ **Example:** Player Black has maritime stage 2 and energy stage 4. Therefore, starting on a land spot, she could move up to 4 Spots including up to 2 water spots and ending on a land spot. She could do a land-water-water-land move (see above) but could not cross 3 water spots such as water-water-water-land.

c. The Blitzkrieg Rule.⁷⁶ You are not allowed to spread from a Migrant that has already moved on your turn, or from a City that was formed this turn, unless you have either (1) a war animal city, (2) an oil city, or (3) an uranium city. This includes transactions that use spread (trade, preach, war, or enslave, see J3). You are allowed to urbanize (G7) from a Migrant you have spread, even without blitzkrieg.

◇ **Example:** You have no war animal city. You spread a Migrant to the elephant hex in India, and domesticate it in the same turn. You have one last spread action, and are allowed to spread from your new City since now you have a war animal city.

d. Entering an Enemy Post. You are not allowed to enter a Spot occupied by an enemy Migrant without prior permission from the owner to pass unless performing a transaction (J3). The final Spot entered must be unoccupied unless you are performing a successful transaction (trade, preach, attack, or enslave to an opponent, see J3).

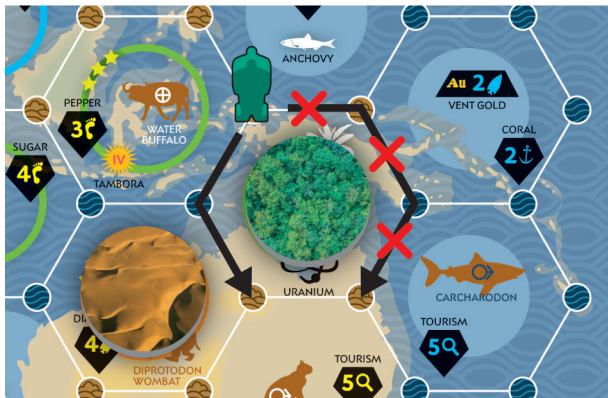
e. Global Wrap. If you enter one of the named Spots on the far east of the map (Beringia, Musicians Seamounds, or Hawaii), you are also considered to be on the same Spot located on the far west of the map (and vice versa).

74 ENERGY. Life got kickstarted with geochemical energy, and subsequent evolutionary developments added sunlight, oxygen, and flesh to the list of energy sources. This expanding realm has led to an increase in the diversity and complexity of ecosystems. Human technologies have added fire (hearths and kilns of energy stage 2), chemical (e.g. fossil fuels of energy stage 5), and nuclear (fission of energy stage 6). Prior to these discoveries, societies were restricted to wood fires and agriculture, limiting economic growth to the rate that solar energy can be converted into useful goods and services.

75 MARITIME TECHNOLOGY is an early example of a technology - a product conceptually visualized in the mind before it is made. It allowed the discovery of new lands, beginning with the aborigine landfall in Greater Australia about 55 kya, as indicated by the time of megafaunal extinctions there. Skin boat technology aided Pre-Clovis Indians to circumvent the Cordilleran Ice Sheet, the barrier between Beringia and the rest of the New World during the last icehouse. The greatest maritime culture of all time, the Polynesians, used seaworthy outriggers and birdwatching skills to discover Hawaii by 500 CE and New Zealand by 1000 CE, about the time the Vikings reached Greenland and Vinland. The Polynesian and Viking feats can be duplicated in the game using stage 2 boats (galleys), but crossing the Atlantic in the manner of the 1492 exploit of Columbus requires stage 3 ships.

76 BLITZKRIEG. Nomadic pastoralists, such as the Kurgans (Yamnaya) and the Huns, bred grazing animals such as horses and cattle, which migrated with them in their caravans. The first wheeled vehicles (#146) were likely developed on the steppes. Such peoples swept into European farmlands with lightning rapidity.

f. Climate Chits refer to the colored chits on the map, added or subtracted during certain events (**E1c,d,e,f**). In general, a Migrant is not allowed to spread along a line that passes between 2 climate chits. Spreading is allowed if passing between a Habitable and an uninhabitable Hex. See **HABITABLE** for exceptions if you have if you have advanced more than once in footprint, energy, immunology, or maritime.



Example: A hobbit migrant in Indonesia wishes to sail to Australia. However, northern Australia is covered by a jungle chit, and the Australian wombat hex is covered by a desert chit. The hobbit has $\downarrow 1$, $\downarrow 1$, and $\uparrow 3$. He cannot take the route east then south, because that would

move between a permanent ocean and the jungle, two uninhabitable Hexes. But he can take the southern route. This also travels between 2 chits (a desert and a jungle), but his footprint stage of 3 allows travel between a desert and an uninhabitable Hex.

Easily Missed. In the above example, do not forget that permanent ocean is uninhabitable (e.g. the Carcharodon Hex), even though there is no climate chit there. Therefore moving along a coastline between ocean and uninhabitable land hex is disallowed without maritime 2 or higher.

g. Shangri-La. A Migrant unable to move because it is surrounded by climate chits remains in isolation (until e.g. removed by Quelling or liberated by technology).

h. Terra Incognita. The arctic area, north of the northernmost row of Hexes, is considered *permanent ice* (**B3h**). This impacts spread along the far north. For purposes of movement, consider all other areas outside of Hexes to be *permanent ocean* (**B3i**).

G7. URBANIZE ACTIONS



A City is created either by domesticate \square , cultivate \square , or prospect \square . Any of these 3 Actions converts a Migrant on a Spot of a Hex into a City in that Hex. The Hex must be **Habitable** (e.g. not Occluded by a climate chit). Expend the Migrant, then remove the leftmost cuboid from your Urbanization and set it to cover the appropriate resource icon (**B3e**) in the Hex interior. Urbanize actions often have **CONSEQUENTS**.⁷⁷

Limit (per Hex). Each Hex can contain only 1 City. Many Hexes contain 2 resource icons, and if you urbanize a second City in a Hex, you must own the first City and use its cuboid to create the second. Therefore, you destroy one City (without Chaos) and use it as the Migrant to create the second.

Limit (per player). See **B9c** if you urbanize but already have 10 Cities.

77 URBANIZATION. "To argue, therefore, that emperors or agricultural surpluses made the urban revolution is to get it backwards. Intensification of trade came first. Agricultural surpluses were summoned from trade, which offered farmers a way of turning their produce into valuable goods from elsewhere. Throughout history, empires start as trade areas before they became playthings of military plunderers from within or without. ... Trade emerged from the interactions of individuals. It evolved. Nobody was in charge." —Matt Ridley, *The Rational Optimist*, 2010.

Note. You can re-urbanize a Resource that you already have a City on, just to gain the Consequent. This does not consume a Migrant.

Example: During your activities you have a $\square \rightarrow 3$ action. This allows you to use a migrant in a metal resource hex to prospect the metal resource, consume itself to create a city, and advance your metallurgy by one stage (to a maximum of metallurgy 3). Alternatively, if you already have a gold city that you conquered the previous turn, you can re-prospect it in order to advance towards metallurgy 3.

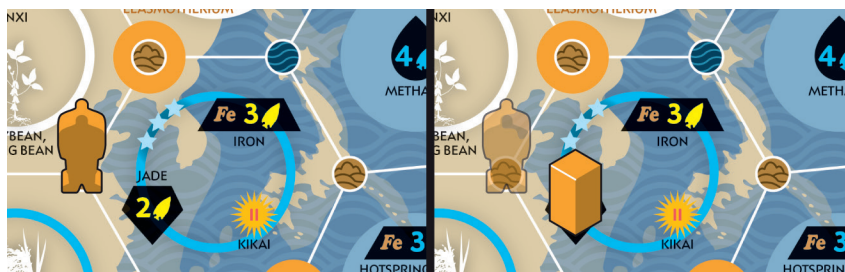
a. Domesticate.⁷⁸ This establishes a City on a Hex you occupy with at least one Migrant. The Hex must contain an uncovered animal icon (brown), and must be Habitable (i.e. not be permanent ocean/ice or contain a climate chit). If so, Expend the Migrant, then take the leftmost cuboid from your Urbanization track and put it into the center of the Hex, to cover the animal icon. This is your City.⁷⁹



b. Cultivate.⁸⁰ Establishes a City in a similar fashion to Domesticate, but instead of a brown (animal) resource, you establish a City on a Habitable white (horticulture or biofuel) resource (see map legend).



c. Prospect. Establishes a City in a similar fashion to Domesticate, but instead of a brown (animal) resource, you establish a City on a Habitable Hex with a black resource icon (luxury, metal, oil, or uranium). As an additional precondition, you must have the minimum Technology Stage listed on the icon.

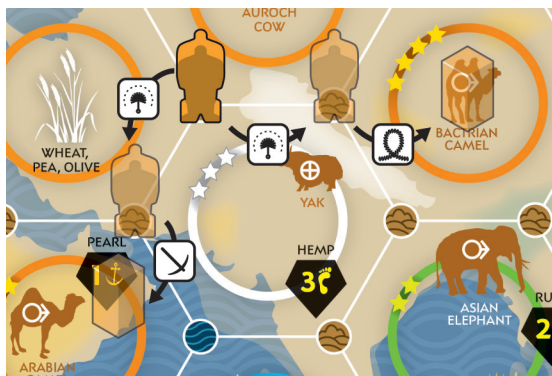


URBANIZATION. Player Orange has metallurgy 2, and uses the \square action.

78 DOMESTICATION is the process of selectively breeding a plant or animal in captivity, to the point it becomes dependent on humans for reproductive success. The known centers for the origin of food production are shown on the game map: the Fertile Crescent (10.5 kya), China (9.5 kya), New Guinea (9 kya), Sahel (7 kya), Mesoamerica (5.5 kya), the Andes (5.5 kya), Ethiopia and West Africa (5 kya), and the eastern U.S. (4.5 kya). Earliest dates for animal domestications are: the sheep and goat 10.5 kya (Fertile Crescent), the pig and silkworm 9.5 kya (China), the auroch cattle 9 kya (Indus Valley), donkey and cat 8 kya (Egypt), the llama and guinea pig 5.5 kya (the Andes), guinea fowl 7 kya (Sahel), and turkey 5.5 kya (Mexico). The recent discovery of what appears to be a domesticated dog frozen in Siberian permafrost has been dated to 18 kya. "The Linearbandkeramic culture that arose slightly before 5000 BCE, was initially confined to soils light enough to be tilled by means of hand-held digging sticks. Only over a thousand years later - with the introduction of the ox-drawn plow - were those farmers able to extend cultivation to a much wider range of heavy soils and tough sods." —Jared Diamond, *Guns, Germs, & Steel*, 1997.

79 ANIMAL PASTORALISM is the cultural dependence on the exploitation of dairy, pack, or draft animals. The earliest known megafaunal domestication was made by the reindeer-herders of the tundras of Lapland. Animal-drawn sleds have been discovered dating back to 12 kya. Cattle herding started in India by 9 kya, and became a staple of civilization that continues today (the biomass of cattle seems to be the greatest represented by a single species on planet Earth today). Draft horses were first domesticated in the Asian hinterland 6 kya. Records that refer to Arabian camels traversing the Arabian and Saharan deserts as pack animals date to 3.7 kya. In America and Australia, the megafauna were killed off too rapidly for animal pastoralism to get started, until post-Columbian introductions. The only exceptions are the small camels of the Andes - llamas and alpacas - which were domesticated 5.5 kya.

80 AGRICULTURAL REVOLUTION, attained in this game by reaching footprint 3, allowed denser populations, which in turn supported larger sedentary communities, the accumulation of goods and tools, and specialization in diverse forms of new labor. Although agriculture introduced some problems in nutrition, social divisions, and gender inequality, it did not bring about the reversal in human fortunes as asserted by anti-technologists. Popular books like *Sex At Dawn* (Ryan and Jetha, 2010) imaginatively depict preagricultural paleolithic life as egalitarian promiscuous communes with children raised in crèches without any notion of parentage, marriage, families, sexual jealousy, possessions, or wars. Studies of hunter-gatherers past and present show a hierarchy of dominance determining nesting sites and breeding privileges. For instance, the Laich-kwiit-tach (Kwakiutl) culture of Vancouver Island, depicted as an utopia, are traditional hierarchical, slave-owning, property-accumulating, and potlatch-celebrating. As Jared Diamond points out in "The World Until Yesterday" (2012), most hunter-gatherers are paternalistic, in a state of constant warfare, and practice unsavory customs such as widow-strangling.



◇ **Example:** During your activities, you have the following Actions in your Tableau, reading from bottom up: [Prospect], [Domesticate], [Migration], [Urbanization] → 5⚡. You spread one Migrant to the Himalayan camel hex and a second to Saudi Arabia for its pearl diving luxury. You use the domesticate to convert the first Migrant into a City

of camel domestication. Because you have the precondition for pearls (maritime stage 1), you use the prospect to convert your second Migrant into a pearl city. The Consequent of the prospect action advances you from energy stage 3 to energy stage 4.

d. Prospect Luxury or Metal. There are 4 kinds of resources that can be prospected with [Prospect]: luxury (gem), metal (quadrilateral), oil (drop), or uranium (atom). See map legend. However, prospecting with the [Prospect] icon can prospect only luxuries, and with the [Prospect] icon can prospect only metals.

G8. BONUS URBANIZE OPTION IN THE BASIC GAME

As indicated on the Species Placard, in the *basic game* (C1a), there is an extra urbanize option for each of the three Disciplines, which is not available if playing the *advanced game*:

- a. Culture** has *domesticate* [Migration] (G7a), with an extra tech requirement that your environment (the sum of your footprint and energy stages) must be at least 5.⁸¹
- b. Politics** has *cultivate* [Domesticate] (G7b), with an extra tech requirement that your environment must be at least 6.⁸²
- c. Industry** has *prospect* [Prospect] (G7c).⁸³

◇ **Example:** Your Ruling Class is politics, and you have footprint 2 and energy 3. During your activities, you are unable to exploit your bonus urbanization of cultivate, because your environment is one short. However, you undergo a Revolution and change your Ruling Class to cultural. Now during your activities you are able to domesticate using your Species Placard.

