Journal of Ethnobiology 20(2): 129-158 Winter 2000

MAYA KNOWLEDGE AND "SCIENCE WARS"

E. N. ANDERSON
Department of Anthropology
University of California, Riverside
Riverside, CA 92521-0418

ABSTRACT.—Knowledge is socially constructed, yet humans succeed in knowing a great deal about their environments. Recent debates over the nature of "science" involve extreme positions, from claims that all science is arbitrary to claims that science is somehow a privileged body of truth. Something may be learned by considering the biological knowledge of a very different culture with a long record of high civilization. Yucatec Maya ethnobiology agrees with contemporary international biological science in many respects, almost all of them highly specific, pragmatic and observational. It differs in many other respects, most of them highly inferential and cosmological. One may tentatively conclude that common observation of everyday matters is more directly affected by interaction with the nonhuman environment than is abstract deductive reasoning, but that social factors operate at all levels.

Key words: Yucatec Maya, ethnoornithology, science wars, philosophy of science, Yucatan Peninsula

RESUMEN.—El El conocimiento es una construcción social, pero los humanos pueden aprender mucho ce sus alrededores. Discursos recientes sobre "ciencia" incluyen posiciones extremos; algunos proponen que "ciencia" es arbitrario, otros proponen que "ciencia" es verdad absoluto. Sería posible conocer mucho si investiguemos el conocimiento biológico de una cultura, muy diferente, con una historia larga de alta civilización. El conocimiento etnobiológico de los Yucatecos conforme, más o menos, con la sciencia contemporánea internacional, especialmente en detallas derivadas de la experiencia pragmática. Pero, el es deferente en otros respectos—los que derivan de cosmovisión o de inferencia logical. Se puede concluir tentativamente que la observación de fenómenos concretas es más afectada por la interacción con el medio ambiente que por el razón deductivo, pero que factores sociales influyen el pensamiento en todos niveles.

RÉSUMÉ. –La connaissance est construée socialement, mais, aussi, les hommes apprendrent beaucoup de leurs environs. En les debâts reciens sous la nature de "science" il y a positions extrèmes. Les uns propose que "science" est des chose arbitraires; les autres propose que "science" est la vérité absolue. C'est possible à savoir plus de ces choses, en considerant la connaissance biologique d'un culture different—un culture que tient une "longue durée" civilisée. Les Maya yucateque possèdent un système biologique que ressemble à celui de la science contemporaine. La plupart des ressemblances existent en domaines d'observation pragmatique et quotidienne. Les differences (ou, selon Derrida, "differances") sont des choses logicales ou cosmologiques. On peut concluir, tentativement, que la observation de phenomènes concrètes est plus afectée par l'interaction avec l'environment que le raison logical, mais les influences sociales existent en touts niveaux.

SCIENCE WARS

Anthropology has recently seen debates concerning the nature and value of "science." These debates are part of a wider challenge to canons of truth, of literary quality, and indeed of all those matters that anthropologists regard as part of culture.

As is frequent in academic conflicts, the debate over "science" has quickly escalated, with the most famous participants being those who take the most extreme positions. This has led to the term "science wars" (see the excellent account in Hacking 1999). However, there are serious questions under the rhetoric. Leading philosophers of science disagree profoundly—though, of course, less profoundly than the extremists of the semi-popular media—over the nature and practice of science.

It is obviously impossible to summarize this debate here, even at a superficial level; the present article merely makes a small contribution to the knowledge base that underlies one aspect of the controversy, the debate on how much of science—in this article, more specifically the classification of living things—is social construction, and how much is based on a reality out there in the world.

Loosely arrayed on one side are those such as Imre Lakatos (1976), Thomas Kuhn (1962), Ian Hacking (1999), and Paul Feyerabend (1987), who hold various positions that give social construction a large role in scientific practice. They are not a uniform group. Kuhn sees the social organization of science as structuring the quest for truth, but is not ready to write off either the search or the goal as hopeless. (In spite of certain claims to the contrary, Kuhn clearly states that he regards some paradigms as more correct than others, and he sees progress in science over time.) Hacking, also, explicitly distances himself from those who see "science" as the construction of arbitrary nonsense, though he sees social construction as important and sometimes overriding the truth. Feyerabend seems to hold a more radical position, at least for debating purposes; he appears to see science as a social belief system, no more believable on the face of it than witchcraft or flying-saucer lore.

There are those who think—following Foucault (e.g. 1971) but going far beyond anything Foucault actually said—that, since we cannot know external truth, all of the claims of science must be false, and must be made simply to keep elites in power, as "truth" was constructed in Orwell's *1984* (Orwell 1948). This is the "vulgar Marxist" version of Marx' claims about religion, expanded to cover the field that many people see as the "new religion" of "20th century" people (on these matters see Hacking 1999).

This position depends on an inconsistency: people are seen to be living in a completely solipsistic world in relation to the natural environment, yet to have a perfect grasp of the realities of interpersonal power. Thus, this position, like other radically "culturological" and culture-essentializing positions in anthropology, is deeply incoherent. People are hypothesized to have a mystical, virtually perfect grasp of their culture, such that insiders participate in a perfect unity that is unfathomable to outsiders—yet somehow this perfect learning does not extend to any phenomena other than social or cultural ones, and somehow the visiting ethnographer has no way of contacting that mystic participation. The natural world,

in particular, is apprehended only via this mystically absorbed cultural perception. The individual humans who are so superbly good at learning from their elders are incapable of learning from their observations.

Arrayed on the other side are a number of philosophers who see science as a way of getting at real truth about the environment—an enterprise that can be subverted or mistaken, but, when done right, gives us pragmatically consistent and useful data. Leaders of this general view include Philip Kitcher (1985, 1993), Larry Laudan (1996), Alexander Rosenberg (1992), Lewis Wolpert (1993), and many more. These too are a diverse lot, but they all agree that science is a search that produces ever more accurate data and theories, not just a social game that produces ever more complex arbitrary representations.

However, and notably, all these writers have abandoned the naïve positivist positions so popular in the early 20th century. No current philosopher of science (so far as I am aware) continues to defend the near-religious regard for "covering laws," "falsification," and "objectivity" that dominated science, and confined it in narrow channels, through much of the midcentury. Ian Hacking and Philip Kitcher provide especially sober and thoughtful critiques of this position (rather unfairly blamed on Karl Popper, who advocated such procedures but was not so naïve as to think they defined all science; see Hacking 1999; Laudan 1996).

It may be remembered that Francis Bacon, in his original definitions of the scientific enterprise, was not only aware of all these problems but was more sensitive to them than are some modern philosophers. He defined the observation-experiment method and warned his readers of the "Four Idols"—the biases we would now call "social construction" or "cultural baggage"—that can blind the unwary and unaware (Bacon 1901, orig. 16th cent.).

As noted above, Hacking, in the most recent salvo in the long and confusing "science wars," concludes that science is somewhat socially constructed, somewhat factual (1999:99). This seems to me to be rather an evasion.

The present paper obviously cannot even begin to summarize the literature on science wars." It merely makes a single point: science is 100% socially constructed, but usually an accurate representation of the world in spite of that. Evidence is supplied from a comparison of Maya and biological classifications of birds. Maya ornithological taxonomy maps fairly well onto biological taxonomy, but there are major differences. This disproves both simple realism (the Maya see the natural distinctions just as the biologists do) and extreme social constructionism (the Maya system must be totally different from the biologists', since the societies are so different).

What has been missed, in the "science wars," is the fact that society does not necessarily get things wrong. To say something is socially constructed is not to say it is inaccurate. After all, people have to learn their social constructions from each other. If they can learn their culture through interaction, why can they (and, thus, their culture) not learn about the environment from interaction, and then teach each other in further interpersonal interactions?

Anthropologists have turned their ethnographic gazes onto the actual practice of science in dozens of societies. Beginning with traditional small-scale societies, they have expanded their gaze to encompass modern laboratories. Particularly noteworthy for its impact on the intellectual field is the work of Laura Nader and

her associates (Nader 1996). Nader has long encouraged research on the movers and shapers of contemporary society, including scientists. Her group has thus studied modern laboratories and university halls, often comparing them with her alternative study area, the highland Zapotec world, which has its own science (Gonzalez 1998; Nader 1996).

Roberto Gonzalez, in particular, has provided some very thoughtful insights into Zapotec traditional agricultural science. He sees it as definitely a science (taking "science" in sense #1, below). He analyzes it in terms of "assumptions"—folk theories—that hold together a body of empirical, pragmatic knowledge. He shows that these work like the theories of modern international science: they are basic, largely counterintuitive ideas, extracted from experience, and used to generate new practices and to explain and justify old ones. Some of them are highly questionable, but so are some assumptions of modern science.

Serious studies of nonwestern science go back to the dawn of anthropology. One recalls Frank Cushing's researches on Zuni agriculture and food, not published in book form until 1920 (Cushing 1920) but carried out in the early 1870s. Malinowski also produced classic studies in this area (Malinowski 1935), as did his students such as Raymond Firth (1957) and Audrey Richards (1948). A self-conscious movement to study "ethnoscience" arose in the late 1940s, largely among students of George Murdock at Yale, working in Oceania (Goodenough 1953; Conklin 1962; Frake 1980). Many of the earlier ethnoscience studies seem to the contemporary anthropologist rather naively positivistic and formalistic, paying rather little attention to such ideas as did not fit well into a "Western" scientific framework. Ironically, this was *not* true of Cushing's (or, to a somewhat lesser extent, Malinowski's) work, which should have served as examples.

Closer to the area of this paper, Scott Atran (1999) has analyzed Itzá Maya "folkbiology" from a similar point of view, analyzing knowledge and its linguistic recognition.

