This is a long and rich chapter. As usual, Christian is unusually interested in *why* events happen. In the first half of this chapter, he focuses on geographical explanations; in the second, on economic explanations, defining it as "the collective human capacity to manipulate the natural environment" (283). In both cases he is looking for large structural changes—population growth, productivity, collective learning and innovation--rather than than detailed sequences of political succession.

While you are reading, then, try to link Christian's analysis with the historical sequence of events that is probably more familiar to you. For example, in this chapter he covers Egypt under the Pharoahs, Greece of the Bronze Age, and the Roman Empire (all familiar in "Western Civ" courses) as all part of the 4000+- year chunk of time he is considering (see e.g. p. 298). He stresses that the emergence of large-scale, diverse agriculture-based states he is describing took place not only in the Middle East but also in other "world zones," most notably Mesoamerica, approximately 2000 years later.

Nevertheless, Christian repeatedly sounds the theme of the dominance in world history of the great junction point, the "center of gravity," where Africa, Europe, and Asia connect—the "Afro-Eurasian world zone" (295), or what we typically and vaguely refer to today as "the Middle East." Therefore he is going to need to explain how modern industry developed in other sites in the modern age—the rise of Europe as the site of the Industrial Revolution, the dominance of the US in the twentieth century, and the emerging dominance of China in the 21<sup>st</sup> century. Keep your eyes open for how he deals with these issues. (Christian himself mentions this "displacement" of the Afro-Eurasia hub from its central role in world history on p. 296.)

Be sure you understand the overall trends of agrarian civilizations in the era ca.3200 BCE to 1400 CE (or ca. 5000-1000 BP). (Note that the "map of time" we looked at in our first class \*began\* the story of history at 5000 BP, while for Christian this date comes about halfway through his historical account.) What are their dominant characteristics? (289) What other types of societies exist during this era and where did they prevail? (284-6) How are agrarian civilizations distinct, and why are they worth special attention, especially in terms of the theme "technology in history"? (286, 293) What is the overall evolution of the balance between agrarian civilizations and other forms of society in this period? (293-94) Describe the overall expansion of agrarian civilizations in this period in terms of territorial domination. Compare the control over population of these civilizations with that of modern capitalist states (302-05; 317).

Much of the story of technology in recent history is written as an account of Famous Inventors, Famous Industrialists, etc. How is Christian's account written in the spirit of "history from below"? (287) How does he account for male authority (patriarchal claims) in this period? (287)

What is a "tribute-taking" society, and how does it differ from a "gift-giving" society? How does power based on consent differ from power based on coercion? What do you think of McNeill's analogy with parasitism (which Christian cites approvingly)? (287-88) Do these concepts help you understand contemporary societies and states?

What are "world-systems? (The question of European dominance begins to be discussed here.) What are four kinds of networks of power and influence? Think about which technologies are distinctively associated with each kind of network. (289-91)

Once again, what do you think of Christian's scientific analogies—e.g. laws of gravity and social centers of gravity, and the deformation of space-time by large bodies? What are hub regions and how do they differ from centers of gravity? (291-93) Is he "reifying" geography when he writes that "Both centers of gravity and hub regions powerfully shaped change....?" Is this geographical determinism? If so, how might it relate to technological determinism?

How separate were the various world zones during this 4-millennia period? (297-98, 301) When and how did India emerge as a new center of gravity? (299) When did agricultural civilization expand to south China, southeast Asia, sub-Saharan Africa, and Europe? (300) to eastern Europe up to the Urals and to West Africa? (301) when did agricultural civilization emerge in Mesoamerica? (301) When the encounter with Europe took place in the 16<sup>th</sup> century, what agricultural civilizations existed in the Americas? (302-4) How did the American world system at that time compare with that of Afro-Eurasia? (304, 318; also map p. 314)

Now Christian turns his attention to the themes of intensification (as opposed to "extensification"), innovation, growth, commercialization, and urbanization—in other words, processes now usually referred to as "economic."

How is scale a source of innovation? What are major innovations in transportation in this period, and how do they related to the "secondary products revolution" Christian described in Chapter 9, pp. 255-57? (306-8) What are major innovations in information communication? (307-8)

What are the long-term patterns of population growth in the early agrarian era? How did population growth and technological change interact in what was ultimately a negative feedback cycle? What is the analysis of Malthus about population growth? What is population "overshoot"? What are Malthusian cycles? (308-12, 331-32)

What are the ecological components of the interactions of population and technologies? Does Christian's discussion alter in any way your understanding of your reading in Diamond's *Collapse*?

What is the role of epidemic disease in the cycles of population and technological change? What are some explanations for the growth of population in Eurasia in the first millennium BCE and for the population downturn in the first millennium CE? (312-16) What are some other causes of major population decline? (316)

How do states and cities stimulate innovation? How do they dampen it? What is the mixed effect of military activity on innovation and accumulation? Of large urban projects? How does the widespread distribution of property inhibit innovation? What are the implications of this relationship for early modern history?(316, 319-324) Where and why did some peasants engage in productivity-raising innovation? (328-29)

How might the dominance of large agricultural civilizations relate to the emergence of universal religions? (319) To a social hierarchy dominated by male warrior values and lifeways and lack of

interaction between this elite and productive work or commercial transactions? (322-25, 328, 220)

What is the role of commercial exchange in promoting innovation and accumulation? What is the relationship of these exchanges to tributary methods? (326-220) To city-founding and –building? (324-26, including table on p. 326) What are some examples of small but vigorous states based on trade? (327, 329-330) When did coinage appear? (328)

Christian summarizes the contradictory results of population growth, increasing state power, and increasing commercialization on innovation and growth of wealth in agrarian civilizations. How does he explain the overall result of sluggish growth? (330-331)

MIT OpenCourseWare <a href="http://ocw.mit.edu">http://ocw.mit.edu</a>

STS.007 Technology in History Fall 2010

For information about citing these materials or our Terms of Use, visit: <a href="http://ocw.mit.edu/terms">http://ocw.mit.edu/terms</a>.