G9. ADVANCEMENTS

Advancements either improve your brain, technology, or Philosophy, or trim your Tableau. They occur either as Eurekas (G2b,c) or as Actions during activities (F). There are 8 types:

81 IDEALISM, represented by the culture discipline/scoring in the game, regards reality as a spiritual dimension transcending and controlling the natural world. The natural world and its laws are regarded, at best, as being only partly real, while the true reality lies in hypothetical entities such as Plato's abstractions, Augustine's God, or Hegel's Ideas. As the philosopher Ayn Rand points out, this amounts to regarding the universe as run by consciousness instead of existence. Regarding a satellite or ballistic spaceship as ultimately moved by the miraculous hand of God rather than by the Natural Law of Gravity constitutes a rejection of reason and science. Stating that a supreme consciousness is responsible for Natural Laws is an evasion: as long as we cannot understand the motivations for a supernatural consciousness to suspend or supplant a Natural Law, we cannot pretend to understand anything. This is the "Eklund's Imp" argument: the existence of even a single supernatural entity makes the universe unintelligible and science utterly inefficacious. Moreover, answering a question about the universe by invoking a miracle is not an explanation, it is the avoidance of an explanation that stifles any further thought or inquiry.

82 POLITICS is the philosophical science that defines a proper social system: how we should profitably get along with each other. Discipline purple in the game advocates a centralized politics of statism or socialism under paternalist monarchs or politicians. Any imposition of force or threat of violence by the ruling class upon others, rationalized by asserting it is good for the rest of society, is socialism (hence the name). Socialism perhaps began with sending elders into the snow, to benefit the survivors. Another manifestation of socialism is coerced enslavement or serfdom deemed necessary for society to survive. Modern socialism includes Nazism on the right and Stalinism on the left. The constant thread is the sacrifice of individuals for the sake of the collective.

83 INDUSTRIALIZATION "meant that land was no longer the only source of wealth. It became possible to generate wealth through manufacturing and trading goods."—Ben Hubbard, *Industry Rises*, 2016.



a. Encephalize moves one pawn from emotions into vocabulary.⁸⁴ Visualize it as an evolutionary swelling of the cortical portions of the brain, as a hardware upgrade.⁸⁵ Pawns in your vocabulary are not able to be used, but can be moved into Free Will via *abstraction* (next bullet).



b. Abstraction moves one pawn from your vocabulary into your Free Will.⁸⁶



c. Art moves a pawn from your Mysticism pool into your Free Will.⁸⁷



d. Prayer moves one of your pawns from any domain on your Brain Placard into your Mysticism pool.⁸⁸



e. Technology X increases your Stage on the named tech track [Footprint] [Lightning Bolt] [Leaf] [Nail] [Anchor] [Magnifying Glass] by one step, to a maximum of X. For instance, if you are at footprint stage 2 and receive a footprint 4 advancement, move your cube one step to stage 3, not stage 4. If you are already at stage 4 and receive a footprint 4 advancement, nothing happens.

84 ENCEPHALIZATION is the physical evolutionary growth of the brain which brought the human brain to modern size by mid-Epoch I. Yet for the next million years human behavior and tool kits seemed no greater than his predecessors with half the brain size. Leda Cosmides and John Tooby theorize that this retardation of the early mind was due to its being compartmentalized into 3 cortical domains corresponding to the game's 3 disciplines: *cultural* (awareness of the natural vs. spiritual worlds), *political* (interactions, hierarchy, alliances, and empathy), and *industrial* (conceptual manipulation of stone and wooden objects). Because they used differing software, percepts used by one domain could not be shared by another. The evidence for this cognitive isolation is archaeological. For instance, for millions of years, all known artifacts are made of wood and stone. Why not out of bone? A modular, non-lingual mind, upon encountering a bone, treats it as an object of food to be processed according to algorithms from the cultural module, not the technological one. Skills acquired in the knapping of stone could not be applied to bone because of the software incompatibility preventing exchanges between the domains of these two instincts. Other evidence of domain isolation is the lack of art, jewelry, or other status symbols throughout Epoch I, interpreted as a separation of social and technical intelligences. These barriers broke down with the acquisition of language.

85 SOFTWARE UPGRADE is from an emotion-driven program of three isolated domains to a verbally-driven one, allowing communication between the domains. Word use in decision-making and memory is an upgrade empowering the human-only attributes of fantasizing, code-switching, metaphors, counterfactuals, and internal monologues (#24).

86 INSTINCT VS. ABSTRACTIONS. 'Mom died yesterday.' There is only one animal that can communicate this simple idea to another of its kind. No social animal, a dog for instance, can communicate this to another dog. Dogs can learn to respond to their name, but cannot use their name, or the names of other dogs or humans as part of their cognition. Canines have been programmed by natural selection to avoid and fear pain and dangerous situations, yet no dog has a concept of 'death'. Although dogs are intelligent, they lack a concept for time and so cannot narrate out possible futures using themselves as actors. When did humans acquire an autoeonic sense of past and future allowing abstractions and long-range planning? Millions of years ago or just a few thousand? Was it gradual or punctuated? And how did it ever maintain itself? "We, alone on earth, can rebel against the tyranny of the selfish replicators."—Richard Dawkins, *The Selfish Gene*, 1976.

87 ART symbolically recreates reality according to the artist's value judgements (and this game is an example!). This bridge from mysticism to conscious free will is uniquely human, birdsong and bower nests are mating strategies and not art. Without art, ancient men could speak and identify percepts with names, but could not organize, integrate, or classify these percepts as concepts. In a speculative scenario of the first artist, suppose a linguistic giant named Og accidentally ingested drugs (#98). At the time, paleolithic humans would have had no more motivation to get stoned than any other animal. But this altered mental state used Og's vocabulary to reconstruct an image, perhaps the first sort of hallucinated image ever. (Lacking a vocabulary, other animals are unable to create or imagine mental images). Og was able to recreate this hallucination as a cave painting or a handheld venus, which allowed him to retain the sensations without the obvious negative survival value of drugs. Thus the world's first imagined image became the world's first representational art. Og's lingual children and students also took drugs and also became artists. Being able to interpret art for what it represents, to be aware of entities of things rather than isolated stimuli, gave Og's tribe awesome inventiveness and conceptual mentality. But at a price that still haunts humans today: the uniquely human attraction to smoking, alcohol, meditation, and mysticism.

88 PRAYER is a means to revert back to primal means of problem-solving and decision-making, a cognitive methodology used before humans became fully conscious. Prayer can be facilitated by hallucinogens, chants, drums, hypnosis, and speaking in tongues, perhaps because these mimic the metronome at which hallucinations were transferred from one side of the brain to the other. These peculiar human vulnerabilities can be exploited by charismatic demagogues (#69). "Those who through what theologians call the 'gift of faith' can center and surround their lives in religious belief (and) can indeed change themselves through prayer and its expectancies much as in post-hypnotic suggestion. ... But for the rest of us, who must scuttle along on conscious models and skeptical ethics, we have to accept our lessened control. We are learned in self-doubt, scholars of our very failures, geniuses at excuse and tomorrowing our resolves."—Julian Jaynes, *The Origins of Consciousness in the Breakdown of the Bicameral Mind*, 1976.

- **Steam and Oil Energy Advance Bonuses.**⁸⁹ As stated on the energy tech track, if you advance into energy stage 6 or 7, you gain a bonus of one free advance in any other tech track (other than energy) as a Consequent.

f. Cull (I), (II), or (III). If a cull is stated as part of an Idea's Eureka, then you must discard from your Tableau onto the top of the Lore Deck one Idea of the stated Epoch or earlier. For instance, "CULL (II)" means that you must discard your choice of Ideas from among the Epoch I or Epoch II Ideas in your Tableau. Nothing happens if you do not have any cards in those Epochs.



g. Purge. This Eureka is only found on *dictators* (E1j), and simulates their tendency to ruthlessly suppress all possible rivals. Placing this Foundation in a Column discards out of the game all other Foundations in that Column (but not the Species Placard, which is permanent). For each purged Foundation, Quell the Foundation's Dissident (if it has one) per D3a.



h. Demagogue. Move the PHILOSOPHY by up to one step in any direction.

H - FOOTPRINT & RESTORE MARKET

H1. FOOTPRINT CHECK

Each Hex can support only so much population. If there are too many, the excess starves. Populations with low technology (such as hunter-gatherers) require more land than others, and so are at greater risk of starvation.⁹⁰

a. Starvation. During this phase, first check for starvation for your Migrants and Cities in each Hex. Starvation occurs in a Hex you occupy if the total number of tokens (including Migrants, Cities, and other player's Migrants and Cities) is more than your current footprint stage.

Easily Missed. During your footprint check, only your tokens can starve, never enemy tokens.

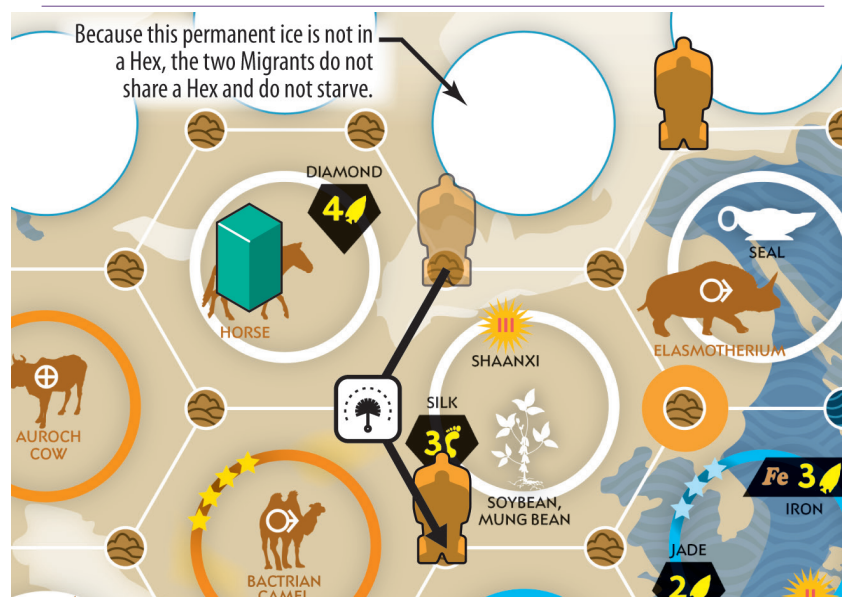
b. Remove Tokens & Starvation Chaos. In all such Hexes with population greater than your footprint stage, remove Migrants or Cities of your color until there are just as many population as footprint.⁹¹ You choose which of your Migrants or Cities to destroy. Each Destroyed Migrant is placed as a Dissident, or (if no Ruling Class Dissents are available) expended to the pool to start a *chaotic revolution* (D3). Each Destroyed City is added to Urbanization, and generates a Refugee (from the pool, or from the map if the pool is empty). This Refugee must be placed as a Dissident, or (if no Ruling Class Dissents are available) remains on the map to start a chaotic revolution.

89 OIL is a resource, and like all resources it has human value once located, extracted, refined, and transported. Oil in the ground is not a resource, and does not belong to a politician or a "country" (the two amount to the same claim). Politicians who present a choice between fighting an oil war or risk losing energy reserves are presenting a false dichotomy. Oil does not guarantee wealth, as the starving inhabitants of Venezuela, the country with the highest proven reserves, can testify.

90 FOOTPRINT is the land area each person needs to survive. Contrary to the ideas of many environmentalists, it is heavily dependent upon the technology of food production or gathering, and shrinks with increasing technology. It requires 2800 hectares (ha) to support each person of hunter-gatherer technology (footprint = 1), but only 56 ha to support each wandering herdsman (footprint = 2). Slash-and-burn agriculture (footprint = 3) requires only 11 ha per person, and it was this advent of agriculture that makes possible sedentary life, with its trappings of permanent walls, cities, sewers, and canals. Short-fallow agriculture (footprint = 4) is down to 2 ha, the Industrial Revolution (footprint = 5) reduced this to 1 ha per person, and each person supported by crops from the Green Revolution (footprint = 6) needs only 0.22 ha. See page 29 for a map showing the worldwide distribution of footprint technology as of 2000 BCE (early Epoch III). Increasing agricultural technology frees land for reforestation, and frees farmers for other specialties. In the year 1900, 70 percent of the U.S. population worked in agriculture. By the year 2000, it was down to 2 percent of the population, yet the U.S. exported more food than ever before.

91 STARVATION occurs when the available space for a creature is smaller than its ecological footprint. The larger the footprint stage in the game = a smaller amount of space required, and a smaller ecological impact. Megafauna that hunt or gather their food require the most space, typically in the thousands of hectares (ha). Neolithic Farming, with yields of 0.5 t/ha, shrinks this footprint by 3 orders of magnitude. The Industrial Revolution farming yields are 2 t/ha, and Green Revolution farming often exceeds 10 t/ha. High tech = green tech! —Max Roser and Hannah Ritchie, *Yields and Land Use in Agriculture*, 2016.

Easily Missed. Cities count towards footprint only for the Hex they are in. If a Refugee exceeds the footprint (H1b), it doesn't starve until the starvation phase next turn (H1a).



◇ **Example:** The hobbit, with footprint 3, has just created a city by domesticating the horse. You as Player Orange have footprint 1, and during your turn your adjacent migrant is in danger of starvation. You use a spread to move him to safety. Other options: (1) assuming you have a higher Mysticism and a preach action, you can capture the City. However, your migrant would still starve during your footprint phase. (2) save your migrant by inventing an Idea that advances your footprint to stage 2. Note the northern areas containing permanent ice are unbounded and thus not Hexes. Thus, your two northern migrants do not share a Hex (and don't starve).

H2. RESTORE MARKET

If there are any Gaps in the Market, slide cards downward (away from the draw deck) to fill the Gap. Then take cards from the draw deck, and use them to fill each Gap with a faceup card. The end result should restore the Market to nine cards in a 3 X 3 matrix.