In any case, this large body of research established "ethnoscience" or "folk science" as something to study. Ethnographers came to see traditional knowledge as worthy of serious, detailed attention. They were exhorted to understand it in its own terms ("emically"), rather than merely comparing it (usually unfavorably) with "Western" science. In spite of rearguard action by opposing scholars like Marvin Harris (1968), studies of traditional knowledge grew and flourished apace. It seems only natural—in fact, surprisingly long in coming—that ethnographers should turn their attention on contemporary university laboratories.

SCIENCE

This, of course, brings us up against the question of defining "science." Much recent writing conflates several different things under that label. The following seem to me to be quite separate phenomena:

1. Science as search for truth—for accurate data about the world, and for theories and hypotheses that model that world in ways that guide further searching and understanding. Wolpert (1993) notes that these latter are critical, and that science depends on fearlessly generating and testing even the most counter-

intuitive of proposals. It is understood that the search for truth often takes wrong turns, as in the famous cases of "phlogiston" (see Kuhn 1962) and static continents (Oreskes 1999), but that is in the nature of a search. The search is seen as resulting in a body of facts, or at least pragmatically useful data, held together by a framework of higher-level representations that can be called "theories" and "axioms," or, with Gonzalez (1998), "assumptions." To extreme social constructionists, this framework might be seen as merely "worldview" or "cosmovision."

2. Science as a repository of True Facts or of Absolute Truth. Although still militantly upheld by some champions (e.g. Sokal 1997), this position is no longer really tenable. Contemporary scientific practice can get us to the truth about many things when ordinary observation will not, but that does not make Science a God-given repository of infallible wisdom. In fact, philosophers of science now hold that a genuine search for truth *must* take wrong turns. Otherwise it is not a search—merely a repetition of the obvious. Humoral medicine, alchemy, phlogiston, and many other theories were good ideas in their time, probably the best that could have been done with the data at hand. The disproofs of these theories signalled advances in the methods and techniques of scientific practice, and, following those, the improvement of theory. Science advances not by learning *ex cathedra* truth but by providing better and better theories, as Kuhn (1962) pointed out and as most scientists now agree. Possibly a subvariant of the old science-as-God's-truth view is the popular conception of "science": Flashy technology. This is the concept we find in mass media and *Star Wars*. (Wolpert [1993] overmakes the distinction between science and technology, but has some valuable comments on the issue.)
3. Science as one specific form—the modern Western form—of the search for accurate knowledge. There are two major contenders for the form. First, there is the self-conscious "science" that began in perhaps the 14th century and was formulated in the 16th and 17th centuries in the writings and work of Francis Bacon, Galileo Galilei, René Descartes, and, later, men like Robert Boyle and Isaac Newton. This is a science defined (ultimately) as working from observation to inductive and then hypothetico-deductive theories, and testing these (and the observations also) by experiment. It contrasts this search with received wisdom, bias, and popular belief. This science did indeed break radically with earlier ways of knowing. If it is not the only "science," it at least deserves some sort of terminological marking; Randall Collins' "rapid discovery science" (Collins 1998) is a good choice. The second is "science" as defined by the logical positivists in the mid-20th century, with its formal operations, covering laws, emphasis on verification and/or falsification, and formally (=mathematically) stated theoretical models. (This is so restrictive that it has been abandoned by most current authorities.) This type of definition has the advantage of cutting off one specific type of truth-search, but it has the disadvantage of making comparison impossible between contemporary international science and other knowledge traditions.
4. Science as "what scientists do." This allows us to include the faked data, charlatanry, and vendettas that sometimes characterize scientific practice. It also

directs us to look at scientists as whole people—with their own eating habits, daily lives, paranoias, and so forth.

5. Science as a social institution. This, of course, does not exist in most traditional societies—even China, with its unquestionably great scientific tradition, did not have a concept of "science" or a "science establishment" (until modern times). Traditional societies usually have a term for "knowledge" but not one for "science" as opposed to other types of knowledge. Chinese *xue*, Arabic *'ilm*, and, of course, Greek/Latin *scientia* included philosophy, literary studies, history, and other humanities. By contrast, in the United States and other rich modern countries, "Big Science" now has a life of its own, institutionalized in such organizations as the National Science Foundation.

Evidently, the first three of these approaches characterize science as a special kind of truth-seeking activity. The second pair treat science as a part of social action in general—as a social construction. The third approach above is somewhat intermediate, in that it regards science as a social construction—but a superior one, one that inevitably leads to truer and better knowledge.

Champions of science see science as a truth-seeking activity, and see faked data, vendettas and the like as "bad science"—alien contamination of the enterprise. The attackers and critics of science see it as a part of social action, and thus see it in terms of 4 and 5 above. For many of them, the "bad science" is just as scientific as the "good," and phlogiston is just as real as any other scientific conclusion (presumably including well-demonstrated things like the laws of thermodynamics).

There are thoughtful reasons to see science in all the above ways—so long as they are kept analytically distinct.

If one looks at institutions, modern American "Big Science" is a totally different thing from the tiny and scattered band of experimenters, often working in terror of religious persecution, who created European "modern science" in the 1500s. They are linked by being related to the search for truth and understanding, but they are not linked by similarities in institutional or political forms.

Conversely, if one is looking at the accumulation of accurate data, one can reasonably look at Assyrian medicine, Chinese agricultural experiments, and Maya bird lore along with Nobel Prize experiments. One will not, however, be terribly concerned about the personal lives of the Assyrian or Chinese scholars.

If one sees science in a broader and more sociological sense—science as the activities of people who want to know something about the world, beyond what intuition and received wisdom tell them—then the personal lives of the Assyrian and Maya scholars become more interesting. This is the position of most historians of science. It has the major advantage of allowing all human societies into the club, rather than defining "science" so as to restrict it to one cultural tradition. Given the high prestige of the word "science" in today's world, there are obvious political ramifications to these alternate courses of action.

Certainly the most reasonable of the restrictive definitions would confine the term "science" to post-1600 Baconian-Galilean science. This would reduce to a historical footnote the Assyrians, Chinese, Mayas, and indeed well over 99% of the human species' long quest for understanding.[1] If "science" is limited to the

institutionalized rules of methodology that the positivists and scientific philosophers of the early 17th century (let alone the 20th century) invoked, then by definition there was no science before 1600 (or 1900 in the case of the positivists). Moreover, much of modern science does not count. Astronomy, astrophysics, paleontology, historical geology, most of ecology, and most of behavior biology are basically observational sciences, rather than being based on controlled experiments. Not only Maya bird lore, but even professional ornithological research, rarely conforms to the full Popperian or Hempelian canon (see Kitcher 1993 for the best discussion of these issues). Above all, and most directly relevant to the present paper, taxonomy is not a hypothesis-and-lab-experiment science, though modern cladistics is beginning to change that.

Much of the rhetoric in the "science wars" of the late 20th century has been associated with a disregard for the above distinctions. Sometimes the disregard appears to be willful, but often it is simply careless. In any case, what has often happened has been an all-out attack on the entire search for knowledge and understanding, justified by the failings of some scientists (some do fake their data, many are biased in one way or another). Conversely, some champions of science have failed to make the necessary distinctions, and have talked as if an attack on the current social institutionalization of science in the United States was an attack on all attempts to know anything. Sokal (1997), in particular, seems to be perilously close to taking such a view.

Of course, in the real world, it is impossible to have a search for truth that is completely disinterested, wholly objective, and uninfluenced by social attitudes and institutions. We have known this since at least the day of David Hume. Even after half a century of critical theory, C. Wright Mills' book *The Sociological Imagination* (1950) remains probably the best statement on the subject in social science. The best the scientist can hope for is to understand biases, adjust them in a moral direction, and compensate for them by seeking verification or disproof of findings from other investigators from other schools or laboratories (Bacon 1901; Kitcher 1993).

At this point, it may be interesting to turn to a different tradition. If two utterly different societies, with utterly different scientific traditions, come to similar conclusions from similar data, perhaps there is objective truth lurking behind the cultural screen. If and when two such societies differ totally in the way they construct the world, then science may not exist at all, and the social construction of knowledge may truly be said to be an arbitrary and solipsistic activity. To some extent, the degree of "social construction" in science is an empirical question.

THE MAYA OF QUINTANA ROO

For the last ten years, in collaboration with Mexican (including Maya) and United States colleagues, I have been carrying out research on knowledge of plants and animals among the Yucatec Maya of the "Maya Zone" of Quintana Roo. This, the central part of the state, is the area that was never truly reconquered after the Maya rebellion of 1846-48 known as the "Caste War" (Bricker 1981; Dumond 1998). The Maya in the present Yucatán state were crushed in 1848, but in what is now

Quintana Roo they remained independent until 1901, and in the remote west-central interior they were never really subdued. There was fighting as recently as 1934 in Dzula, the community next to my own base in Chunhuhub. Current inhabitants of Dzula do not admit defeat. Alfonso Villa Rojas, ethnographizing the area eastward in the mid-1930s, encountered much hostility and some personal danger. The Maya, unsubdued, have continued to preserve a cultural tradition that is at least five thousand years old in the area (Redfield & Villa Rojas 1934).

Like all cultures, Yucatec culture has profoundly changed over time, and is rapidly changing today; but Yucatec biological knowledge retains much knowledge of respectable antiquity. This is shown by archaeology, which discloses five millennia of milpa fields and cropping patterns not dissimilar to many one sees today (see Sharer 1994). It is also shown by colonial documents, which, from the 16th century onward (Landa 1937; Álvarez 1997; Arzápalo Marín 1987, 1996; analyses in Anderson and Medina in prep.), record biological and medical lore close to today's. The Maya, as everyone knows, created one of the greatest, most brilliant, most innovative, and most original civilizations the world has ever seen (Sharer 1994). The modern Yucatec of Quintana Roo are one of the several successor groups of the Classic Maya. It is probably safe to assume that much of their biological knowledge is derived from a Classic Maya base, given the consistency in usage since the very earliest dictionaries (Álvarez 1997; Anderson and Medina in prep.). This base has been greatly supplemented in more recent centuries by Spanish (including Moorish) lore and international biological science. The modern Maya are not some sort of living fossil, preserving for us the mysteries of the Classic Maya; nor are they a tiny isolated group. They are bearers of the elaborate and expert science of a long-lived, populous, brilliantly successful, constantly evolving civilization.