H3. DIVERSITY CHECK

You may ask other player(s) to adjust their cubes in the Diversity Track to accurately reflect the number of unoccluded Rainbows in their Tableau.⁹² This is important in the endgame, because Diversity is used for Comet Scoring at the end of Epoch III and also for final scoring.⁹³

92 DIVERSITY AND TRADE are negatively impacted if either priests are in charge, such as in theocracies ancient and modern, or if politicians are in charge, as in tyrannies or democracies ancient or modern. Suppression of minorities occurs in both left or right wing regimes, and is all the more oppressive if the regime enjoys widespread support or a landslide victory. Diversity is particularly low under medieval serfdom, with petty warlords in charge and most of the populace engaged in unspecialized subsistence farming rather than division of labor. Conversely, mercantile diversity flourishes in a republic as defined during the Enlightenment. Here, nobody is in charge, government is minimal, and disputes are resolved constitutionally. Merchants by their very definition deal with persuasion and not force, and thus cannot rule without changing their industrial nature to a political one. Historical examples of commercial societies include Akkadians, Phoenicians, Rome in her republic days, Renaissance Italy, Golden Age Netherlands, Pax Britannica, northern USA in the 18th and 19th centuries, the 4 Asian tigers, and the EU (plus Switzerland). The citizens of these enterprising societies are prosperous and productive, yet vulnerable to invasion since national defense is waged better by politicians than bankers.

93 DIVERSITY is a measure of integration of pluralistic beliefs, on a scale of totally monocultural (modern Iran) to multicultural with no state religion or party. This is the opposite of the politically correct "diversity" preached on many campuses, where college administrators are selected on the basis of viewing students as members of oppressed or oppressive classes rather than individuals. The result is censorship of research results on the wrong side of race and gender issues, and harassment is arbitrarily held to be anything that any member of a protected group feels is harassing. Under such a tyranny of subjective "standards", independent thought and diversity is suppressed. (As a personal anecdote, in my rocket scientist days I once led a fight against this arbitrary "definition" of harassment in my workplace.) —Alan Kors and Harvey Silverglate, *The Shadow University: The Betrayal of Liberty on America's Campuses*, 1998.

I - GAME END & FINAL SCORING

If you challenge the last Comet card in Epoch IV, the game ends immediately (no Chaos, Market renovate, or comet scoring). Then each player calculates his *cultural scoring* (I1), *political scoring* (I2), and *industrial scoring* (I3), and the highest one is his **final score**.

a. Determining The Winner. The player with the highest final score is the winner. If tied, compare the sum of all three scoring alternatives (even if philosophically shutdown) for each player. If still tied, players share victory or position.

b. Philosophy. If the Philosophy is in the FREEDOM or ABOLITIONIST spots, no player can perform political scoring. If the Philosophy is in the EQUALITY or AGNOSTIC spots, no player can perform cultural scoring. If the Philosophy is in the UNITY or PACIFIST spots, no player can perform industrial scoring.⁹⁴

c. Comet Endgame. If the last comet is visible for an entire player turn, continue for two full rounds around the table, and then end the game just before that player's turn.

I1. CULTURAL SCORING

a. Victory Chits. 1 VP for each victory chit on COMET I of your color, see E3d.

b. Mysticism. VP equal to your current Mysticism (i.e. the number of pawns in your mysticism pool).

c. Environment. VP equal to your Stages in the two environment tracks (footprint plus energy).

I2. POLITICAL SCORING⁹⁵

a. Victory Chits. 1 VP for each victory chit on COMET II of your color, see E3d,

b. Urbanization. VP equal to your current Urbanization,

c. Welfare. VP equal to your Stages in the two welfare tracks (metallurgy and immunology).

I3. INDUSTRIAL SCORING⁹⁶

a. Victory Chits. 1 VP for each victory chit on COMET III of your color, see E3d,

b. Diversity. VP equal to your current number of unoccluded Rainbows in your entire Tableau,⁹⁷

c. Economy. VP equal to your Stages in the 2 economy tracks (maritime & information).

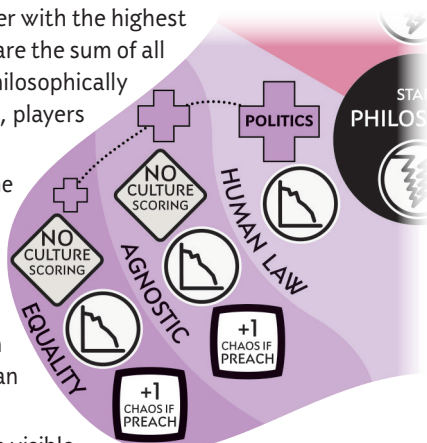
⁹⁴ WONDERS and public monuments (such as Egyptian pyramids) are regarded as less important as ideas (such as Greek philosophy) in this game. "Philosophy as we understand it is a Greek creation."—Martin Litchfield West.

⁹⁵ GOVERNMENT is defined by Max Weber as the institution with a "monopoly of legalized violence". It needs this monopoly to enforce the foundations of the society and to regulate the use of violence which may otherwise reduce the population to anarchy. A political victory is one where empowered central planners regulate the populace instead of their peers. In practice as in theory, the concentration of coercive power exhibits a serious long-term instability and imperial courts freed of the consequences of their own actions are filled with vice, treachery, and wantonness. A government unregulated in the means it may use to attain its goals has led to the Holocaust, Killing Fields, Great Leap Forward, starvation in North Korea and Venezuela, Tiananmen Square, Soviet Purges and Holodomor, WWI, and many more horrors.

⁹⁶ INDUSTRIAL VICTORY. "...China could have industrialized at any point from the 11th century, when it developed an iron and steel industry, powered by coal. But its...political climate was...unfavorable: the Confucian ideals promoted by the government emphasized stability, and industrialization was seen as disruptive."—Ben Hubbard, *Industry Rises*, 2016.

⁹⁷ SOCIAL DIVERSITY comprises the complex welter of businesses, voluntary associations, educational institutions, clubs, unions, media, charities, and churches that span today's global economy. It also encompasses the acceptance and self-disclosure of minorities, religions, and sexual orientations. Diversity is essential for a division of labor and thus trade among those of different specialties, the basis for capitalism. In times past, societies had low diversity and division of labor, and could be managed by the central planning of family heads or war chiefs. The family was then the primary vehicle by which the young acquired the skills that allowed them to live in broader society and through which the values and knowledge of that society were transmitted across generations. —Francis Fukuyama, *Trust*, 1995.

◇ **Example:** Your opponent takes the Comet IV card, and you count your final score. The Philosophy is in "AGNOSTIC", so you do not bother to count your cultural score. Instead, you want to see which is higher, your political or industrial final score. In the middle column on the map, you have no Victory Chits, and Urbanization of 5, and a welfare of 3 + 4 = 7, for a total political score of 12. In the right column, you have 1 Victory Chit, Diversity of 5, and an economy of 0 + 5 = 5, for a total industrial score of 11. You are tied in victory with your opponent, who has an industrial score of 12. The tiebreaker is to combine all 3 scorings, and your opponent wins this.



J - ADVANCED GAME

If playing the *advanced game* (C1a), add in all rules with a blue font. The advanced game Action icons have thick bulging borders. Additionally, the following rules supersede the rules in the basic game:

J1. MILANKOVITCH CYCLES⁹⁸ (NOT FOR 1- OR 2-PLAYER GAMES)

In addition to their normal effects, global warming and global cooling may suddenly plunge the world into **icehouse** (a really cold glacial maximum) or **ice age** (a not so cold interglacial optimum). If during a challenge a *cooling* (E1c) is drawn, draw a second card of the same Epoch, taking the card from the top of the unused facedown challenge cards. If this card is also a cooling, the world suddenly becomes icehouse. If not, resolve the cooling event as normal. If during a challenge a *warming* (E1d) is drawn, follow the same procedure except the world can suddenly become ice age if a second warming is drawn. In both cases, put the card into the bottom of the unused challenge cards.⁹⁹

a. Icehouse. The challenger flips all existing seas (blue chits) in the game to their white side, and places them on ice hexes per E1c.¹⁰⁰

b. Ice Age. The challenger flips all existing ice (white chits) in the game to their blue side, and places them on shelf hexes per E1d.

c. Stalled Milankovitch. Do not draw a Milankovitch card during cooling if the world's blue chits are all already flipped to their white side. Do not draw a Milankovitch card during warming if the world's white chits are all already flipped to their blue side.

d. Dry Icehouse. If you suffer *cooling* (E1c) but there are no more seas to freeze, or no more places to put ice, suffer one *deforestation* (E1e) instead of drawing any cards. If you suffer deforestation but there are no more forests to turn into deserts, or no more places to put deserts, nothing happens.

e. Wet Ice Age. If you suffer *warming* (E1d) but there is no more ice to melt, or shelves to put the melted ice, suffer one *forestation* (E1f) but there are no more deserts to turn into forests, or no more places to put forests, nothing happens.

⁹⁸ MILANKOVITCH CYCLES are changes in the Earth's orbital parameters that are the dominant climate drivers on the millennial time scale of this game. These parameters include axial tilt, axial precession, apsidal precession, and orbital inclination, but the dominant orbital driver of climate change the last million years is the 100,000 year eccentricity cycle (see climate chart on page 29). The sudden appearance and disappearance of glacial maxima seem to be driven by orbital eccentricity, which in turn is driven by tidal forces mainly from the planets Jupiter and Saturn. The connection between Milankovitch cycles and climate is confirmed by analysis of ice cores, deep-ocean cores, rock cores, lake depths, and physical artifacts going back 215 million years.

⁹⁹ ORBITAL VARIATIONS are gradually increasing the summer insolation over the next 25,000 years as the Earth's orbit becomes less eccentric. This is thought to put glaciers in overall retreat and delay conditions for a new icehouse for the next 50,000 years. Climate is also influenced by sunspot cycles (thus glaciers were advancing during minor events such as the 4.2 kya event and the "Little Ice Age", Timeline diagram), greenhouse gases (largely water vapor), and clouds.

¹⁰⁰ ICE AGE is any period when ice appears on the Earth, in the form of continental and polar ice sheets and alpine glaciers (normally the Earth is entirely ice-free). Thus, the entire period of the game is an Ice Age, and has been since the Antarctic ice sheet formed 35 Mya. The Arctic ice sheet started 2.58 Mya, about the start of the long game. In the present Ice Age, there are two temperature settings which I call "ice age" and "icehouse". Thus an "ice age" is a relatively warm interglacial such as what we live in today, whereas an "icehouse" is a deep freeze such as imagined in the Blue Sky cartoon "Ice Age".

👉 **Example:** A challenger draws a challenge card showing cooling, and so he draws a second card from the unused pile. This also shows cooling, so Earth suffers a Milankovitch icehouse that turns all of its blue disks to white ones.¹⁰¹

J2. INVENTIONS

An **invention** is an Idea that you add to your Tableau by using *invent* (G2), so that you can use its listed Actions and advancements during your *activities phase* (F).¹⁰² This addition moves the invented Idea from the Market to your Ruling Class Column half-under your uppermost card (Species Placard or Idea), oriented so its visible color matches the Ruling Class Column. Alternatively you may discard this card onto the top of the Lore Deck. In any case, Expend all Elders on the card. You may add an invention only if you meet its listed requirements (see a, b, c, d below), otherwise discard the Idea onto the LORE DECK:



a. Menopause listed as REQ.¹⁰³ Your species develops Menopause once you have 2 or fewer emotion pawns on your Brain Placard. This requires either prayer or encephalize. If an Idea has Menopause listed as "REQ.:" (requirement), then if you are not yet at Menopause you still claim its Eureka but will discard it on top of the Lore Deck instead of claiming it as an invention.

👉 **Example:** With still 3 pawns in your emotions, you are not yet at Menopause. However, you invent an Idea with a Eureka of "encephalize". Because this reduces your pawns in emotions to 2, you can add this Idea into your Tableau as part of your invent action.

b. Technology or City Type listed as REQ. If you have not attained this requirement you still claim its Eureka but will discard it onto the Lore Deck instead of claiming it as an invention. If there is a city requirement, you must have a City with that resource: 🏠=any, 🐾=war animal, 🏠=work animal, 🚗=biofuel, 🌱=horticulture, 🏠=metal, 🛢️=oil, 🏠=uranium.

👉 **Example:** You invent broadcasting (#178), with the requirement: 🚗 / 🛢️. This means that you need either a biofuel or an oil city to claim the invention into your Tableau.

c. Orientation Requirement. In order to claim the card as an invention, one of its two Orientations must be able to match the color of your Ruling Class Column. Orient the card into this color when placing the card into your Tableau.

101 ICEHOUSE, also called a glacial maximum, was marked by desiccated, freezing air that was stormy, dust-laden, and impoverished in the greenhouse gases water and carbon dioxide. Forests were widely supplanted by C4 grasses, which conserve both water and CO₂. We live today in a period between icehouses called an interglacial, allowing a warmer, wetter, and greener planet. The greatest ecological holocausts humankind has ever suffered are the dozen or so sudden plunges from interglacials into icehouse, of which the end of the Eemian and the Younger Dryas are the two most recent (see climate chart page 29). Each resurgent icehouse sterilized much of Chile, North America and Europe under ice kilometers thick. Extreme CO₂ deserts sterilized Sahara, Australia, and Paraguay-Bolivia, and turned most of the Amazon, India, Indonesia, and sub-Saharan Africa into grasslands.

102 INVENTION indicates a tool or technology created because it was envisioned in the "mind's eye". This requires symbolic/metaphoric language, and the ability to plan and to visualize. According to Aristotle, a scientific or technological discovery requires a causal and logical connection. The first invention may have been the hafting of a stone point onto a wooden shaft to form the first composite tool. Evidence from a Syrian Neanderthal site suggests that the first hafting used fire-softened bitumen or birch-bark pitch, rather than lashed on. The mere fact that variations in technique are possible suggests that Neanderthal had limited verbal cognitive software installed by 300 kya. And yet the remarkable non-inventiveness thereafter argues that hafting was an accidental gradual development, perhaps the result of a long association of Neanderthal glue use for various purposes.

103 GRANDMOTHER HYPOTHESIS explains the puzzling evolution of menopause, the shutdown of the menstrual cycle unique to humans and pilot whales. Why would Darwinian selection favor a cessation of a female's reproductive capacity when the whole purpose of the selfish gene is to reproduce? Menopause gives an adaptive advantage under two conditions: the dangers of childbirth are high, and there is a societal advantage to having mothers survive into grandmotherhood. Without menopause, the premature death of so many mothers curtails the transmission of language or inventions to their children. Especially in the epochs before writing, grandmothers are essential to teach children tribal lore while their own mothers are foraging. If in the game you haven't developed menopause, then you will be losing intelligent young moms and this is reflected whenever you are unable to keep an idea or foundation with a menopausal requirement.

d. Elder Precondition. See G2a.

e. Obsolescence. You are limited in the number of Ideas (but not Foundations) that you may hold in your Tableau. This limit is equal to your information stage. If this addition of a new invention exceeds this limit in your Ruling Class Column, you must choose one Idea to discard onto the Lore Deck.

J3. TRANSACTIONS

You can transact with either an enemy Migrant or enemy City. Against a Migrant, *spread* (G6) to the Spot of the targeted Migrant. A preach, war, or enslave transaction can be affected by *morality* (J4). Then resolve the transaction as follows:

a. Trade¹⁰⁴ spreads a Migrant to an enemy map token (Migrant or Spot in a City Hex). For Cities, unlike preach, war, or enslave, you do not need the Migrant to start adjacent to the City. Then follows this sequence:



- **Expend** your Migrant to your pool.
- **Negotiation Benefits.** First you, then the player you are trading with, choose a NEGOTIATION.
- **Perform Consequent** (if any CONSEQUENT listed).

👉 **Example:** During your activities, you perform a 🏠 → 6 🏠. First you spread a "trader" Migrant from your City to a nearby enemy City. Then you choose for your Negotiation to clear a Dissident. Since you are at footprint stage 2, your trade partner chooses for his Negotiation to advance to this Stage. Finally advance your maritime to stage 2 and expend your trader.



b. Preach¹⁰⁵ can be used only if your Mysticism is greater than that of your opponent. If so, use the preach action to spread to and then convert an enemy map token. To preach a City, you must spread from a Migrant that starts adjacent to the City, which expends the Migrant. Preach is an Act of God, so losses do not generate Chaos.

- **Preach Migrant.** The enemy Migrant is converted (i.e. Destroyed without Chaos) and your Migrant remains.
- **Preach Siege City.** To preach a City, you must first have at least 1 Migrant on a Spot in the Hex of the targeted City. Then use a preach action which converts the City to your color. Destroy the enemy city (without Chaos) and replace it with a City of yours.¹⁰⁶


104 TRADE is the voluntary exchange of valuables. "Let us consider a meeting between two individuals from two different bicameral cultures. Let us assume they do not understand each other's language and are owned by different gods...if the bicameral theocracies of both individuals meeting have been unthreatened for a generation, both their directive gods would be composed of friendly voices. The result may have been a tentative exchange of gestural greetings, ... or even an exchange of gifts. The relative rarity of each other's possessions (coming from different cultures) would make such an exchange mutually wished for. This is probably how trade began... Such trade was not, however, a true market. There were no prices under the pressures of supply and demand, no buying and selling, and no money. It was trade in the sense of equivalencies established by divine decree. There is a complete lack of reference to business profits or loss in any of the cuneiform tablets that have been so far translated." —Julian Jaynes, *The Origins of Consciousness in the Breakdown of the Bicameral Mind*, 1976.


105 PREACH is a type of acculturation that attracts and absorbs peoples of differing mysticism. The greatest acculturation event in history was the invention of monotheism such as recorded in the Old Testament. In Epoch II, polytheism dominated the world, and men were personally guided by visions of private gods. As the nature of consciousness and language changed beginning in Epoch III, the personal gods began to fall silent, and societies fell into chaos and terror as the old decision-making rituals failed and the fragile hierarchies collapsed. The problem was not lack of faith, a concept not yet envisioned until the age of monotheism. The hallucinated personal authority figures had to be replaced with a new universal authority figure, and the idols and graven images that handled the old gods had to be smashed, in order to bring men to accept this new and fundamental shift in authority structure.

106 EVANGELIZE CITY uses both the sword and the Word. Starting from Mecca, Mohammed and his successors built an evangelical empire from Spain to India in just 129 years. Preaching is more effective, and permanent, than military might. The sway of monotheism in Epoch III was so strong that it was ridiculously easy for a few monotheist missionaries to convert entire nations of polytheists to a strong centralized and organized religion.

♣ **Example:** Your Mysticism is 1 and you have a spread, prayer, and then a preach action in your Ruling Class Column. You have domesticated the horse and so have blitzkrieg. Your opponent also has Mysticism 1 and thus is immune to your preach. However, you first spread a Migrant next to one of his Cities, then a prayer to add 1 to your Mysticism, and finally your preach action which converts the City to your color. Your Urbanization rises, and his falls.






 **c. War**¹⁰⁷ spreads to an enemy map token, either a City (you must have an adjacent Migrant) or a Migrant (must be in normal spread range), and then attacks it in one of 4 ways:

- **Attack Migrant.** Compare your metallurgy stage  to that of your opponent.¹⁰⁸ If yours is higher, his Migrant is destroyed and placed as a Dissident, where it might cause a *chaotic revolution (D3)* and your Migrant remains. If it is equal, both Migrants are destroyed and placed as Dissidents. If yours is less, only your Migrant is destroyed as a Dissident, and his remains.

Important: If the war has a CONSEQUENT (see glossary), you gain the Consequent no matter if you win, lose, or draw. This is a reason to attack even if defeat is certain.

- **War Siege City.** To siege a City, you must first have a higher metallurgy stage than the defender and must spread from a Migrant that starts adjacent to the City, which expends the Migrant. Then use a war action which converts the City to your color. Destroy the enemy City (with Chaos, since this is an Act of Man) and replace it with a City of yours.

♣ **Example:** Player Green has domesticated war rhinos and has metallurgy 2 (more than her opponent, Player Orange). She also has footprint 2. On her activities phase, she has both a  and a  →  action. For her spread, she moves 1 migrant into an empty spot in a hex containing both an orange city and an orange migrant. She then uses her war action. She could spread a warrior to kill the migrant, but since she has the city in siege, she decides instead to capture the city. She replaces the orange city with a green city, and advances to metallurgy 3. The lost orange city generates a Refugee, which is placed as a dissident in the orange ruling class.

107 ENDEMIC VIOLENCE between hunter-gatherer clans is apparent in the burials of Mesolithic Northern Europe (6200-5000 BCE). Many males were buried with head wounds consistent with face-to-face fighting with a right-handed opponent. Others were killed by arrows. Some of the violence may have been ritualistic, as with a woman killed by a blow to the head buried beside her putative husband. The notorious skull nests of the cave of Ofnet consist of dozens of beheaded women and children, who were buried with ornamented shells, pierced teeth of red deer, and red ochre. It is unknown if the elaborate burials were made by the aggrieved survivors, or by the victors to appease their spirits. —Steven Mithen, *After The Ice*, 2003.

108 METALLURGY was initially driven by social rather than economic or technical need; the earliest copper and gold objects were personal ornaments. Stone continued to be the material of choice for tools for the next 4000 years. Systematic metalworking began when pottery glaziers accidentally discovered techniques for smelting copper and tin from naturally-occurring outcroppings of ore, and then alloying those metals to form bronze castings. The dates for the early Bronze Age vary with location: 3500 BCE for the Near East (Uruk), 3300 BCE for India (Harappans), 2100 BCE for China (Xia), 1800 BCE for Europe (Unétice), and 900 BCE for the Andes (Chavin). The critical ingredient of bronze is tin, as ancient sources of tin were confined to the British and Canary islands. This made bronze implements quite expensive until the introduction of cheap iron tools around 1200 BCE. The superiority of iron over bronze in battle or in agriculture is not so much due to the properties or hardness of iron, as it is the abundance of iron ore. The era of cheap aluminum was ushered in by the Hall-Héroult process of 1886 CE, which uses electricity and the catalyst cryolite to smelt aluminum ore. The era of synthetics was ushered in by the development of thermoplastics (cellophane and bakelite) early in the 20th century.

- **Missile Bomb City/Migrant.** If you have maritime stage 8 and a metallurgy superior to your enemy, your war action can Destroy any City or Migrant (with Chaos) anywhere on the map
- **Nuclear Bomb City/Migrant.** If you have energy stage 8, you may use your war action alternatively to Destroy a City or Migrant in the Hex you spread a Migrant into, with metallurgy requirements waived. If you have both energy and maritime at their highest stages (stage 8), your war action can Destroy any City or Migrant (with Chaos) on the map without the need for adjacent Migrants or metallurgy superiority. (Energy 8 are tactical nukes waiving the requirement for higher metallurgy. Energy 8 + maritime 8 are ICBMs waiving the requirement for adjacency.)



d. Enslave¹⁰⁹ can be used only if your Urbanization is greater than that of your opponent. If so, use the enslave action to spread to and then convert an enemy map token. To enslave a City, you must spread from a Migrant that starts adjacent to the City, which expends the Migrant:

- **Enslave Migrant.** The enemy Migrant is destroyed and placed as a Dissident, where it might cause a *chaotic revolution (D3)*. Your Migrant remains.
- **Enslave Siege City.** Before you can enslave a City, you must first have at least 1 Migrant on a Spot in the Hex of the targeted City. Then use an enslave action which converts the City to your color. Destroy the enemy City (with Chaos, since this is an Act of Man) and replace it with a City of yours.

Easily Missed. Performing a violent transaction (enslave, preach, or war) will cause you to suffer a Chaos if the Philosophy is in an unfavorable *moralityspot (J4)*.

J4. MORALITY

Some positions of the PHILOSOPHY add a Chaos Consequent to certain transactions:¹¹⁰

- Abolitionist.** If the Philosophy is in one of the two spaces indicated "+1 CHAOS IF ENSLAVE", then any player performing the enslave transaction suffers a Chaos, effective after all other effects of the action are performed.
- Agnostic.** If the Philosophy is in one of the two spaces indicated "+1 CHAOS IF PREACH", then any player performing the preach transaction suffers a Chaos, effective after all other effects of the action are performed.¹¹¹

109 SLAVERY is the condition of being under force to live one's life for the sake of another. It has been the dominant condition of humankind since the dawn of consciousness, and the quirky way that consciousness was acquired seems to have made us susceptible to submission to authority. As detailed in my game *Pax Emancipation*, it was only during the Enlightenment that it was discovered that freedom is the basic human value and civilizations do not actually need slavery to thrive. For all the millennia prior, 99.9% of the game, slavery was accepted as an unpleasant necessity by all religions and philosophies. Global emancipation remains the greatest accomplishment of humankind.

110 KIN SELECTION is the evolutionary strategy that favors the reproductive success of an organism's relatives, even at a cost to the organism's own survival. "If even the most advanced non-human animals ordinarily limit their good behavior to insiders (kin or community members), can we really speak of their behavior as moral?" —Primatologist Frans de Wall, *Primates and Philosophers*, 2006.

111 AGNOSTICISM VS. ATHEISM. An atheist accepts the existence of secular absolutes, such as natural law, in the same way that a deist accepts supernatural absolutes such as God. An agnostic, however, rejects all absolutes, including truth, morality, principles, and fundamentals. The agnostic approach to knowledge is subjective: nobody will ever know if any assertion is true or false. The agnostic approach to morality is pragmatic: choose whatever works for the moment, regardless of principle.

c. Pacifist. If the Philosophy is in one of the two spaces indicated “+1 CHAOS IF WAR”, then any player performing the war transaction suffers a Chaos, effective after all other effects of the action are performed.¹¹²

J5. ELDER ACTIONS

There are eight actions that impact your Elders and/or Tableau instead of your population:¹¹³



a. Exogamy. Take a new pawn from your Free Will and place it as an Emissary on an Idea in the Tableau of any opponent. You are limited to one Emissary per Idea.¹¹⁴



b. Racism. Expend an opponent's Emissary out from your Tableau.¹¹⁵



c. Cold War. Expend one Elder or Emissary and cause a *Chaos (D2)* to one opponent with a *welfare* (metallurgy plus immunology) that is less than yours.¹¹⁶



d. Artisan. Take a pawn from your Free Will and place it on any card in the Market.



e. Constitution. Reorient 1 Foundation and move it from its resident column to the bottom of its other column (removing its Dissidents without effect). This is not a Revolution and the Ruling Class is unchanged.



f. Invent. When you *invent (G2)*, instead of Discarding the Idea, you may add it to your Tableau if you meet the *menopause* and *tech requirements (J2a, J2b)*.



g. Library. See G3.

112 MORALITY is defined as a code of values determining the proper beneficiary of one's actions. It is a uniquely human trait; no other animal has free will to be immoral or to choose a beneficiary of its actions other than what is dictated by its self-serving genes. But as a voluntary being, you choose what to do with your life, and who or what should benefit from your decisions. Suppose you think your personal happiness is painting nudes in Tahiti. But some influential intellectual protests that your math talents mandate that you devote your time adding to the storehouse of knowledge. But the elected head of society decides that you should be conscripted into building some pyramid with lasting value to society. Contrary to popular views, morality consists of objective discoveries, not subjective inventions. Discoveries about the nature of politics for a social animal, and as such is applicable to zoon politikon anywhere in the universe. New discoveries about morality are still being made. The Enlightenment discovery of natural rights (#184) led to the abolition movement.

113 ELDERs are knowledgeable specialists essential for the production of wealth – material goods – under a system of division of labor. A specialist lives by producing just one thing, and is supplied by the labor of others for the greater part of his needs. Having a division of labor society allows each person to concentrate upon the type of work for which they are best suited. In particular, it frees geniuses to study science and invention, rather than filling their lives working on the farm. The specialist is a rarity in the history of mankind; tribal bands up to medieval times have been mainly generalists who spend their lives producing or growing everything they need.

114 EXOGAMY is the practice of leaving one's clan to marry elsewhere. In Epoch I, this means marriage to another race or subspecies, such as what produced the sapiens-neanderthal admixture. To put this in context, the proto-neanderthals left Africa 200 kya, and had Europe to themselves for at least 120,000 years. What happened when their long lost cousins, the Sapiens, finally appeared in Europe? They seemed to avoid each other, with Sapiens flinging javelins at small game with atlatls, and Neanderthal taking down mammoths with heavy thrusting/throwing spears. But sometimes violence broke out: forensic evidence on the Neanderthal skeleton Shanidar #3 shows he was killed by a spear flung by an atlatl, a weapon only Sapiens used. But exogamy also occurred: all non-African peoples today have a few percent Neanderthal DNA, proof of a legacy of hybrid vigor. My game *Neanderthal* speculates that the mulatto hybrid of a dark-skinned Sapiens and a light-skinned Neanderthal made a cognitive breakthrough, producing the first abstractions and imaginations of things that never were, but could be. This explains why culture, such as paintings, flutes, figurines, and burials appear suddenly in the brief 5000 years that the two subspecies shared Europe.