Maya languages have a written tradition going back 1600 years, at first in hieroglyphic and syllabic scripts, later in Spanish letters. Written transmission has been a small but significant part of cultural transmission for a very long time. In Yucatan, for instance, we have such examples as the Rituals of the Bacabs (orig. ca. 1600; see Roys 1965, Arzápalo Marín 1987), which records magical and medical lore from the earliest part of the Colonial period.

Such a huge tradition is far from homogeneous or uniform (see e.g. Hervik 1999), and has its own self-reflexive turn (Sullivan 1989). This article focuses on knowledge recorded in and around Chunhuhub, Quintana Roo.

Chunhuhub is a large farming town of some 5,000 people, occupying an *ejido* (communal landholding) of 14,330 ha. All are Yucatec Maya except for a few administrators and technicians, and a small number of in-migrants from central Mexico. Almost everyone is bilingual. Most families still raise maize, beans, squash, chilies, and other crops by slash-and-burn cultivation of tracts ranging from 1 to 4 ha. Yields reach a ton per hectare or more. Every family has its dooryard garden; many of these are large and contain up to 90 species of useful plants. Herbal medicine is commonly practiced. Some game is still obtained, but overhunting in recent years has depleted game stocks (Anderson and Medina in prep.). Seventy percent of the ejido is covered with forest, all of it in various stages of regrowth from past cultivation. Some logging is carried out, but valuable woods were depleted in the

early 1990s. Stockrearing and beekeeping are important. The vast majority of the population is highly knowledgeable about forests, fields, wild and tame animals, medicinal herbs, insects, and indeed all aspects of the environment. Given the solidly agricultural nature of the community, this knowledge is of a pragmatic, experiential type, fitting well into the wider model of "ecology of practice" developed by Nyerges (1997).

Research in Chunhuhub lasted for six months in 1991 and six more in 1996, with almost annual visits during intervening years. I was joined in the field by Eugene Hunn during a month in 1991; he introduced me to Felix Medina Tzuc, who became my collaborator and field assistant. Dr. Hunn also recorded bird voices in the field for Maya experts to identify (Hunn 1992) and worked with Don Felix and myself on seeing how far Maya could go in identifying birds from pictures in Peterson and Chalif's guide to Mexican birds (Peterson and Chalif 1989). Otherwise, research consisted primarily of walking through Chunhuhub and neighboring ejido and ranch lands, observing birds in the field and obtaining Maya identifications. I also listened to a great deal of Maya conversation about birds and other biota, including a great deal of discussion and argument over just what to call a particular bird. Since I was studying "referential practice" (Hanks 1990), rather than in the psychology of classification, I found it expedient to spend a great deal of time in the field listening to actual practice, and made minimal use of formal eliciting techniques beyond the frame interviewing described by Frake (1980). Thus, the following data refer strictly to name usage in ordinary conversation. I did not carry out experiments of the sort done by Atran (1999) and others, since I was interested, at this stage of research, in different questions (see Hanks 1990 for discussion and justification of the referential-practice approach in studying Maya; however, experimentation will be carried out in future research, opportunity permitting).

The Maya do not have a concept of "science" in the modern international sense. They do, however, have a reasonable equivalent. It is based on the core term ***k'aj*** "to know." Connected to this is the complex word ***ool***, which means "heart," and by extension "knowledge, will, condition" (and sometimes also "lungs" and other internal items near the heart). Uniting these, we get ***k'ajool***, "to know something, to recognize," and thus the verbal noun ***k'ajoolal*** "knowledge." This is as near as we can get to "science." It is not a far reach; ***k'ajoolal*** focally signifies practical working knowledge.

This article focuses on classification and uses of birds, with some comparisons to bird representation in contemporary international biological science.

MAYA BIRD CLASSIFICATION

Classification is often described as "carving nature at the joints." This, of course, assumes that nature has joints. How similar are Maya bird taxa to those of contemporary biological science?

In ethnoornithology, as in science wars, there is a range from social-constructionist to realist positions. No one is as extreme as Feyerabend (1987), but Ellen (1993), Forth (1996), and to a degree Bulmer (1967) stress social factors, and Ellen

has been sharply critical of narrowly realist models. Conversely, Boster (1987; Boster, Berlin and O'Neill 1986; Boster and d'Andrade 1988) and Hunn (1977) seem more prone to assume people recognize categories that are real in the sense of evolutionary biology. Atran (1990) and Berlin (1992) take a relatively strong position: people are mentally programmed to recognize the multistranded similarities that evolutionary relationships provide, and thus do carve nature at the joints. Atran's later position seems considerably more qualified and nuanced, due to his prolonged study (including use of psychological experiments, in collaboration with psychologists) of Itzaj Maya classification (Atran 1999).

The Yucatec Maya data are consistent with the position that the Maya recognize groupings that are natural in the sense of evolutionary biology. However, use and other cultural and social factors enter into and shape the classification system. The system can be understood only by taking both culture and nature into account.

Maya bird names are mostly at a level that Brent Berlin (1992) calls "folk generics."[2] These are usually one-word names. They contrast with each other; to place a bird in one folk generic means it is not in any of the others. They are sometimes broken down into "folk specifics," which are normally formed by adding an adjective to the generic. Thus ***ch'om*** means "vulture"; ***chak pool ch'om***, "red-headed vulture," is the Turkey Vulture (*Cathartes aura*). Maya, English, and Latin, like most languages (Berlin 1992; his usage is followed here, rather than that of Atran 1999, more for convenience than because of any deep theoretical reason), use the classic pattern in which a folk-generic name is modified by an adjective to produce a specific. (The Greco-Latin genus name *Cathartes*, roughly "one who cleans up," covers one or two other vulture species; *aura* comes from a Native American name for this bird.) Latin terminology has many higher categories—the familiar phyla, classes, orders, and families of Linnaean taxonomy. Maya terminology has only one: the unique beginner ***ch'ich'*** "bird." Maya also has very few folk specifics. Almost all classifying of animals and plants is done at the folk-generic level. (This is true in most Native American systems.)

Of the 89 named terminal taxa (folk genera not broken down, or folk species) listed in the Appendix below, 63 have a one-to-one correspondence with the species recognized by international ornithology. Ten are focus-and-extension names: a focal species whose name is extended, more or less often, to other birds that are seen as distinct but are not named. In 9 cases, a terminal taxon is a Linnaean genus (4 cases), part of a genus (2 cases), or a group of closely related genera (5 cases). In 3 cases, a terminal taxon names a whole family, and in one case a name covers two unrelated but very similar families (***kusuun***: swifts and swallows). One name—only one—is a broad, vague category without Linnaean counterpart.

In two cases, a folk generic is broken down into folk specifics, all of which have a one-to-one correspondence with the international ones. One of these folk generics corresponds to a Linnaean family, one to a pair of closely related Linnaean genera.

In addition, I identify 13 groups, loosely named or named by extension of the name of one of their species (see below). Of these 13 larger groups ("folk families"), one corresponds to two (Linnaean) orders, two to an order, six to a family, two to part of a family, and two to a genus.

Many small birds are not considered important enough to have names of their own. These are lumped into broad, vague categories that may or may not resemble international scientific taxa.

These groupings are of two kinds. First, there are some genuine categories that are well-bounded, well-recognized, and correspond loosely to international taxonomic units. An example is provided by flycatchers of the Linnaean family Tyrannidae. These are divided into three groups in Maya: ***takay*** "large yellow-bellied flycatchers," ***juiiro*** "large flycatchers that have a loud call that sounds like ***juiiro***," and ***yaj*** "small flycatchers." These groups are seen as related, as is proved by the fact that ***juiiro*** (a rather exotic term) can be lumped with either ***takay*** or ***yaj***. It is explicitly recognized that these groups are diverse. Felix Medina Tzuc, for instance, pointed out to me the only pair of Piratic Flycatchers that we saw in our many months of co-work, and explained: "That ***takay*** is taking over the nest of those orioles." It was, indeed, doing that, but not so obviously that Don Felix could observe it on the spot; he relied on his knowledge of the bird. The Piratic Flycatcher (*Legatus leucophaius*) is a rare bird in Yucatan, and only a person with a great deal of field knowledge would realize that it is a special sort of yellow-bellied flycatcher that takes over the nests of other birds rather than building its own. It does not have a special name in Yucatec Maya, but it is recognized nonetheless.

To some extent, there is a "focus and extension" semantics here. ***Takay*** most commonly refers to the Couch's Kingbird (*Tyrannus couchii*). ***Yaj*** has a definite focus: the small *Myiarchus* flycatchers. These birds have a miserably mournful-sounding call, like a child whimpering "***yaj!***" ("pain!" or "I hurt!"). No other small flycatchers call like this, so the name qualifies as an extension. Another type of broad category is much vaguer. "Little brown birds" are all vaguely lumped as ***yankotij***, a name which properly belongs to the Tropical House Wren. (This is clear from its literal translation: "The one under the wall." Only Tropical House Wrens forage and nest in the stonewalls of the Maya house compounds.) "Little yellow birds" are all vaguely lumped as ***chinchinbakal***, a name that has no generally agreed focal referent. It covers goldfinches, warblers, small yellow-marked tanagers, and much more.