115 RACISM is defined as ascribing moral, social, or political significance to a person's genetic lineage rather than to her character and actions.

116 COLD WAR was responsible for a new relation of military spending compared to private in the United States, in the name of defending an ideology of anti-communism. Before WWII, the allocation of resources for military purposes remained at token levels, typically 1% of GDP, except during actual warfare, which occurred infrequently. Despite an enormous demobilization after WWII, military spending remained at unprecedented levels, about 7% in the post-Korean War era. In other words, the nation was at constant war. All spending came directly at the expense of spending in the private sector. —Robert Higgs, *Depression, War, and Cold War*, 2006.



h. Science. You may search through the LORE DECK and retrieve one Idea with a red Orientation. Add it as a new *invention (G2d)* to the bottom of the Ideas, just above the Species Placard, so as to become the oldest Idea of your Ruling Class Column (without gaining its Eureka). However, you must meet its *requirements (J2a, J2b)*, if any.



i. Pseudoscience. This is exactly the same as *science* (previous bullet) except the retrieved Orientation is white instead of red.¹¹⁷

K - EXPERIMENTAL WORLD BUILDING

K1. BIOS:EARTH CAMPAIGN MAP (KEN BROWN)

Most *Bios:Megafauna* games will end in the green climate range, often yielding forested wastelands no longer suitable for your creeples. The goal with this rule is to create a custom map for the *Bios:Earth Campaign (C6)* using the tiles provided in *Bios:Origins* that is a reasonable facsimile of your continents in *Bios:Megafauna*. To do this, simply decide where your cratons would go per the regular *Bios:Origins* rules, then do the following:

- 1) For every forest hex, place a random green tile.
- 2) For every weeds hex, place a random blank tile (no circle), or a random white tile if blanks run out.
- 3) For every mountain hex, place a random orange tile.
- 4) For every swamp hex, place a random white tile.
- 5) For every sea hex, place a random ocean tile.
- 6) Place climate chits on spaces with stars.
- 7) Place the climate strip that you ended with in *Megafauna*.
- 8) For each ice chit in a green latitude, flip it to its blue side and move it to a blue circle hex in a green latitude. If no such hex exists, remove the chit.
- 9) Perform the same step as 8, but turn ocean chits into ice for white latitudes.

a. Insufficient Oceans. There are only 26 *Bios:Origins* tiles, but 28 hexes in *Bios:Megafauna*. To recreate the two cratons that have two sea hexes, do not place an ocean tile in one of the sea hexes on each.

b. Proceed with the regular game; no need to add resources or domestic creeples. What you're left with should look like your world in *Bios:Megafauna* but play like an *Bios:Origins* game.

117 SCIENCE VS: PSEUDOSCIENCE. These opposing philosophies disagree on the nature of knowledge. Science holds that all knowledge is gained by the use of reason based upon observation, while pseudoscience accepts mystical forms of knowledge, e.g. based upon revelation, instincts, sacred texts, telepathy from aliens, rituals, emotions, or “just plain knowing”. Science holds that everything acts according to its nature, has a cause, and is knowable. Pseudoscience accepts the supernatural, the acausal, and the inexplicable.

K2. CUSTOM SETUP TIPS (PAWEŁ GARYCKI)

Having read the existing setup rules for Cratons and hex chits as well as transition from *Bios:Megafauna/Mesofauna*, here are principles of world design:

- a. America.** An uninhabited continent to the west is useful to reward exploration and maritime investment. America should be separated by permanent ocean and at least 3 water spots to recreate a Columbus voyage or island hopping passage. If continuing from the raindance Earth environment, follow Mars & Venus setup, however there will be no "America".
- b. Pangea.** The more players are in the game, the more hex chits each one will need. They should start on the same continent (Pangea) to encourage early interaction.
- c. The Islands** depicted on the map are often the only sources of uranium and oil and should not be occluded. Note that those islands are initially land which may extend continents.
- d. World Wrap.** Avoid placing hexes or cratons so that they touch the east or west border of the map, because of alignment issues. Touching the north or south edge or the Philosophy is ok, and may be necessary to have enough room for craton placement.
- e. Venus or Mars Settings.** To avoid the transition from *Bios:Megafauna*, follow the craton setup with both Mars/Venus forming the Old World continent and "America" forming another, regardless of player count. Cover "America" as usual with randomized hexes. As highlands may be transferred to either swamp or weeds, roll 1d6 dice twice and put a burrower creeple on those highlands which hit the rolls. As typical for Mars/Venus, the burrower indicates the biofuel resource while other highlands indicate horticulture. Distribute the animals and roll for luxuries in central hexes. Then, in player order, players choose their starting spot in the Old World on either of the 2 cratons. Finally, each player places only one climate chit in the Old World.
- f. Vassal Randomization.** The Vassal module provides a way to randomize a starting world. It works both ways. First, propose the location of cratons or hexes with just one click. Repeat the click until you are satisfied with the placement if you have specific requirements. Then it is possible to populate the randomized craton or hex locations with actual cratons and hexes. Here, you can always undo the operation and try again. Then copy the result into your physical game. Vassal randomization could also be used for Mars/Venus starts and, if you are patient enough to wait for a continent distribution resembling the legacy one, to transition the game from *Bios:Megafauna*.

K3. SETUP VARIATIONS (PAWEŁ GARYCKI)

These describe differences in setup between the Earth and Mars games:

- a. Archipelago.** Add a bunch of hexes to the craton setup. For climate resolution, see Mars & Venus games climate chits handing.
- b. Fast & Easy Setup.** First randomize craton locations, then cover cratons with hex chits. The 2 craton hexes not covered will be inland lakes or gulfs.
- c. Merfolk Waterworld.** Leave the custom map entirely water, and randomize starting spots. Consider all islands covered in water climate chits so that no climate changes ever occur. Consider movement to be half a player's maritime stage, rounded down, plus energy.
- d. Campaign Real-Earth Map.** Transit cratons from *Bios:Megafauna* to the classic Earth map. Rotate continents-cratons 30 degrees to align with the lattice. Fill them with random land hex chits when craton land is placed on permanent ocean and random blue-ringed and white-ringed hex chits when craton sea is placed on non-blue-ringed land. Transit creeples and climate chits as per *Bios:Earth* campaign setup (**C6**) regardless if they land on correct circles. Apply climate chits to the standard map circles according to the player count. Remove cratons from the map so that they don't occlude hexes. Don't put any new resources on the map. Climate strips are not used.
- e. Chimeraworld.** Mix Mars, Venus and Earth cratons with hex chits. If done on the classic Earth Map, they represent recent resurfacing events.

K4. GREEN MARS OR VENUS (PAWEŁ GARYCKI)

May also be used for Earth, if green meeple are used for vegetation.

- a. Alien Terrain Mars and Venus craton terrain is treated the following way:**
 - **Basin** is treated as sea.
 - **Highland** is treated as a swamp if a green plant archetype is present (may place an unused burrower to further indicate this), or otherwise treated as weeds.
- b. Climate Chit Transformation.** Replace the following on each raindance craton:
 - **Mountain (black disk)** -> orange chit
 - **Sea (white disk)** -> blue chit
 - **Tubers Forest (green burrower plant)** -> green chit
 - **Wasteland (no green creeple and no disk)** -> white chit
- c. Alien America.** Add two additional Earth cratons as America to form a continent to the west of the Mars or Venus cratons. Cover Earth cratons entirely with random terrain chits and apply climate chits there according to the player count stars.

L - TIPS

L1. ELDER ACTION TIPS

A heavy bidding strategy concentrating on Foundations and ignoring Ideas will make you weak in Advancements, Urbanization, artisans, and trade. Conversely, if you concentrate on Ideas, you will stifle your mental development and will be vulnerable to chaotic revolutions which often discard multiple Ideas. Here are further tips on what Ruling Class to be in, or if you should challenge or not, to achieve a specific Advancement:

- a. Break An Abstraction Logjam.** In Epoch I you normally build up pawns in vocabulary or mysticism. Abstractions are rare, so do not expect to build up Free Will until Epoch II (the dawn of consciousness and volition).¹¹⁸ If you have a lot of pawns stuck in vocabulary, switch to a cultural Ruling Class and use a combination of prayer and art to break this mental logjam. But beware, art becomes more rare later in the game, so accumulated Mysticism may be hard to reverse.¹¹⁹
- b. Clear Your Brain.** If you do not win challenges, as the game goes on it becomes harder to move pawns out of your emotions, and your Free Will stagnates.¹²⁰
- c. Advance Your Information.** You should achieve information 2 in Epoch II at the latest, which usually requires winning Ideas. If all else fails, use Library. Once at information 2, challenge the gods for further advances.¹²¹
- d. Urbanize (domesticate or cultivate).** There are 3 significant advantages to having Cities: (1) they provide VP during Epoch II scoring, also during political final scoring, (2) they enable or disable enslavement, and (3) they are tech requirements for many Ideas starting in Epoch II. In the early game, the best Ruling Class for city-building is white. A particularly valuable resource is biofuel.
- e. Urbanize (prospect).** Later in the game, advance your metallurgy so that you can build Cities by prospecting. Oil and uranium are requirements to valuable cards in the endgame.
- f. Trade.** Your Ruling Class should be in white or especially red to have the best chance for this invaluable action.
- g. Preach.** Challenge if your rulers are purple or especially white in Epochs I, II, or III.¹²²

118 HUMAN VOLITION. The human capacity for free will is discontinuous with the natural capacities of all known non-human species. Our distinctness is so obvious that there would be no need to belabor this point if it were not for the ominous rise of behaviorism. The behaviorists who claim that free will is illusionary - men like Pavlov, Skinner, Malthus, and Marx, and groups like the Club of Rome or Social Darwinists, are dead wrong. Free will is a linguistic innovation, enabling everything that is uniquely human.

119 ABSTRACTION is a type of verbal induction, a method of perceiving what exists. It mentally separates attributes, motions, or numbers from entities. For instance, if I ask you to visualize "animal", your cognitive processes that convert words into images will struggle to picture every sort of particular animal. The problem of subsuming particulars into generals is called the problem of induction, and it can only be accomplished using words, images aren't enough. With the single word "animal" a human (and no other known beast) can make all sorts of useful conclusions about animals as a whole, or even more difficult abstractions such as "freedom". You are far more word oriented and less of a visual thinker than you likely realize.

120 FREE WILL is a decision-making process using an abstraction of oneself in an imagined context. As with all abstractions, verbal concepts rather than percepts are used to reduce and manipulate sensory data. Every word you use is a concept that stands for an unlimited number of concretes of a certain kind, allowing counterfactuals, metaphors, and outright lies. Crucially, free will includes in its repertoire words for oneself, so that the thinker can abstractly imagine himself in various possibilities, including fantasies. Free will notoriously allows humans to rebel against their own nature, even against Darwinian imperatives, in acts such as abstinence, celibacy, monasticism, suicide, altruism, and other behaviors utterly unknown in the rest of the animal kingdom. Humans first acquired free will as a result of becoming accomplished linguists, possibly as late as Epoch III.

121 STONED APE HYPOTHESIS posits that the sudden doubling of the human brain size 200,000 years ago was due to the ingestion of psilocybin mushrooms, which is known to trigger "unconstrained cognition" and physical changes in the emotion centers of the brain. Normally a habit of getting stoned would be rapidly weeded out by natural selection, but perhaps coupled with language this led to the first word-based abstractions, which conferred an adaptive advantage. —Terence McKenna, *Food of the Gods*, 1992.

122 TEMPLES discovered in Göbekli Tepe, Turkey, have been dated to at least 8000 BCE, which precedes cities, writing, and agriculture. The sequence seems to be burials, ancestor worship, megalithic tombs, temples, urbanization, and finally civilization.

h. War or Enslave. Challenge if your rulers are purple or (if Epoch IV) white.

L2. DIASPORA PROBLEM

Do not despair if, due to war, enslavement, or preaching in the advanced game, you are reduced to a single diaspora figure being hounded on the map and with no chance to urbanize. Here are some suggestions:

- a. Industrial.** Attain this victory by using library to increase your information and winning challenges as much as possible. You will want to increase maritime, which often requires energy 4. Increasing footprint may help keep the Cities necessary to hold many Epoch II cards from *starvation* (H1a).
- b. Cultural.** For this victory bid strongly for religious challenges, and then use prayer and preach to launch a counterattack to damage your opponent's political score. Both prayer and preach are mainly found on Challenge Cards and Ideas in the white discipline. Library and Mysticism help dominate bidding.

M - TRANSITION TO HIGH FRONTIER

The end state of a game of *Bios:Origins* can serve as the starting condition for a game of *High Frontier* (any edition). Follow these steps:

- a. Starting Faction.** Choose factions in the order of victory, with the highest scoring player choosing first. If your high score in *Bios:Origins* is political, preferably choose either Yellow or Purple. If it is cultural, preferably choose either White or Green. If it is industrial, preferably choose either Red or Gray.
- b. Starting Politics.** The Active Law starts in "CENTRIST" if the ending Philosophy in *Bios:Origins* is in the center or adjacent to the center. It starts in "UNITY" if the ending Philosophy is to the right (pacifist or unity), or in "EQUALITY" if the ending politics is to the left (agnostic or equality). It starts in "FREEDOM" if the ending politics is in abolitionist or freedom.
- c. Starting Player.** The winner of *Bios:Origins* is the starting player in *High Frontier*.
- d. Transferable Victory Points.** See **C6j** to transfer VP to the game of *High Frontier*.
- e. Orbital Capacity.** Any player who has attained maritime 8 starts with double the usual Aquas.
- f. Nuclear Energy.** Any player who has attained energy 8 starts with a random starting thruster.
- g. Bellwethers.** For each *Bellwether* (E3e) a player has, he starts with one extra Aqua in addition to the normal starting Aqua.
- h. Bios:Solar System Campaign.** If playing an epic game starting from *Bios:Genesis*, in addition to the above, follow the rules written in **V7** section of appendix of *High Frontier 4 All*. If the winning *Bios:Genesis* macroorganism came from a cosmic landform, start *High Frontier* on an oceanic Mars if it came from the Mars paleo-ocean, and oceanic Venus otherwise. See **V8** (appendix) for details.
- i. Creeples.** For thematic purposes only, it is suggested your Creeples instead of *High Frontier* colony domes, as a reminder of your animal heritage.