Several other names can be extended ad hoc. The ones that can be extended are known and constantly used to label some unknown bird. Other names are never extended. Unknown medium-sized red birds, such as migrant red tanagers, are lumped as ***chakts'its'i*** ("the red bird that says ***ts'its'i***")—a name that properly belongs to the Northern Cardinal (*Richmondena cardinalis*). By contrast, ***sojlin*** "ant-tanager" is not normally extended; if it is used for anything but an ant-tanager, the extension is regarded as a mistake. ***Ts'apim*** "saltator" (*Saltator* spp.) is extended to any medium-sized brownish bird of unknown identity. ***K'ok'*** "Clay-colored Robin" (*Turdus grayi*) is extended to cover any robin-like bird, such as wintering thrushes from North America. ***Pich'*** "Melodious Blackbird" (*Dives dives*) is the name used for unknown birds that are smallish and black.

A very different type of extension is the use of one common name to cover a natural group. In these cases, the name contrasts at two levels: (1) in its normal or proper referential usage, it applies to one species; (2) in its extended usage, it applies to that species and the natural group it is in. A common case is ***t'uut***, properly the White-fronted Parrot (*Amazona albifrons*—by far the commonest parrot in the

area). This name is extended to cover all parrots (though not parakeets). In particular, the Yucatan Parrot (*Amazona xantholora*), ***ek'xikin*** "black ear" in Maya, looks very much like the White-fronted and often travels with it; the two species are collectively ***t'uut*** to everyone, unless and until the distinctive black earpatch can be seen. Similarly, woodpeckers can be collectivized under the term ***k'olonte'*** (or sometimes ***che'hun***); quail under ***bech'***; hawks under ***ii'*** or ***chuy***; and a few others as noted in the Appendix.

Hofling and Tesucún (1997), in their dictionary of Itzaj Maya (which is very close to Yucatec), treat these generalized terms as higher-level taxa that might be called "folk families." Thus, they treat ***ixt'ut (=t'uut)*** as a general term for parrots, with the several folk generics (including ***t'uut*** in its more restricted sense) grouped under it. Yucatec does exactly the same. The Itzaj use ***ixpaloomaj*** (the Spanish word *paloma*, Mayanized) for pigeons and doves; Yucatec has a similar way of labeling pigeons by extending the term ***ukum***. Hofling and Tesucún (1997) also introduce a range of gender and environment categories that seem to cross-cut rather than structure the Maya general purpose taxonomy. This is problematic for the comparative nomenclaturist. In particular, their separation of tame and wild birds under totally different headings is certainly not the Yucatec pattern. However, in general, Hofling and Tesucún's Itzaj classification is very close to Yucatec, though their lumping of blackbirds and anis seems definitely not a Yucatec view, and their lumping of quails and tinamous in a "covert category" of "ground birds" (1997:76-77) seems rather ad hoc.

Atran's excellent work on the Itzaj (1999) has gone into a different realm: categories psychologically real to his specific consultants, as shown by tests in the field. These categories include "fish-eating water birds,...edible fruit-eating ground birds,...edible fruit-eating tree birds,...inedible flesh-eating birds,...inedible fruit-eating birds," and "inedible blood-sucking birds [i.e., vampire bats]" (Atran 1999:172-174). None of these have emerged as categories from any work done by me or others in Yucatec. It is notable that the category of "edible fruit-eating ground birds" has a very different composition from Hofling and Tesucún's similar category, though the same people were talking about the same general set of birds. Similarly, "inedible flesh-eating birds" includes groups that Hofling and Tesucún and the Chunhuhub Yucatec both separate into a "hawk" group and an "owl" group. The other assemblages found by Atran are even larger and less well defined, and nothing like them emerges from Hofling and Tesucún's data or from mine; they appear to be categories arrived at by testing for psychological similarity, and are certainly not part of a linguistic taxonomy.

Hunn (1977) treats Tzeltal bird names similarly, recognizing "groups" that are, de facto, folk families—natural groupings as recognized by the Tzeltal, but not named as formally as the folk genera are. These, again, are similar to Yucatec and to Itzaj (Hofling and Tesucún 1997), but also include several other sets that he calls "complexes. Most of these are the same, or much the same, as Yucatec (hawks, vultures, doves...). Others include montane Chiapas species outside the knowledge of Yucatec observers. However, some groupings psychologically real to the Tzeltal would seem exceedingly far-fetched to the Yucatec, e.g. the link of squirrel cuckoos with quail (Hunn 1977:153-5) or of trogons and motmots (Hunn 1977:169-170). Hunn found the wide groups of waterbirds and black birds that Hofling and

Tesucún found and that seem nonexistent for the Yucatec (except in so far as the latter use the general descriptive term ***ch'ich' ha'***, "water bird"—without any implication of real relationship).

Such groups blend into the "covert categories" of Berlin and his students. I am very loath to invoke covert categories without proof that the people in question really do think that a group is a real category. I think that wider-than-generic categories are clearly shown by extension of terms, if reliable and predictable—not purely ad hoc like the extensions of ***ts'apim*** and ***chakts'its'i***. But one must work constantly in the field, with consultants, to make these distinctions, and even then they could be challenged. I have done it in the appended table, but I have done it with great care—only when a group is explicitly and reliably named by an extended term, and I have independent interview data suggesting that the group is seen as a natural one. The extension of terms like ***t'uut*** and ***k'olonte'*** does most certainly show that the Maya recognize the parrots and the woodpeckers as natural categories. The extensions are thus of considerable interest.

All this reveals a pattern (the Yucatec one is very similar to the Itzaj one described by Atran 1999). Big, obvious, or useful birds have their own names, which, though "folk generics," correspond with the species of Latin taxonomy. Small, rare, or unobtrusive birds are referred to by names that are also "folk generics," but that do really correspond to genera or even families. Very small, insignificant birds are simply lumped with the most convenient and well-known small bird of the same color.

Consider the guild of woodpeckers and trunk foragers:

The area's five common species of woodpeckers are abundant, obtrusive, noisy, confiding, and impossible to miss. They are parceled out under three names (two almost identical species being lumped as ***kolonte'***, and two as ***che'hun***; either is sometimes extended to cover woodpeckers in general).

Woodcreepers, though equally diverse in the area, are much less common, less easy to observe, and dull in color. They have only one name, ***tatak' che'***, corresponding exactly with the Linnaean family Dendrocolaptidae.

Small trunk-foraging birds (such as the Plain Xenops, *Xenops minutus)* are rare and obscure. They have no names at all, but, when noticed, are lumped under the garbage-can category created by extension of ***yankotij***.

Similarly, all game birds have their own names, but various non-eaten birds of equal size and obviousness are lumped into broad categories. Hawks are lumped into form-classes: each group with a distinctive flight profile, or appearance in flight, has its own name. This causes some interesting debates about e.g. the position of the White-tailed Kite (*Elanus leucurus*), which has pointed wings like a falcon and thus could be a ***k'eenk'eenbak'***, but is large and heavy-bodied and pale like an ***ii'*** (focally the Gray Hawk, *Buteo nitidus*) and thus could be in that category. Maya discussions of such issues while away many a sleepy hour, and remind the visiting ethnographer of debates among ornithological taxonomists.

One significant observation is that none of the wintering birds from North America is named. Though Yucatan is vitally important as a major wintering ground for many midcontinent species, with Chunhuhub alone playing host to thousands of birds, not one has a Yucatec Maya name. (One, the Indigo Bunting *Passerina cyanea*, has the Spanish name *azulejo*. In other areas of the Peninsula, migrant war-

blers are collectively referred to by the onomatopoeic word ***ts'ip***, but I have not heard this word used by Chunhuhub Maya.) Instead, the migrants are the major beneficiaries of the loose extension of words like ***yankotij*** and ***chaktsi'tsi'***.

In short, nature has joints, but society sometimes sees every reason not to recognize them. When birds are useful or too obvious to ignore, they get their own names, which cover exactly the same space as a Linnaean species. To the degree that birds are useless and otherwise nonsalient, they are lumped into progressively wider and vaguer categories. Most of these categories correspond to the larger Linnaean taxonomic units: genus, family. Then, as terms are extended out to birds that are not only insignificant but do not even breed in Maayab ("Maya land"), the terms cease to have any relation to Linnaean categories. Instead, they lump birds roughly by size and color. (As a matter of fact, the same was true of early European taxonomy, and Linnaeus himself did some broad lumping.) However, all of them have a focal exemplar that is a real, well-recognized Linnaean species or tightly-knit group. The only exception is the catchall term *chinchinbakal*.

In other words, almost all Maya taxa, when not loosely extended, correspond exactly with Linnaean taxa—at the species level, if the bird is salient; otherwise at the genus level (but only if the genus is tightly knit, with all local species similar) or at the family level. The less salient the birds, the more wide the Linnaean group that equates to the labeled group in Yucatec. Some families (hawks, flycatchers) are parceled out in ways not like those of international ornithology, but the parceling does make a great deal of sense in terms of the realities of Chunhuhub. They accurately label natural-seeming groups, united by appearance and voice—even when they cut across Linnaean taxa (as they sometimes do—but only in marginal extensions of the terms).

One concludes that classification is a social construction, but one that must take account of real natural differences if it is to be of any use at all (cf. Atran 1990; Berlin 1992; and literature reviewed therein). Since the Maya and contemporary international biologists are both trying to find useful labels that represent some sort of external reality, there are many similarities in the two systems. Since the uses in question are not the same, there are also differences—largely at the level of "lumping." The Maya lump species that are unimportant to them. The biologists find all species equally important—at least in the Class Aves. However, biologists too lump things they do not find salient. I am told by colleagues that the few thousand recognized species of nematodes could probably be split into hundreds of thousands (if not millions) of species, if nematode taxonomy were as developed as avian taxonomy. Thus, one does not expect, and does not find, quite so good a fit as one would expect from some of the work of Boster (1987; Boster, Berlin and O'Neill 1986; Boster and d'Andrade 1989) or of Atran's earlier theorizing. Maya extension of terms fits well with Boster's findings that broad visual similarities serve as primary markers of relationship, and also with Boster's observation that Native American peoples are prone to name birds from their vocalizations. This affects classification; flycatchers, for instance, are broken down as much by vocalization as by appearance. The Maya also consider behavior and habitat in making identifications and classifications. The term ***pujuy***, for instance, is extended to birds that act like the focal ***pujuy***.

MAYA BIRD USE

Knowledge of the uses of birds is straightforward, but not without interest in the present connection. The most important use is as food. In addition to domestic fowl (chickens, ducks and turkeys), several wild species are hunted—especially quail, tinamous, chachalacas (***bach***, *Ortalis vetula*), and the very few larger game birds still found in the area. Wild birds are also kept as pets, especially parrots, parakeets, doves and pigeons, and-rarely now—large game birds.

Birds for food are usually shot with shotguns or rifles. (Maya hunters wingshoot quail with ancient .22s, a feat that would awe any Anglo-American shooter.) However, small birds, and all birds wanted as pets, are caught with traps and snares. Most common is a simple box trap, usually used by boys to get pets. Small birds are baited in, and the boy pulls a string that removes a twig holding up a small box. It falls over the birds. This is sometimes used more seriously, to get quail for food. Nooses, snares, and sticky materials are occasionally used to catch small birds. Sometimes a *batea* is staged: a hunt in which men form a long line and beat the bush for game. Birds, however, are not successfully hunted this way, since they fly off.

Birds are occasionally used as indicators of time or the like. For instance, the Bright-rumped Attila (*Attila spadiceus*—one of the ***juiiro*** flycatchers) is sometimes called the ***pak'sak'al***, "plant-the-brushfield," because it sings loudly at the time of year when a farmer should be doing that. The noise of feeding birds can attract one to wild fruit. Last of all, some birds, especially parrots, parakeets, and jays, are often pests of the milpa fields. They must be controlled by scaring them away, and—in desperate cases—by traps, slingshots, and guns. The Maya of Chunhuhub love and cherish birds, and will not kill a pest bird unless its depredations become devastating.

To this extent, knowledge is highly pragmatic. Social construction enters the picture to the extent that only the larger and tastier birds are defined as edible; no one would eat a hawk, toucan, or other large but non-choice species unless hunger was serious.

However, a different kind of knowledge exists. Many birds are associated with various sorts of dark powers. These fall into two categories: Ominous birds and birds used in magic.

Ominous birds are the nocturnal species, considered unlucky through both indigenous Mexico and traditional Spain. The Barn Owl (***xooch'***, *Tyto alba*) is particularly feared; its loud and hideous shriek presages death. Even the common little ***pujuy*** (nightjar or pauraque, *Nyctidromus albicollis*) is worrisome. When it calls and jumps up after insects, it presages death. Since hundreds of ***pujuy*** call and jump all night, every night, in Chunhuhub, one would expect many deaths—and, sure enough, every day, several people die in Mexico. Since any death, anywhere, counts as a "hit," the predictive value of the ***pujuy*** is confirmed. Some Maya also believe the loud, wild call of the peppershrike (***ch'uyin***, *Cyclarhis gujanensis*) is ominous.

Chunhuhub seems not to have imaginary birds, but other areas of the Yucatan's Maya world have reported such animals. From Chan Kom, the most intensively ethnographized community in the peninsula, we hear of the purple ***taankas*** par-

have seen the ***xtabay*** (the demon woman). However, it is admitted that one usually sees the ***xtabay*** only after consumption of a large amount of alcohol. This is traditionally thought to be because she finds drunkards particularly vulnerable to her evil charms, but skeptical Maya are quite aware of the obvious alternative explanation.

In short, there is a realm, marked off in Maya thought, in which social construction has really run far beyond any observable or verifiable reality. This is a realm in which love, death, and fear are paramount. There are countless anthropological theories of magic, and it would be tedious and irrelevant to catalog them here. Suffice it to say that almost all agree that, in these areas, human fears and desires press irresistibly hard against the boundaries of observable reality. It is by no means clear if any culture, including the culture of professional psychologists and doctors, has any solution to the problems of ruling love and predicting death. This does not stop most people from believing they can "have dominion over Judgment Day" (as the traditional blues line has it), or at least over love. Exploring these issues is outside the realm of this paper.

There is no explicit body of theory holding Maya bird knowledge together, but one could, with Gonzalez (1998), formulate assumptions. First, it is assumed that birds that look alike and sound alike are natural categories. If the birds are essentially identical, they must be in one category, and if lumped they are lumped with similar birds. No Maya, and probably no one on earth, would classify kingbirds, horned owls and cormorants in one group opposed to another group made up of small flycatchers, barn owls and grebes. Social construction does not work that way. Second, there is an assumption that all things are potentially useful for filling material needs, and that all things large enough to be interesting should be explored for their value in these areas. This assumption has led to the accumulation of a great deal of lore about birds as food and as pets, and how to obtain them. Third, there is an assumption that love, harm, and some kinds of fate can be controlled by use of *secretos*, and that birds are useful in this enterprise. Certain birds are earmarked for the tasks of magic.

DISCUSSION

Culturally standardized, traditional knowledge is, by definition, 100% socially constructed. However, as Marx said of history: "Men make their own history, but they do not make it just as they please"(Marx 1986:277). Observed external reality provides constraints that cannot always be ignored. One cannot indefinitely believe in the safety of consuming deadly poisons, or walking off cliffs. Even if an individual did so believe, a culture would not encode the belief. Experience to the contrary would be too commonly observed.

The Yucatec Maya live as subsistence farmers in a harsh environment. They survive only through having a literally encyclopedic knowledge of soil, water, useful plants and animals, and useful farming techniques. Unlike academics at prestigious universities, they do not have the luxury of believing anything they wish or of dismissing the real world. Instead, they must constantly interact with nonhuman reality. They walk a razor edge; the least mistake, the least failure to invoke the correct strategy, can mean death.

Accurate knowledge does matter. Chunhuhub residents tell that some years ago, two young Dutch hikers got lost in the woods near Chunhuhub. They died of thirst in the waterless bush. The forest where they died was festooned with wild grapevines (***saya ak'***, *Vitis* spp.). Every experienced Maya knows these grapevines, and knows that they store water, containing up to a cup or more of clear, pure water per linear meter of vine. The reason why this knowledge is so widespread is grimly obvious from the fate of the unknowing Dutch youths.

The more one knows about farming and about ***baalche'*** ("things of the trees"—wild animals), the better one lives. The forest provides, for those that truly know it well, a good living, and even a few luxuries such as pet birds. Moreover, the Maya yield to none in their enjoyment of the wild birds. They love the songs and color as much as medieval European poets seem to have done. Enjoyment, too, leads to knowledge and to its social construction. Many a Maya bird taxon appears to be widely recognized simply because the birds in question are so amusing, or beautiful, or delightful. This, too, is a use of nature, and a socially constructed one; but it requires the existence of the birds, and the potential to enjoy them.

Interaction with nonhuman lives should not surprise those who believe in "the social construction of reality" (Berger and Luckmann 1967). After all, social construction can only arise from people interacting and discussing. It cannot exist unless people actually do see and respond to an external reality—the reality of the others they meet and the communication transactions they experience in dealing with those others. If people are interacting with each other and learning from that, it seems hard to deny that people interact with birds also, and learn something of the avian world.

So ecological knowledge, like other knowledge, arises from practice (Nyerges 1997). It arises from interaction between people who are interacting with the nonhuman world. It is phenomenological, but a phenomenology based on sensory experience (Abram 1996).

When "nature fights back," refusing to let people ignore it, society can construct knowledge only within strict limits. If people want to use birds, the need for an adequate classification system is strongly felt. This is a place where Nature really has joints, if not always clear and obvious ones. People need to "carve Nature at the joints" if they are to deal effectively with birds and communicate effectively about them. As a result, classification systems from around the world look somewhat alike. On the other hand, society and history play a role in determining which birds are used, which are held salient, which are ignored. Social construction determines which are recognized as species, and which are lumped into broad vague categories.

Berlin (1992) has demonstrated the similarity of classification systems around the world, and the similarity of many systems to modern scientific taxonomy. This he ascribes to a tendency of humans to perceive certain sorts of discontinuities and continuities in nature. It is perhaps more accurate to say that people perceive all sorts of things, but interact with humans and with other lives so much that everyone, eventually, tends to realize that some differences matter and some do not. The differences between different quail species are real, and matter to the Maya. The differences between small flycatcher species are equally real to a biolo-

gist, but are of no special consequence to the Maya, who therefore ignore them (cf. Boster and d'Andrade 1989). Overall, the Maya data fit much better with the findings of Boster and his associates than with those of more social-constructionist scholars. However, it is noteworthy that the latter (e.g. Bulmer 1967; Ellen 1993; Forth 1996) have often been those who carried out research in east Indonesia or in Papua-New Guinea, areas where systems may be genuinely very different from both Maya and western models.

However, different Maya groups, and even different Maya consultants within the same group, obviously classify birds in different ways. This is not so much a matter of failing to perceive relationships as of devising classifications that fit one's own referential and ecological practice (Hanks 1990; Nyerges 1997). In particular, birds are lumped ad hoc if there is no special better reason to lump them, or if there is no pragmatic reason to see them as deeply and basically separate.

Words, after all, are to talk with, and there is no sense providing a verbal label for something one does not talk about. Conversely, "utility" in the narrow sense originally adduced by Hunn (1982) did not exhaust the reasons why people might want to talk about something. They might want to talk about it only because it is common and has a pretty song, and is thus hard to ignore if one loves birds as much as the Maya do; thus there are not one but two names for the singularly "useless"—but pretty and songful—Yellow-green Vireo (*Vireo flavoviridis*).