CULTURE, POLITICS, INDUSTRY (essay, Phil Eklund)

The Industrial Revolution and the Enlightenment were the two most influential impacts on the course of human destinies, and they occurred so close in time and place as to be perhaps inseparable. For a game designer wishing to simulate civilization, recreating the whys and hows of the dance of industrialization and philosophy are paramount to success. I approach this goal obliquely, by looking at the whys and hows of empires and civilizations that fell short of sponsoring their own Industrial Revolution.

Personal Anecdote. I worked for many decades in a rocket factory. When we got a contract for a part of the Space Launch System, we needed the plans for the Saturn V (the moon booster that had last flown 35 years prior). I was shocked to discover that no digital plans were available, only mail-order blueprints which my boss hung up on the walls. Blueprints? Is this the cutting edge in booster technology? At that time, 2/3 of the dozen astronauts who used this booster to walk on the moon were dead of old age. It seems the early lead in space was more of a publicly-funded patriotic monument to the cold war than a sustainable next step into the New Age.

The Ming Dynasty of China took an early lead in science and technology, notably in the production of iron and textiles using water-power. For international trade, the government sponsored seven armadas of junks, staffed by 37000 soldiers, sailing as far as Kamchatka and Zanzibar between 1405 and 1430. But after the death of the visionary emperor Yung-lo, not only did the funding halt, but there was an official ban on private technological developments and trade with the outside. China had withdrawn from the brink of leading the industrial revolution and globalization. In game language there was a change in the ruling class, responding to royal fear that the power base of the eunuch faction in the royal palace was growing too strong.

The Roman Republic took a lead in politics, with such advanced features as the Senate, jurisprudence, democracy, *ius privatum* (personal and property rights, *jus gentium* (common law) and subsidiary citizenship for women. After almost 5 centuries as a republic, autocratic control was seized by Julius and the rest of the Caesars, and Rome fell into gradual decline.

In My Game Pax Renaissance, I argue that a Republican tradition in Italy fostered the rise of bankers and merchants that directly led to the Industrial Revolution 3 centuries later. The Italian city-states were without cohesion or a central ruler and thus incredibly vulnerable to invasion by ambitious kings. But the rulers of superpowers such as France, Habsburgs, and the Ottomans saw benefit in using Italy as a buffer zone in a balance of power. Italy remained uninvaded for only a brief generation, but this was enough to produce the Medici banks as well as Leonardo. Even after invasion, the power of trade could not be snuffed out. For one thing, the introduction of paid mercenaries revolutionized and the strength of paid mercenaries versus conscripts proved durable.

Why Not The East? But why did the Renaissance happen in Italy, and not in the Muslim World, which had equally inherited the advanced Greek philosophy of the West, and moreover was far ahead in literacy, technology, and science? An essay by my son Matt Eklund, published in *Pax Renaissance*, goes into the details of this question. The short answer is that a philosophical battle was occurring in the highest echelons of the Muslim World, and science and reason lost to faith and obedience. Why study something if the answer is available only to the almighty? In the West, faith and reason came to an uneasy balance, inspired by worldly thinkers such as St. Thomas Aquinas.

Profit Motive. Unsustainability in the course of human progress in the Ming Dynasty, the Roman Empire, and the Muslim World can be explained in three words: "Property Became Insecure." What was respected in a government with division of power became subject to corruption in a centralized dictatorship. Insecure property kills the profit motive, since property is necessary for profit and profit and capital. What are these? Profit is any human value, and capital are the tools required to create those values. Anyone who wishes to prosper and to acquire nice things and services for themselves and their families has a profit motive. This is the driver for production, for the emergence of multi-layered social stratification, for the accumulation of capital, and for the specializations of economic function (merchants and bankers). Those who decry the profit motive as crass or the source of all evil is often the most outraged if his own efforts are seized.

Profit Is Not Money. As this game demonstrates, money is a recent technological advancement. Yet the profit motive precedes money, going back to the dawn of consciousness, the time of the first art and jewelry. For this you need the first capital, perhaps a handaxe or hammerstone. A knapping specialist could profit from the making of necklaces, and his/her customers would profit as well. Where did this mutual profit come from? Specialization of labor and capital generates profits for everyone involved in voluntary exchanges. It's win-win. To give a modern example, if you give a babysitter a book in exchange for her services, no money is exchanged, yet both persons profit.

Slavery had suppressed the overwhelming majority of human potential for the first three Epochs of the game, but its necessity went unquestioned until the Enlightenment. The dramatic story of how a small group of Enlightenment zealots conceived an outrageous but ultimately successful movement to end the legality of slavery throughout the world is detailed in my game *Pax Emancipation*. Emancipation, the single greatest political achievement in history, benefitted not just the slaves, but their liberated profit motive vitalized the general economy.

Freedom is the core human value, without which the people of a civilization will stagnate in oppression, as reflected by the general culture, politics, and industry.

—Phil Eklund, May 2020.

A TALE OF TWO ISLANDS (essay, Phil Eklund)

The Island of Madagascar and the Islands of New Zealand are similar in geographic diversity, biological isolation, and colonial history. Both were populated late in the human diaspora, less than two millennia ago (two game turns), both by the same Austronesian seafaring cultures. Both were later governed by European colonists, and after 60 years both became independent. Yet today New Zealand is in the top 5 countries in wealth and freedom, while Madagascar is in the bottom 25. The imports and exports of New Zealand are 10X greater (around 39 billion USD), even though its population is 1/5 that of Madagascar. Today the peoples of Madagascar belong to the 6% of the world population has yet to progress out of Epoch III.

What went wrong? In this essay, I compare the two modern island nations using game terms, and then add up their winning scores. "M" stands for Madagascar, and "NZ" stands for New Zealand. Nobody who has visited both islands, who has been surrounded by beggar children, seen rainforests ablaze, met bereaved spearmen bent on vigilante justice, or been shaken down by corrupt policemen, can be in the slightest doubt as to who is the winner here. Most persons in M are subsistence farmers, with little legal capitalist options, while most persons in NZ are wealthy business-oriented urbanites. I conclude that it is a land's political foundations that determine its prosperity, freedom, and happiness. But first, let's compare game factors for M and NZ:

Footprint: M=3 (slash-and-burn rice paddies, 71% land is agricultural), NZ=6 (deer & sheep husbandry, green revolution, 42% of land is agricultural). The slash-and-burn farmers of M need 2 hectares of land to keep each person fed, and there is barely enough land on an island the size of M to be self-sufficient. It is a common sight to see farmers toiling the soil with nothing more than Malagasy shovels, without the benefit of even the neolithic ard plow (#144), or igniting the fields and forests using Tavy, the ancient method of slash-and-burn agriculture. Tavy is so inefficient that M has become the world's most environmentally degraded nation. The need for land just to feed themselves means that 80% of the island burns each year, and much of the once-forested wastelands are beyond recovery. But the tractors, fertilizers, and high yield crops of NZ only need a quarter of a hectare to feed each person, good enough on an island the size of NZ to feed their population 26 times over. NZ exports 23 billion USD of dairy, venison, lamb, and other food, while M exports almost nothing.

Energy: M=4 (wood-fired factories and homes), NZ=7 (mainly oil and gas, but some geothermal and hydrothermal). Everywhere in M one sees women and children trudging barefoot with firewood balanced on their heads. The forests are ravaged by low tech axes; and the deforestation is wrought not by power tools or wood exports, but by people in an energy crisis. I photographed a baobab a millennia old that had been stripped with axes. Wood-fired open air factories produce bricks, paper, salt, silk, and pottery. The distinctive Malagasy homes are 2 storied, with the upper floor pitch black from wood fires. Transportation is by foot, zebu carts, or brush taxi. The trains stopped running after the French colonials were kicked out. Farmers who once used those trains to export tree crops abroad have now reverted to burning the forests for subsistence rice paddies.

Mysticism: M=5 (shamanistic animism), NZ=0 (agnosticism). The aboriginal peoples of both islands believed in ancestor worship, which led to a caste system, slavery, and the duty to serve royalty (called in Malagasy "Fanorpoana"). Although castes were abolished by the British colonials in NZ, they lingered under French colonialism in M, with forced-labor programs such as SMOTIG. This hierarchy of worshipful obedience has remained largely untouched under today's centralised socialism in M, where personal aspirations take second seat to obligations to the state. At least 93% of the populace respect shamanism, from fady taboos to animal sacrifice, usually coated with a veneer of Christianity. Meanwhile in NZ, only around 61% believe in some sort of universal supernatural being, with 28% absolutely certain, making NZ one of the most agnostic countries in the world. The descendants of the Maori colonists are just as agnostic as descendants of European settlers, with 46% of Maori claiming no religion.

Metallurgy: M=3 (charcoal fires), NZ=6 (large scale aluminum and metal production). Both islands use imported steel and plastics.

Immunology: M=6 (drugs), NZ=10 (vaccines). Through the judicious use of the pesticide DDT in the 1960s, M reduced malarial deaths from thousands per year to zero. This stopped with the 1972 Western ban on DDT, and deaths from malaria tragically jumped back to thousands per year, so M has gone backwards in immunology. Meanwhile, NZ has reduced her mosquito-vector deaths to zero.

Urbanization: M=4 (37%), NZ=9 (86%). It is remarkable that NZ is a net exporter of food despite being largely urban, while M has very little imports or exports. M's isolation contradicts Marxist theories that she is impoverished due to "exploitation" by wealthier peoples. Although almost all of the shoes and clothing in M is western, these are almost entirely from donations.

Maritime: M=2 (boats with lateen sails and oars), NZ=8 (space age). Every morning the fishermen of M launch their outriggers, hardly distinguishable from the watercraft used to first discover the island. Meanwhile, on the Mahia Peninsula of NZ, a 2017 Rocket Lab launch was the first anywhere from a private launch facility.

Information: M=3 (post-colonial literacy, native paper-making, cell phone towers), NZ=6 (broadcasting & internet). Both M and NZ were 100% illiterate before colonial times, for the simple reason the natives had not yet invented writing. Post-colonial literacy in M rose to 71%, but after independence it tragically backslid to 65%. In NZ, literacy rose to its current 99%.

Diversity: M=0 (family/tribal), NZ=8 (globalization). Societies with high family values and tribal allegiances have a high distrust of outsiders and a correspondingly low diversity. Their institutions are often marked by nepotism, cronyism, racism, and irrational business decision-making. And chaos: on our trip across M, we detoured around the remains of a 50m suspension bridge that was dynamited, not by terrorists, by the nation's president in protest against election results. In contrast, as a former British colony NZ has entirely jettisoned informal moral obligations in favor of formal, transparent, legal ones. Accordingly, the NZ economy is high trust/high diversity, and is one of the most globalized in the world.

Winning Game Scores: M=12 (cultural), 13 (political), 5 (industrial). NZ=13 (cultural), 25 (political), 19 (industrial).

Slavery: Both islands were marked by ceaseless intertribal warfare and slave raids in the centuries prior to colonization. In M, both the Sakalava and Imerina Kingdoms exported slaves to the Arabs, until the French occupying forces liberated a half million slaves with an emancipation law in 1896. In NZ, the brutal enslavement/genocide of the Moriori Islanders by the Maori colonizers, as dramatized by the book/film *Cloud Atlas*, was ended by the British in 1847. The story of the delegalization of slavery, the greatest accomplishment in history, is detailed in my game *Pax Emancipation*.

Madagascar Megalopolis: Just for fun, imagine the world's population of 7.7 billion souls living in a single city with the density of a moderately crowded city like Barcelona (16,000 persons/km²). Such a city could easily fit on the island of M. Using footprint 8 agriculture, this "Madagascar Megalopolis" would need an area the size of Antarctica for the croplands to feed it. Leaving most of the continents as wilderness.

2018 Index of Economic Freedom: M=56.8 (117th in the world), NZ=84.2 (3rd highest in the world). Thus in terms of property rights, taxes, government integrity, freedom of trade and business, M is at the nadir, and NZ is at the pinnacle. Yali's question (to borrow a question from "Guns, Germs, and Steel") is: how did two similar islands turn out so differently? This can be reversed: the once impoverished island nation of Mauritius, just off the east coast of M, now has the 21st highest freedom index in the world (75.1).

Repressed Entrepreneurs: Distributed along Route 7 in M, roadstands offer strawberries, ceramic statues, rabbits (for eating), raffia dolls, drums, pots, fruit, sapphires, toys made from cans, etc. But, as in most of Africa, about 98% of them are illegal, vulnerable to forfeiture or squeeze by any government official. It is long and expensive for a seller to navigate the dubious road to legality imposed by the regime. And once there, property rights are uncertain and ill-respected. It takes decades to legally acquire state-owned land in which to build a house. It is estimated that Africa has a trillion dollars of "dead capital", savings that cannot be used in collateral because it is invested in undocumented property. We stayed in such a home, converted from a hotel. One French hotelier described to me how he had built the facility, paved 20 km of road, erected the windmills, hired the guards, and arranged for water to be brought in by canoe daily. In other words, the bureaucrats in M contributed nothing towards startup costs, but once there was a whiff of profit, they came in droves with hands outstretched, both above and below the table.