Even classification systems get confused with power relations, as Foucault (1971) showed for the Linnaean system; one need only look at its hierarchy, with "Kingdoms," "Orders," and "Families" duly arranged by relations of inclusion. I find no evidence that the Maya system was concocted with one eye to the State, even though the ancient Maya did have states. But one cannot be sure. If relations with the natural world and with fellow farmers are clearly reflected in the system, relations with the hierarchy may also be. The weird birdlore reflected in the Rituals of the Bacabs may well have a great deal to do with politics. We do not know.

Moreover, as belief gets uncoupled from immediate observation, society can construct with a much freer hand. In international biological science—and, even more, in high-energy physics and in astrophysics—much high theory is purely speculative. Theorizing runs far ahead of observation. Conversely, sometimes a new theory is irrationally rejected for decades, until the buildup of supporting facts is so overwhelming that no one can deny it any more (see Oreskes 1999).

Of course, the ideal of testing it is there; but by the time a theory is adequately tested, theorists have already gone on to even wilder flights of imagination. It should, then, surprise us not at all that the hardheaded and pragmatic Maya farmers believe some very improbable things about birds.

To the dispassionate anthropologist, the mistakes people make seem remarkably similar. As our felt needs for knowledge outrun our possibility of checking, we come to believe some very improbable things. In so far as a whole society is made up of people with such needs and such biases, a whole society can construct a whole system of knowledge that is far from observed reality. This is as true of 20th century scientists as of Maya farmers. Against the Maya use of birds in love magic, we can set the enormous amount of speculation on love that fills rack after rack in any bookstore. Much of this material seems to the uninitiated to be as far

from any observed reality as are the beliefs about the use of powered ***takay*** heads. It is not only the Maya whose need to deal with love runs far beyond their ability to understand it.

In Mayaland and in the modern laboratory, observations are usually good and accurate, unless driven by powerful antecedent beliefs. This is because people can check their observations against reality, on frequent occasions, and thus are disabused of the minor errors that derive from unquestioned assumptions, sheer ignorance, and mistake. Interpretations and explanations, in so far as they are decoupled from direct observation, are increasingly tentative. Accordingly, they must be more and more self-consciously tested against reality. At no stage is the process free of bias and social construction, but at no stage is the process so removed from reality-testing that it is pure construction in a vacuum.

CONCLUSION

There is, then, a universal search for truth. We can use the term "science" for this worldwide search for more and more accurate data and understanding.

However, every culture, every society, has its own unique form of "science," and systems of knowledge are indeed socially constructed, in a very literal sense. It would thus be possible to limit the term "science" to the activity defined by Bacon, Galileo, Boyle, et al; however, the restriction of the term to contemporary institutionalized Big Science is absurd, and the restriction to formal, positivist work (a restriction still made by e.g. Cronk 1999) is not only absurd but flagrantly violated by almost all working scientists (Hacking 1999; Kitcher 1993; Kuhn 1962).

Even the limitation to post-Baconian experimental practice may be seen as arbitrary and Eurocentric. "Science" is a highly prestigious label in modern society. Refusing to use Egyptian, Greek, Chinese, Near Eastern and Maya traditional knowledge systems seems undesirable, not only because it would add to the already great amount of bias in the world, but also because it might lead contemporary scientists to slight traditional knowledge.

Knowledge is socially constructed, but *it is through the very process of social construction*—inevitably involving interaction, checking, and feedback—*that accurate, empirically useful knowledge can be increased, refined, corrected, and made more valuable.* Mistake-making is an inevitable cost of this system. Science flourishes in so far as people keep interacting with the world, to verify or disprove the speculations they have entertained and the conclusions they have reached.

Because of differences in this and in entire social contexts, knowledge systems in different cultures can look very different. They can also look similar, especially when they are under constant tight control by feedback from the actual "world out there." The degree of similarities between systems, and the degree of arbitrariness that enters into socially constructed knowledge systems, are matters for empirical investigation.

NOTES

[1] I avoid the term "western science," because contemporary biology is an international, not a western, project; Chinese, African, Indian and other scientists have made major contributions to it. "Western" science, conversely, still includes a great deal of lore (such as the

humoral medical theory, still common in western folk societies) that is no longer part of formal biological science. And, anyway, the Maya live west of Europe. "Western" science is an obsolete and misleading, not to say prejudicial, term for international science in today's global society. Writers such as Wolpert (1993) restrict the term "science" to the west, usually through ignorance of what other cultures are doing. Wolpert, for instance, states that "the Chinese, often thought of as scientists, were expert engineers but made negligible contributions to science. Their philosophies were essentially mystical...(Wolpert 1993:xii)." Even given Wolpert's restrictive definition of "science" (basically, post-1600 western experimental science, but extended to include ancient Greek speculation and modern non-laboratory sciences), this statement is absolutely wrong, and demonstrates complete ignorance of Chinese science and philosophy—an ignorance more than confirmed by Wolpert's wildly inaccurate discussion of China (1993:46-47). His opinion of all "primitive" and nonwestern traditions is summed up: "...for thousands of years the mythology and cosmology of almost all cultures entertained neither a critical tradition nor curiosity about nature (Wolpert 1993:54)." He equates nonwestern knowledge-seeking, including Chinese and Islamic science, with a chimpanzee joining two sticks together to get bananas (1993:26). Yet—as an educated Englishman—he adulates the ancient Greeks, crediting them with the full Baconian-Galilean approach; this is, again, not accurate. It is surprising and depressing to find that claims of this sort can still be published in an academic work. Wolpert's work is also confused and inconsistent. He defines science in various ways, loosely classifiable into a broader definition and a narrower one. By Wolpert's broader definition (thoughtful observation leading to counterintuitive generalizations—"intuitive" meaning, loosely, "consistent with everyday rationality—biases and all"), all societies have science. (This is not helped by Wolpert's lack of clarity about just what is counterintuitive.) By his narrower one, only certain post-1600 sciences count. The latter definition would rule out taxonomy—contemporary biological as well as Mayan.

[2] There is no previous systematic account of Yucatec Maya bird names. Existing accounts such as those of Pacheco Cruz (1958) and Hartig (1979) are incomplete, out of date, and seriously compromised by major errors. (Pacheco Cruz does include a great deal of cultural material that is of great value—including a very large amount of magic and folklore, well beyond anything I encountered.) Itzaj Maya, which is virtually a dialect of Yucatec, has been more fortunate, having been the subject of two excellent studies: Scott Atran (1993, 1999) has provided lists of terms, and Charles Hofling, with F. F. Tesucún (1997), have provided an entire dictionary. This dictionary gives a list of bird names (pp. 72-77). This list breaks up the bird names into various categories, including use-categories, and provides a number of different sorts of higher-level taxa that might be called "folk families" (see above). One or two of these groupings seem highly idiosyncratic, and are certainly not psychologically there for the Yucatec. For instance, the Yucatec would not group anis with blackbirds. However, most of them are the same as the Yucatec groups. I have been more cautious in listing groups. For example, their category of ground game birds—named in Spanish but not in Itzaj—is probably real, in some sense, to the Yucatec too, but I have not listed it because it is not a Yucatec-named group. Presumably all of the groups listed in the dictionary are real to the Itzá; Tesucún is a scion of an old and powerful Itzaj lineage. However, on the whole, the arrangement of animals in this dictionary is somewhat different from anything familiar in Yucatec. Many names, too, have quite different usages from those common in Yucatec; for instance, ***ts'apim*** refers to orioles instead of saltators. They also use the diminutive ***ix-*** (equivalent to modern Yucatec ***x-***) wherever it is commonly used in speech; but the diminutive is actually an optional addition to the name, so I have not indicated it.

ACKNOWLEDGEMENTS

I gratefully acknowledge, above all, the help of Eugene Hunn, Felix Medina Tzuc, and the people of Chunhuhub. William Balée and two anonymous reviewers provided valuable editorial input.

LITERATURE CITED

ABRAM, DAVID. 1996. The Spell of the Sensuous. Pantheon, New York.

ÁLVAREZ, CRISTINA. 1997. Diccionario Etnolingüístico del Idioma Maya Yucateco Colonial. UNAM, Mexico.

ANDERSON, E. N., and FELIX MEDINA TZUC. In prep. Animals and the Maya in Central Quintana Roo. Ms.

ARZÁPALO MARÍN, RAMÓN (editor). 1996. Calepino de Motul. UNAM, Mexico.

———. 1987. El Ritual de los Bacabes. UNAM, Mexico.

ATRAN, SCOTT. 1993. Itza Maya agroforestry. Current Anthropology 34:633-700.

———. 1990. Cognitive Foundations of Natural History. Cambridge University Press, Cambridge.

———. 1999. Itzaj Maya folkbiological taxonomy: Cognitive universals and cultural particulars. Pp. 119-204 in Folkbiology, Douglas Medin and Scott Atran (editors). MIT Press, Cambridge.

BACON, FRANCIS. 1901 (orig. 16th cent.). Novum Organum. P. F. Collier and Son, New York.

BERGER, PETER and THOMAS LUCKMANN. 1967. The Social Construction of Reality. Anchor Books, New York.

BERLIN, BRENT. 1992. On Ethnobiological Classification. Stanford University Press, Stanford.

BRICKER, VICTORIA. 1981. The Indian Christ, the Indian King. University of Texas Press, Austin.

BOSTER, JAMES. 1987. Agreement between biological classification systems is not dependent on cultural transmission. American Anthropologist 89:914-920.

———., BRENT BERLIN, and JOHN O'NEILL. 1986. The correspondence of Jivaroan to scientific ornithology. American Anthropologist 88:569-583.

———., and ROY D'ANDRADE. 1989. Natural and human sources of cross-cultural agreement in ornithological classification. American Anthropologist 91:132-142.

BULMER, RALPH. 1967. Why is the cassowary not a bird? A problem of zoological taxonomy among the Karam of the New Guinea Highlands. Man 2:5-25.

COLLINS, RANDALL. 1998. The Sociology of Philosophies. Harvard University Press, Cambridge.

CONKLIN, HAROLD. 1962. Hanunoo Agriculture. FAO, Rome.

CRONK, LEE. 1999. That Complex Whole. Westview Press, Boulder.

CUSHING, FRANK. 1920. Zuni Breadstuff. Museum of the American Indian, Heye Foundation, New York.

DUMOND, DAN. 1998. The Machete and the Cross. University of Nebraska Press, Lincoln.

ELLEN, ROY. 1993. The Cultural Relations of Classification. Cambridge University Press, Cambridge.

FEYERABEND, PAUL. 1987. Farewell to Reason. Verso, London.

FIRTH, RAYMOND. 1957. We the Tikopia. (second edition). George Allen and Unwin, London.

FORTH, GREGORY. 1996. Nage birds: Issues in the analysis of ethnoornithological classification. Anthropos 91:89-109.

FOUCAULT, MICHEL. 1971. The Order of Things. Pantheon, New York.

FRAKE, CHARLES. 1980. Language and Cultural Description. Stanford University Press, Stanford.

GONZALEZ, ROBERTO. 1998. Zapotec science: Farming and food in the Northern Sierra of Oaxaca, Mexico. Ph.D. dissertation (Anthropology), University of California, Berkeley.

GOODENOUGH, WARD. 1953. Native Astronomy in the Central Carolines. University of Pennsylvania, Museum of Anthropology, Philadelphia.

HACKING, IAN. 1999. The Social Construction of What? Harvard University Press, Cambridge.

HANKS, WILLIAM. 1990. Referential Practice. University of Chicago Press, Chicago.

HARRIS, MARVIN. 1968. The Rise of Anthropological Science. Thomas Y. Crowell, New York.

HARTIG, HELGA-MARIA. 1979. Las Aves de Yucatán: Nomenclatura en Maya-Español-Ingles-Latin. Fondo Editorial de Yucatán, Mexico.

HERVIK, PETER. 1999. Maya People within and beyond Boundaries. Harwood Academic Publishers, Amsterdam.

HOFLING, CHARLES ANDREW and FELIX FERNANDO TESECÚN. 1997. Itzáj Maya-Spanish-English Dictionary. University of Utah, Salt Lake City.

HUNN, EUGENE. 1977. Tzeltal Folk Zoology. Academic Press, New York.

———. 1982. The utilitarian factor in folk biological classification. American Anthropologist 84:830-847.

———. 1992. The use of sound recordings as voucher specimens and stimulus materials in ethnozoological research. Journal of Ethnobiology 12:187-202.

KITCHER, PHILIP. 1985. Vaulting Ambition. MIT Press, Cambridge.

———. 1993. The Advancement of Science. Oxford University Press, New York.

KUHN, THOMAS. 1962. The Structure of Scientific Revolutions. University of Chicago Press, Chicago.

LAKATOS, IMRE. 1976. Proofs and Refutations: The Logic of Mathematical Discovery. Cambridge University Press, Cambridge.

LANDA, FRIAR DIEGO DE. 1937 (Spanish orig. 16th century). Yucatan Before and After the Spanish Conquest. (translated by William Gates). The Maya Society, Baltimore.

LAUDAN, LARRY. 1996. Beyond Positivism and Relativism. Westview Press, Boulder.

MALINOWSKI, BRONISLAW. 1935. Coral Gardens and Their Magic. American Book Co., New York.

MARX, KARL. 1986. Karl Marx: A Reader. (edited by Jon. Elster). Cambridge University Press, Cambridge.

MILLS, C. WRIGHT. 1950. The Sociological Imagination. Oxford University Press, New York.

NADER, LAURA (editor). 1996. Naked Science: Anthropological Inquiry into Boundaries, Power and Knowledge. Routledge, New York.

NYERGES, ENDRE (editor). 1997. The Anthropology of Practice. Gordon and Breach, Amsterdam.

ORESKES, NAOMI. 1999. The Rejection of Continental Drift. Oxford University Press, New York.

ORWELL, GEORGE. 1984 (orig. 1948). Nineteen Eighty-Four. Oxford University Press, New York.

PACHECO CRUZ, SALVADOR. 1958. Diccionario de la Fauna Yucateca. Zamna, Mérida.

PETERSON, ROGER TORY and EDWARD CHALIF. 1989. Aves de México: Guia de Campo. Diana, Mexico.

RE CRUZ, ALICIA. 1996. The Two Milpas of Chan Kom. SUNY Press, Albany.

REDFIELD, ROBERT and ALFONSO VILLA ROJAS. 1934. Chan Kom, A Maya Village. Carnegie Institute of Washington, Washington, D.C.

RICHARDS, AUDREY. 1948. Hunger and Work in a Savage Tribe. Free Press, Glencoe.

ROSENBERG, ALEXANDER. 1992. Economics—Mathematical Politics or Science of Diminishing Returns? University of Chicago Press, Chicago.

ROYS, RALPH. 1965. Ritual of the Bacabs. University of Oklahoma Press, Norman.

SHARER, ROBERT. 1994. The Ancient Maya. Stanford University Press, Stanford.

SOKAL, ALAN. 1997. Impostumes Intellectuelles. O. Jacob, Paris.

SULLIVAN, PAUL. 1989. Unfinished Conversations. University of California Press, Berkeley.

WOLPERT, LEWIS. 1993. The Unnatural Nature of Science. Harvard University Press, Cambridge.

APPENDIX.—Chunhuhub Yucatec Maya Bird Names and Their Correspondence with Linnaean Nomenclature

Maya is transcribed according to the system recently standardized and accepted for Maya languages. This system is still unfamiliar in Yucatan, but is winning rapid acceptance and is used in the newer literature. Only common, well-identified names are given. I have recorded several others that are either vague or need more research. Only the commonest Spanish names are provided. Unlike Hofling and Tesucún, I have not bothered to respell Spanish names in Maya transcription (see e.g. "***ixpaloomaj***" above). The people of Chunhuhub are bilingual, and usually pronounce the Spanish without any Maya accent. To respell Spanish names seems pedantic. Like other tropical American peoples, the Maya are fond of naming birds from their call. In the forest, birds are far more often heard than seen. Often, individuals do not even know the appearance of a bird well known by voice.

Class Aves: ***ch'ich'*** "bird"

Arbitrarily arranged in Linnaean order; no obvious order or high-level groupings arise from the data. Vague and tentative "covert" or ad hoc categories are often proposed, but I prefer to be conservative, staying with unquestionable data.

Tinamou cluster: ***Non***

Mankolom. Great Tinamou, *Tinamus major*. Does not occur locally, but known to locals who who have been farther south.

Non (nom). Rufescent tinamou, *Crypturellus cinnamomeus*. Common; a game bird, but not often obtained because of its extreme wiliness.

Ke'el non. Little tinamou, *Crypturellus soui*. In spite of a name that makes it sound like a subcategory of the foregoing, this is recognized as a different bird.

Kamacho. Olivaceous Cormorant, *Phalacrocorax olivaceous*. Spanish-sounding extension of *mach*, the more general Yucatec name. Extended to the Anhinga, *Anhinga anhinga*. I have heard the cormorant called *jichkal* but this seems nonstandard.

Kuts ha' "water turkey." Muscovy Duck, *Cairina moschata*. (More commonly just called *pato*, the Spanish for "duck." To distinguish it from the rarely found domestic mallard, it is called *pato criollo* "native duck.") Common domestic and rare wild bird. Used for food and as a pet.

Pijije. Black-bellied Whistling-duck, *Dendrocygna autumnalis*. Echoic. This is the Spanish name too, but it was probably borrowed from a Maya language or from Nahuatl.

Ch'om "vulture." One of the few named groups in which a true folk generic is broken down into folk specifics:

Batab ch'om "chief vulture." King Vulture, *Sarcorhamphus papa*.

Box pool ch'om "black-headed vulture." Black Vulture, *Coragyps atratus*.

Chak pool ch'om "red-headed vulture." Turkey Vulture, *Cathartes aura*.

Hawk group: All hawks are recognized as related, as is shown by the fact that they can all be covered by widely extending the terms ***ch'uy*** and ***ii'*** and by the Spanish *aguililla* or *gavilán*. Careful speakers, however, break out several other categories.

Ch'uy "large hawk." This term can cover any large hawk. ***Ek'pip***. Black Hawk-eagle, *Spizaetus tyrannus*. Extended to other hawk-eagles and large impressive hawks.

Ii'. Focally the Gray Hawk, *Buteo nitidus*, but used for any medium-sized hawk, especially pale-colored ones.

Sak ii' "white hawk." The Gray Hawk in particular—or, sometimes, any light-colored hawk—as opposed to other ***ii'***.

Jonkuuk. Harpy Eagle, *Harpia harpyja*. Now extinct in the area, but the name is well known to local residents, who remember the bird and describe it accurately. It also appears in the Colonial dictionaries, with unmistakable descriptions.

Koos. Laughing falcon, *Herpetotheres cachinnans*. Unlike the other hawk names, this one is not often extended.

K'eenk'eenbak'. Small falcons. Apparently the most typical, or perhaps even focal, one is the Bat Falcon, *Falco rufigularis*. However, the term is extended to any small-ish, pointed-winged bird of prey, up to and including the White-tailed Kite, *Elanus leucurus*, which is also called ***ii'*** and ***sak ii'***. The male bat falcon is called ***kiris*** or ***kiklis***.

Bach. Chachalaca, *Ortalis vetula*. There is some possibility that the chachalaca is seen to be related to the following four, but I have no evidence of it. Common; food item but usually too wily to kill. Also called ***kobi*** or ***koba***.

Kox. Crested Guan, *Penelope purpurascens*. Food. Now very rare.

K'ambul. Curassow, *Crax rubra*. *Faisán* in local Spanish. Food and pet. Rare.