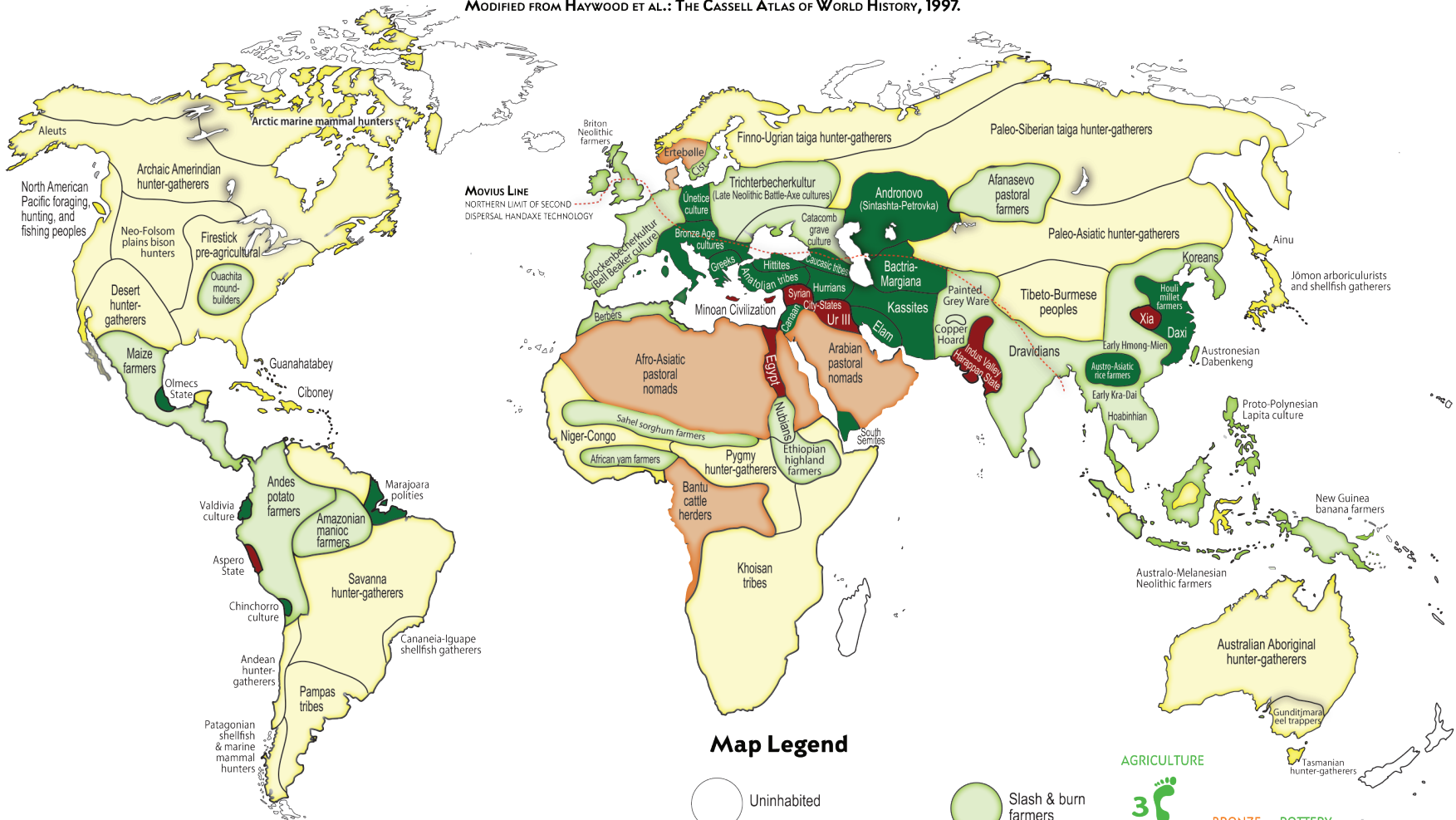
Post Colonial Socialism: Upon independence, following the best advice of Western "experts", M adopted a democratic socialist government with sweeping regulatory powers. From 1975 to 1992, this government operated under the Charter of the Malagasy Socialist Revolution, resulting in a plummeting economy, increasing environmental degradation, decreasing literacy, decreasing private ownership, and single party rule, all under a succession of autocratic dictators and an army of corrupt officials. In fact, every measurable facet of human welfare declined in this period, even compared to the rather autocratic colonial period. Corruption is inevitable under socialism because giving an official total control over productive businessmen means the temptation to extract what they earn is enormous. In fact, every colonial nation in the world that has adopted socialism upon independence has suffered an economic decline, sometimes precipitous. NZ, in contrast, adopted a capitalist government like almost all of the former British colonies. Capitalism legally excludes the initiation of force in transactions, while socialism mandates it (in the name of society).

My Answer To Yali: the difference between M and NZ is due to ideological foundations, not geography, resources, or even technology. Yes, technology is lower in M than NZ, but this is an effect, not a cause. The ceiling blocking the farmers and would-be entrepreneurs of M from reaching prosperity is a consequence of its socialist political foundation. Here I use the standard economist's definition of socialism: a system of government where politicians own and control the means of production, under a governing principle of service to society. This contrasts to a capitalist society, such as in NZ and the rest of the Western world, where there is no centralized authorities and the populace are free to work for their own benefit, rather than for "society" or some other social construct. I have simulated these opposing ideas by use of player tableaux in which inventive ideas sprout from ideological foundations. I hope that you appreciate the result.

—Phil Eklund, Feb 2019.

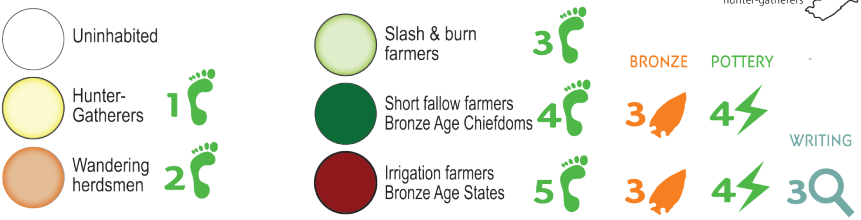
The Human World in Epoch III, 4 kya (2000 BCE)

MODIFIED FROM HAYWOOD ET AL.: THE CASSELL ATLAS OF WORLD HISTORY, 1997.

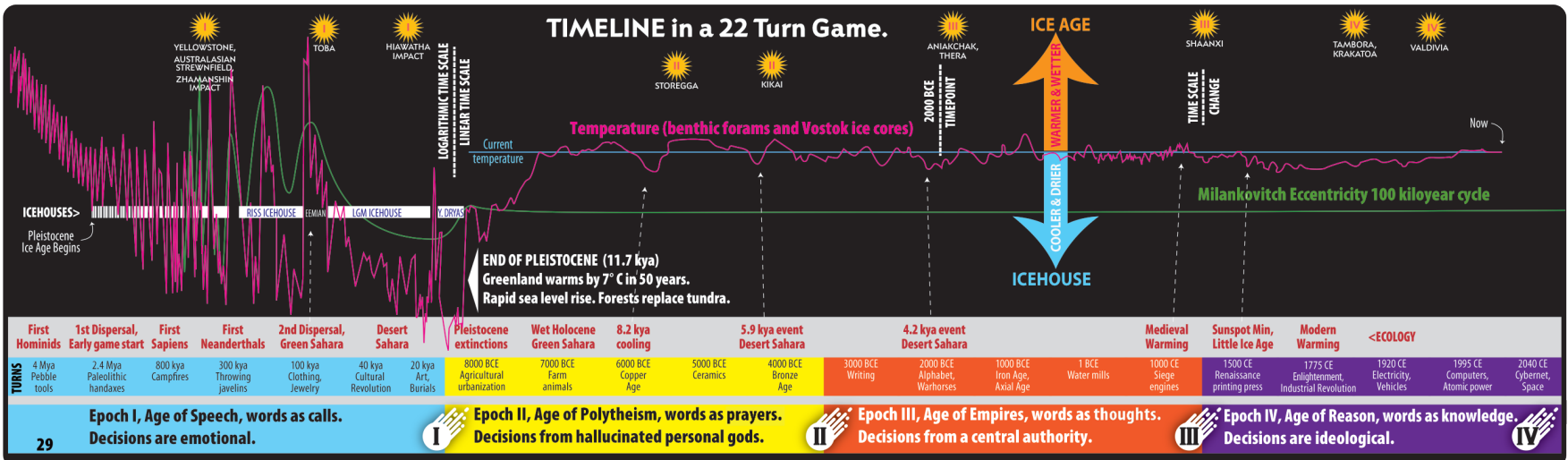


MOVIUS LINE
NORTHERN LIMIT OF SECOND
DISPERSAL HANDAXE TECHNOLOGY

Map Legend



CLIMATE HISTORY OVER THE 4 MILLION YEAR TIMESPAN OF A TYPICAL GAME (below). Starting from the left, global temperatures (red) oscillate abruptly between ice age and icehouse conditions, on a 100,000 year cycle that closely corresponds to orbital parameters (green). This correlation is proven by correlations going back hundreds of million of years, although it remains unclear why small orbital changes can generate huge temperature swings, while large orbital changes sometimes result in small warmings and coolings. The pattern is a sudden swing from icehouse to the warmer ice age, flat temperatures for 100,000 years, then a rapid fall into icehouse. We live in a typical relatively stable ice age, and if this pattern holds we still have 70,000 year to run before the next icehouse.



GLOSSARY

Acts of God. If a token is destroyed (see Destroy (Acts of God)) by a natural event or **preaching**, then no Chaos is generated. In the case of preaching, the affected Migrant or City should not be imagined as slaughtered but merely proselytized into another player's color.


Acts of Man. See Destroy (Acts of Man).

Action. One of the game processes you can perform each turn during your *activities phase* (F), as listed on Species, Foundation and Idea cards according to their Orientation in your Tableau. You cannot perform an action unless it is listed on a card in your Tableau. **Your action may have a Consequent and/or a Negotiation. If so, follow this sequence: action, your Negotiation, your trade partner's Negotiation, Consequent.** Actions include *specialize* (G1), *invent* (G2), *library* (G3), *elect* (G4), *spread* (G6), *domesticate* (G7a), *cultivate* (G7b), *prospect* (G7c,d), *advancements* (G9), *trade* (J3a), *preach* (J3b), *war* (J3c), *enslave* (J3d), *exogamy* (J5a), *racism* (J5b), *cold war* (J5c), *artisan* (J5d), *constitution* (J5e), *science* (J5h), and *pseudoscience* (J5i).

Bellwether (E3e). This represents a predictor or harbinger of future advances, and is found on the other side of each Comet. If you claim this card during your challenge phase, you may employ a future challenge phase to discard this card out of the game to move the Philosophy by 1 or 2 steps. Otherwise, it has no use.

Brain Placard. See B1a, D1f.

Challenge Card. Together with Comets, these cards form the challenge deck and one is auctioned each time any player challenges the gods during phase A1a with no Comet visible. They are separated into the 4 Epochs. Each Challenge Card enacts two events such as catastrophes, diseases, and dictators, and then the card itself is auctioned as a Foundation (E2).

 **Chaos (D2).** An event or Consequent that removes Migrants from the map (or from your pool if cannot be removed from the map) and adds them to Dissents. In general, the owners of Migrants or Cities suffer chaos if they were destroyed by *Acts of Man* (D2a) and no chaos if destroyed by *Acts of God*. Other sources of chaos include *pollution* (E1g), *civil war* & *economic crisis* (E1i), *future shock* (E3a), *morality* (J4), *cold war* (J5c), and some *Consequents* (Fd). Chaos suffered is added to the Ruling Class of your Tableau as Dissidents, which lowers your Diversity and shuts down Foundations.

City. A permanent settlement represented by a cuboid placed over a resource icon in a Hex. A city is created by an *urbanization action* (G7), taking the required cuboid from the leftmost occupied square on your Urbanization track. There can only be one city per Hex, see G7. A city is destroyed with no Chaos by Acts of God, and with 1 Chaos by Acts of Man. Return the cuboid of a destroyed city to the Urbanization track of its owner. The number of Cities you have is equal to your Urbanization. Cities are classified according to the resource icon they cover; there are luxury, metal, biofuel¹²³, oil, uranium, war animal, and work animal cities. Note an underwater methane city is the same as an oil city.

123 BIOFUEL is a biomass-derived oil used for lamps, heating, or engines. Biofuels on the gamemap include: rapeseed / olive oil (Mediterranean), peanut oil (the Andes), jatropha / jojoba oil (Sonoran desert), and whale oil (Hawaii). They typically have an energy content of 39 MJ/kg and yields of 900 to 1600 kg oil/ha. Although renewable, they require far larger footprints than other energy sources.

Column. Your Tableau has three columns, each of a different Discipline color. One of the columns is your Ruling Class, as indicated by your Crown. This column is used to determine your order of Actions and advancements during *activities* (A2).

Comet (B2c). A card in the challenge deck (C2g) that heralds the start of the next Epoch. The game starts with four in the deck, starting with COMET1. Each is double-sided, so as to be visible in the challenge deck. When visible, it is automatically awarded to you if you challenge the gods, replacing the auction. This triggers the procedure listed in E3. Keep the card as a *Bellwether* (E3e).


Consequent (F0d). After certain Actions there will be listed on the card the symbol ➔ followed by an Action, usually either an *advancement* (G9) or Chaos (E). This icon means that if (and only if) you perform the Action, the advancement is awarded or the Chaos is suffered after any other effects of the Action such as Negotiation or war losses. Actions with consequents include prayer, urbanizing a City (using domesticate, cultivate, or prospect), *war*, or *trade*. You can re-urbanize a City you have already established, just to gain its consequent. You can perform an Action even if you have already attained its consequent. The free advancements due to steam or oil (G9e) are consequents.

Crown. Your crown-shaped chit, see B8c.

Destroy (Acts Of God). Migrants are destroyed by Acts of God during *catastrophes* (E1b), or *preach convert* (J3b). Cities are destroyed by Acts of God during *diseases* (E1a), *catastrophes* (E1b), *climate change* (E1c,d,e,f), *famine* (E1h), or *preach evangelize* (J3b). Move a destroyed Migrant to your pool, and a destroyed City to your Urbanization track. Each destroyed City generates a REFUGEE, taken from the pool (or from elsewhere on the map if the pool is empty), and added to the Hex of the destroyed City (assuming there is an available Spot).

Destroy (Acts of Man). Migrants or Cities are destroyed by Acts of Man during *starvation* (H1b), *war attack* (J3c), or *enslave* (J3d). Move a destroyed Migrant to an empty Dissent in your Ruling Class Column, or (if there are no empty Dissents there) expended to start a chaotic revolution. Move a destroyed City to your Urbanization track. Each destroyed City generates a REFUGEE, which must be moved to an empty Dissent in your *Ruling Class*, or (if there are no empty Dissents) remains on the map but starts a chaotic revolution. Note that Cities destroyed by QUELLING generate a Refugee which also remains on the map but does not become a Dissident.

Discipline. There are 3 of these, each associated with a different color: culture (white), politics (purple), and industry (red). Each Idea and Foundation card has 2 disciplines, only one of which is active depending on its Orientation. Each discipline can be thought of as supporting a different morality: divinity (white), society (purple), or self (red).¹²⁴

 **Dissent.** A Rainbow icon marked on the upper right of some Foundations, and also on your Crown. Unlike other Rainbow icons, a dissent can hold one Occluding meeples called a Dissident, which is added if you suffer *Chaos* (D2). If a Dissident can't be placed because all dissents in your Ruling Class are occupied, then you suffer a chaotic revolution. Accordingly, the more empty dissents you have in your Tableau, the more Dissidents you can absorb without going into revolution.

124 THE DISCIPLINES segregate the populace according to their epistemology, i.e. the science of figuring out how to determine truth. Discipline purple holds truth to be the majority view, discipline white preaches truth to be found in supernatural or unknowable realms, and discipline red finds truth in logic, observation, and natural law. See footnote 11.

Dissident (D2c). An Occluding Migrant figure on a Dissent. It is added to an empty Dissent on your Ruling Class each time you suffer a Chaos (D2b). Dissidents can be violently removed by a Quell during a *revolution* (D3a), *genocide* (E1i), *election* (G4), or *purge* (G9g), or quietly removed during a *constitution* (J5e) or *Negotiation*.¹²⁵



Diversity. The number of Rainbow icons visible (i.e. not Occluded) in your Tableau, either on Foundations or on your Crown. Your Diversity is also tracked by a cube of your color in the Diversity Track, and is updated if any player requests it during his turn (H3). Your Diversity rises as you add Foundations or remove Dissidents, and falls as you subtract Foundations or add Dissidents. It is used during *civil war* (E1i), the *comet scoring* (E3) that ends Epoch III, and *industrial final scoring* (I3b).

Domain Pawn. A pawn stored in any of the three domains on the Brain Placard (B4a).

Elder. A pawn on an Idea card in the Market, placed during *specialize* (G1) or *artisan* (J5d) and removed (Expended) if their Idea finally gets Invented, if Quelled, or if they are used for payments (E2e) or election (G4). Enough elders on a Market Idea makes it viable for *invent* (G2, J2).

Emissary. An opponent's pawn on an Idea in your Tableau that was installed by *exogamy* (J5a). If during your activities you use a card that has an opponent's Emissary on it, then he gains a NEGOTIATION bonus. Only the owner of the Emissary gets this bonus. This represents the influence of intermarriage, family ties, diplomatic treaties, or foreign queens. You can voluntarily expend your Emissaries by using them for *payments* (E2e) or *elect* (G4). They are involuntarily expended by Quells, *obsolete ideas* (D3e), *culls* (G2b), or by *racism* (J5b). They are immune to diseases, pollution, or famine. A card can have only one Emissary from each player, each of whom receives a Negotiation if the card is used.

Epoch. The Challenge Cards and the Idea cards are divided into 4 Epochs, numbered I, II, III, and IV. Each time a Comet gets challenged, the Epoch advances and all Ideas of previous Epochs in the Market get flushed unless an Elder is working on them.

Eureka (G2b,c). An advancement listed on an Idea or Foundation, awarded during *invent* (G2) or to the *auction winner* (E2d). Includes *encephalize* (G9a), *abstraction* (G9b), *art* (G9c), *prayer* (G9d), *technology advancement* (G9e), *cull* (G9f), *purge* (G9g), and *demagogue* (G9h). No preconditions are needed to claim an Eureka. During *copycat eureka* (G2c), you are awarded a card's Eureka if your Elder is on it when your opponent claims it from the Market.

Expend. Move one Migrant to the owner's pool or one pawn to the owner's Free Will. If it is a pawn, it can be an Elder or Emissary. Example processes using expenditures include: *obsolete ideas* (D3e), *auction payments* (E2d), *invent* (G2d), or *racism* (J5b).

Footprint. Representing the land area needed to collect or grow enough food to survive, your footprint is heavily dependent on technology. A hunter-gatherer has a bigger footprint than a farmer, since he needs to roam over a greater territory. The footprint equals number of tokens that each Hex can hold without *starvation* (H1a). If your footprint is exceeded, the excess tokens starve during the final phase of your turn. Each Migrant, sitting as it does on a Spot between 3 Hexes, occupies all three Hexes simultaneously. If the Migrant is at Footprint 1, the most primitive, it needs all 3 Hexes empty to survive and can starve if another Migrant enters any of the 3 Hexes.

125 DISSENTS simulate how much unrest a society can absorb and still function, which parallels the hierarchy of command. In other words, if it is crystal clear who holds the monopoly of power, the society is modeled as robust with many Dissent spaces to hold dissidents.

Foundation (B2a). A landscape-oriented card in your Tableau. Each one has a Rainbow, and if that Rainbow is a Dissident it can be Occluded. You add a foundation by winning a challenge auction, whereupon you orient it so that one of its colored Disciplines is uppermost. Although foundations are stable compared to Ideas, nevertheless you can lose a foundation by *genocide (E1i)* or *purge (G9g)*.

Free Will (B1a). The upper part of your Brain Placard where you store your unemployed pawns. You cannot use these pawns for bidding.

Gap is an empty place in the 3X3 matrix that comprises the Market.

Habitable. Hexes or Spots can be habitable. A Hex is habitable for a landfolk City if it does not include a climate chit, and is not permanent ocean or ice. A Hex is habitable for a merfolk City if it either is permanent ocean, or has a sea climate chit. Cities may be built in habitable Hexes only. A land spot is habitable for landfolk Migrants, and a water spot is habitable for merfolk Migrants. Migrants are not allowed to end their spread on a Spot that is not habitable. Migrants are not allowed to spread between 2 uninhabitable climate chits (see example **G6f**), with these exceptions:

- **Footprint Stage 3.** Consider desert hexes habitable for purposes of spreading Migrants.
- **Energy Stage 5.** Consider ice hexes and permanent ice habitable for purposes of spreading Migrants.
- **Immunology Stage 4.** Consider jungle hexes habitable for purposes of spreading Migrants. (They are full of mosquitoes, tsetse flies, and other disease vectors).
- **Maritime Stage 2.** Consider sea hexes and permanent ocean habitable for purposes of spreading Migrants.

Hex. A map area bounded by 6 (sometimes 5) sides. Each can hold one climate chit, one City cuboid, plus one Migrant meeple in each of its Spots. Each hex is about 1700 km (1000 miles) across.

Idea (B2b). Ideas are claimed using *invent (G2)*. They never cause a change of the Ruling Class, and if added to a Tableau must be oriented to the color of the Ruling Class.

Lore Deck. Ideas discarded from a Tableau (as a result of *Revolution (D3e)*, *cull (G2b)*, *unqualified invent (G2d)*, or *obsolescence (J2e)*) are placed faceup into the top of this deck. Ideas discarded from the draw piles and Market when renovating the Market at the end of an Epoch are removed from the game, not added to the lore deck. To speed up the game, you may examine only the top card of the lore deck until after you have announced your intention to perform either the *science (J5h)* or *pseudoscience (J5i)* actions. Only when you have committed yourself may you examine the rest of the deck, and optionally select one. Shuffle the deck and leave one random card faceup on top after use.

Market. A 3 x 3 matrix of cards. Above each column are draw decks for each Epoch, with a different Discipline in each column.

Market Row. Each card in the Market is in one of 3 rows. Row three is just below the draw decks, row two below that, and row one on the bottom. The row number is equal to the minimum number of Elders required to invent a card.

Menopause (J2a) is attained if you have 2 or fewer pawns in your emotions. If a card has a menopause requirement, ignore this in the basic game.

Migrant. A figure representing hunter-gatherers, Refugees, Dissidents, and other groups. At the end of your turn, a Migrant can be in one of 3 places: in your pool, on a Habitable Spot on the map, or as a Dissident on one of your Dissidents.

Mysticism. The number of your pawns in your mysticism pool (**D1d**) indicates levels of ritualism, religion, and superstition. Move pawns here through *prayer (G9d)* and move them out by *art (G9c)*. Mysticism is used during *genocide* and *economic crisis (E1i)*, *mystical augmentation (E2b)*, the *comet scoring (E3)* ending Epoch I, *cultural final scoring (I1b)*, and *preach (J3b)*.

Negotiation. A bonus action awarded if a card occupied by your Emissary is used by an opponent during his *activities phase (F)*, or if a *trade (J3a)* is initiated with you, or you initiate a trade. This bonus is either (1) an advancement in one technology in which you lag behind your trade/emissary partner (**J3a**), (2) move one of your *Domain Pawns (B4a)* to your Free Will, or (3) clear one Dissident. Perform a negotiation before an action's Consequent, if any. If you do a trade action, perform your negotiation before your trade partner performs his (all during your turn). You may not take your bonus. You may decide not to take the bonus, or might not be able to take the bonus, but in a trade cannot stop your opponent from getting his bonus.

Occluded. The deactivation of the effect of an icon because it is covered by a token. A Rainbow occluded by a Dissident does not count towards Diversity, and shuts down all the Actions on a Foundation (**F0b**). A Resource icon is occluded by a cuboid, climate chit, or craton (**G7**), except that, for merfolk, it is the absence of a sea climate chit (rather than its presence) that occludes a resource. Catastrophes are occluded by cratons and hex chits but not by climate chits.

Orientation. Foundation and Idea cards can be oriented into one of two Discipline colors. The active one is at top and reads upright, and the other is inactive.

Philosophy (C2e). The token on the philosophy track (map) which enables *globalization bid augmentation (E2c)*, limits *final scoring (I)* and penalizes certain transactions (**J3**).

Quell (D3a) returns one Dissident from a Dissent to your pool, and represents a violent suppression of dissent. It can happen during a *Revolution (D3)*, *genocide (E1i)*, *election (G4)*, or *purge (G9g)*. For each Dissident quelled, choose one of the following losses: (1) Expend one of your Elders or Emissaries, or (2) Destroy one of your Cities (no Chaos), or (3) Expend one Migrant on the map (if you have more than one). However, you must preferentially expend Elders or destroy Cities before you can Expend Migrants. Furthermore, your last Migrant on the map is sacrosanct per **D4a**. Thus, if you run out of both Elders and Cities and have but one Migrant on the map, quell your remaining Dissidents for free.



Rainbow. Either of the icons shown to the left, found on all Foundations and Crowns. The Rainbow with a superimposed figure icon is called a Dissident, and is Occluded if there is a Dissident on it.

Refugee. A Migrant that you must place if your City is Destroyed for any reason. The figure comes from your pool if possible and goes onto one of the Habitable Spots surrounding the former City Hex, if there are any Spots unoccupied. If the city destruction generates Chaos, then the refugee must either be added as a Dissident or, if there isn't an empty Dissent in your Ruling Class, be left on the map to cause a chaotic *revolution (D3)*.

Renovate (E3b). This process, which occurs at the end of each Epoch, discards all Idea cards in the Market without Elders on them from the game. Additionally, it replaces all three draw decks for the Market with new draw decks with unused cards from the next Epoch. Draw cards from these new decks to fill the Market grid again (**H2**).

Resource. An icon on a Hex. All Hexes have at least one resource; many have two. A City can be established on either resource icon by cultivate (white icons), domesticate (brown icons), or prospect (black icons). Prospecting can only be accomplished if you have the *tech requirement (B3f)* listed on the resource icon.

Rosetta Stone. A player aid listing symbolic icons and their verbal explanations.¹²⁶

Ruling Class Column. The Column in your Tableau that has the Crown. This indicates your ruling class: cultural = theocracy with priestly ruling class, politics = monarchy or dictatorship with a political or monarchical ruling class, and industrial = constitutional republic with no ruling class.¹²⁷ Your ruling class column determines the Actions and advancements available during your *activities phase (F)*. All Ideas and all Dissidents will always be in your ruling class.

Scale (Map). Each Hex on the map is about 1700 km (1000 miles) across. Each City on the map has a population of approximately 10^X , where $X = \text{footprint} + 1$. Therefore, a neolithic city at footprint 3 has a population of 10,000, while a medieval city of footprint 4 has a population of 100,000.

Scale (Time). The long game (first dispersal out of Africa) starts 2 million years ago (2 Mya), and spans 2 million years, up until today. The short game (second dispersal out of Africa) spans 100,000 years. In Epoch I, turn length is on a log scale of tens of thousands of years. In Epochs II and III each player turn is a millennium (1000 years). In Epoch IV, each turn is about half the preceding one.

Species Placard. See **B1b**.

Spot. The small circles on the map. Each spot is part of up to 3 Hexes, and each can only hold 1 Migrant. Land spots are light brown, and merfolk Migrants cannot end their move on them. Water spots are wavy blue, and landfolk Migrants cannot end their move on them.

Stage. A number assigned to each Technology.

Tableau. The set of splayed cards sets in front of each player. Your tableau has space for three columns of Foundation cards, one of which is marked as the Ruling Class. The Ruling Class can contain Ideas which are also part of your tableau.

Technology. The numbered position of your figure used on any of the six tech tracks below the map to indicate the technological level of each player. The six tech tracks are footprint, energy, metallurgy, immunology, maritime, and information. Each track is divided into six Stages, each with a unique stage number.

Urbanization.¹²⁸ A number indicating the number of Cities you own. This number is listed for each player as the number visible to the left of the leftmost cuboid on your Urbanization track (map). It can help prevent *economic crisis (E1i)*, and counts for victory points during the *comet scoring (E3)* ending Epoch II and *political final scoring (I2b)*. If you have a higher Urbanization than your opponent, you are able to use *enslave actions (J3d)* against him. On the other hand, too much Urbanization can be harmful during *crowd disease (E1a)*, *pollution (E1g)*, and *famine (E1h)*.

126 ROSETTA STONE is a famed stele inscribed in 196 BCE in two languages: Ancient Egyptian and Ancient Greek. When discovered in 1799, it was key in deciphering Egyptian hieroglyphics.

127 RULING CLASS indicates the group with a monopoly on the use of force in a geographical region. A constitutional republic has no ruling class because the use of force is carefully regulated by a constitution, and the chances of a constitution being enforced are enhanced by maintaining a separation of powers.

128 URBANIZATION. The game value times 10 is equal to the percent of the population living in cities.



2020 Goblin Magnífico Nominee



2019 Golden Elephant Award Finalist

CREDITS

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Bios:Origins is dedicated to the memory of Dr. Hayo Siemsen, designer of the game "Mein erstes Bohnanza", author of many papers on ancient civilizations and philosophies, and a good friend of both designers of this game. Our collaboration with Professor Siemsen in this game was curtailed by his untimely death. His ideas are manifest in incorporating the Kurgan hypothesis into the Epoch II foundations.