Kaax. Domestic fowl, *Gallus domesticus*. Name derived from *Kastelan* "Castilian," a recognition of the introduction of the bird by the Spanish. A rooster is ***t'eel***, which must once have meant a male bird or male game bird in general.

Bech' group:

Bech'. Yucatan Bobwhite Quail, *Colinus nigrogularis*. Common. Potentially a food, but in practice too small and wary to be worth the trouble of hunting it.

Chibilub. Singing Quail, *Dactylortyx thoracicus*. Rare; potential food, actually too rare and well-hidden to hunt.

Turkey group: unlabeled but clearly recognized, and terminologically united by sharing special terms for tom and hen.

Uulum. Domestic Turkey, *Meleagris gallopavo*. Echoic name. Common; important food resource. Tom is ***tso'***, hen is ***tuux***.

Kuts. Ocellated Turkey, *Agriocharis ocellata*. Formerly important game bird, now almost exterminated by overhunting. I believe the tom and hen are labeled as in the preceding.

Gallinola. Gray-necked Wood-rail, *Aramides cajanea*. Also Northern Jacana, *Jacana spinosa* (when it is not given its proper Maya label). Extended to any other rails present (the only common one is the Sora *Porzana carolina*, a winter visitor). Water birds are so rare in interior Quintana Roo that Maya names have usually been replaced by Spanish ones—as in this case.

Correa. Limpkin, *Aramus guarauna*. Spanish name; probably a variant of the commoner Spanish *carao*.

T'eel ha' ("watercock"). Jacana, *Jacana spinosa*. Probably extends to similar birds.

Pigeon cluster; all lumped as *ukum* or under the Spanish term *paloma*.

Paloma. Rock Dove, *Columba livia*. Common tame bird. Since it is a Spanish introduction of no great age in the area, it has no Yucatec name.

Chuukij. Scaled pigeon, *Columba speciosa*.

Ukum (ukuch). Red-billed pigeon, *Columba flavirostris*. Echoic. This is the common pigeon of the area, and its name is routinely extended to mean "large pigeon in general," i.e. to cover the preceding species. Also called ***kukut'kib***, which name is also extended to the foregoing. Used for food, but rarely taken.

Sakpakal. White-winged Dove, *Zenaida asiatica*.

Tsutsuy. *Leptotila* doves and similar doves. Common is the White-tipped Dove, *Leptotila verreauxi*. Other species occur and are not distinguished terminologically, except for the Ruddy Quail-dove, *Geotrygon montana*, which is ***chak*** (red) ***tsutsuy*** or ***k'aankab*** (red-dirt) ***tsutsuy***.

Mukuy. Ground doves. Probably echoic. Three species:

Chak mukuy "red ground-dove." Ruddy Ground-dove, *Columbina talpacoti*. Abundant; occasional pet.

Sojol mukuy "leaf-litter ground-dove." Common Ground-dove, *C. passerina*. Rare.

Tuch mukuy "ground-dove that calls *tuch*," thus part-echoic. Blue Ground-dove, *Claravis pretiosa*. Common but shy and seldom seen.

Parrot group: recognizable by being lumped collectively as ***t'uut***.

T'uut. White-fronted Parrot, *Amazona albifrons*. Common; frequent pet. Also a frequent pest of milpas, eating maize, fruit, and almost anything else well above ground level.

Ek'xikin "black ear." Yucatan Parrot, *Amazona xantholora*. The Maya name hits home—it points to the one field mark reliably distinguishing this uncommon bird from the preceding.

Kocha'. Red-lored Parrot, *Amazona autumnalis*. Pet, but rare in the area. Also called ***kulix***.

Taadi'. White-crowned Parrot, *Pionus senilis*.

K'ili'. Aztec Parakeet, *Aratinga nana*. Abundant, and a very serious pest, descending in flocks on maize and fruit. Sometimes shot with slingshots when caught in the act. (Chunhuhub Maya do not usually, otherwise, kill even the worst pests.) ***K'ili'*** are never called ***t'uut***.

Baakenchulul. Pheasant cuckoo, *Dromococcyx phasianellus*. Extended to cover the Lesser Roadrunner *Geococcyx velox*, rare and probably a recent arrival in the area (coming with large-scale clearing of forest).

Kipchoo'. Squirrel cuckoo, *Piaya cayana*. Echoic.

Chikbu'ul. Groove-billed Ani, *Crotophaga sulcirostris*. Echoic, but folk-etymologized in that ***bu'ul*** means "beans," and anis often hide in bean vines.

Owls would seem a natural cluster, and this may be shown by their uniformly ominous significance, but they are always kept terminologically distinct, so far as I have heard.

Xooch' (or ***xiich'***). Barn owl, *Tyto alba*. Echoic. A bird of very bad omen; if it shrieks over a house, an inhabitant or relative will die. This common European belief may have been introduced by the Spanish.

Tunkuruchu'. Great Horned Owl, *Bubo virginianus*. Echoic. Also called ***bujk'aanij*** and ***xo'chikin***. A bad omen.

Kulte'. Mottled Wood-owl, *Ciccaba virgata*.

Chaxnuk (from ***chak xnuk***, "little red old man"). Ferruginous Pygmy Owl, *Glaucidium brasilianum*. Also a bad omen, but so common and tame that no one takes it very seriously. Name extended to other small owls. Also called ***koak'ab***, "the one who goes ***ko*** at night," which is, obviously, a part-echoic name.

Nightjar cluster: Identifiably a cluster because they are covered by the well-known, widely used Spanish term *tapacamino*.

Pujuy. Paraque, *Nyctidromus albicollis*. Probably echoic.

T'unkiya. Salvin's Nightjar, *Caprimulgus salvini*. (Probably also covers the rare Yucatan Will, *Nyctiphrynus yucatanicus*.) Echoic.

Jaap. Common Potoo, *Nyctibius griseus*. Echoic.

Ts'unuun. Hummingbirds in general. The many species found in Chunhuhub are not terminologically distinguished. Apparently echoic of flight sound.

Uulum k'aax "forest turkey." Trogons, *Trogon* spp. Echoic; name from similarity of call to turkey's common note. Several species occur and are seen as different, but they are not terminologically recognized. People in other areas say that ***kux*** is the correct name for the trogon.

Juj. Blue-crowned Motmot, *Momotus momota*. Echoic.

Toj. Turquoise-crowed Motmot, *Eumomota superciliosa*. Echoic. The Spanish name, often used, is *pajaro reloj*—"clock bird"—because this motmot regularly swings its long, pendulum-like tail from side to side.

Toucan cluster; recognized because the name ***panch'el*** is used for both species.

Panch'el. Collared Aracari, *Pteroglossus torquatus*.

Pitoreal or ***tucan***. Keel-billed Toucan, *Ramphastos sulfuratus*.

Woodpecker cluster; collectively called either ***che'hum*** or ***kolonte'***.

Che'hun. Golden-fronted Woodpecker, *Melanerpes aurifrons*. Often extended to the Yucatan Woodpecker *Melanerpes pygmaeus* and sometimes to other species.

Chi'pirix. Ladder-backed Woodpecker, *Picoides scalaris*. Name—or, usually, just the ***pirix***—sometimes extended to the Yucatan Woodpecker (which looks like a Golden-fronted but is smaller, about the same size as the Ladder-back). Name also extended to the male genitalia, as is the Spanish *picocarpintero* ("woodpecker") in Mexican folk speech.

Kolonte'. Lineated Woodpecker, *Dryocopus lineatus*, and Guatemalan Ivorybill, *Campephilus guatemalensis*. These two woodpeckers are very similar and tend to occur together. Even those who see that they are separate species tell me that the birds are too similar to be worth distinguishing! Probably an echoic name.

Tatak'che' (tak'ak'che'). Woodcreepers, family Dendrocolaptidae. A collective term. It is extended to cover the Smoky-brown Woodpecker, *Veniliornis fumigatus*, which looks and acts more like a woodcreeper than a woodpecker—though it is sometimes called ***che'hun***, too. The several species of woodcreepers are uncommon and hard to spot, and—again—even those who see they are different see no reason to recognize that fact terminologically. Echoic, but of the birds' pecking, not of their calls.

Sob (or, more rarely, ***pu'***). Barred Antshrike, *Thamnophilus doliatus*.

Flycatcher group: united by loose and sloppy use of the following three names—especially the first and last—to cover the whole group.

Bech' lu'um. Black-faced Antthrush, *Formicarius analis*. Also called ***tsiimink'aax*** ("forest horse")—a name also used, formerly at least, for the tapir. The reason for this naming is hard to imagine.

Takay. (This name is *always* spoken with the diminutive suffix *x*: ***Xtakay***. It is given that way in other works.) Large yellow-bellied flycatchers, focally the Couch's Kingbird, *Tyrannus couchi*, but including many species. Echoic.

Juiiro. Medium-sized brown forest flycatchers. Echoic; these all have calls that sound like ***juiiro***.

Yaj. Small flycatchers. Echoic. Focal is the Olivaceous Flycatcher, *Myiarchus tuberculifer*, whose mournful whistle does sound absurdly like a small child calling "***Yaj***!" ("I hurt!").

K'eo. Masked Tityra, *Tityra semifasciata*. Echoic. Extended to other tityras and similar birds. Name sometimes extended to ***peelank'eolij***.

Kusuun (kusaam). Swallows and swifts, collectively (families Hirundinidae and Cypseluridae).

Pa'ap. Brown Jay, *Psilorhinus morio*. Echoic. Never called ***ch'el*** or linked with ***ch'eloob*** in any way, so far as I can tell.

Jay group: ***Ch'el***. These could be thought of as two "folk species" of a "folk generic," or as two very closely related folk genera united in a broader group. In spite of its name, the aracari toucan does not seem to be regarded as a ***ch'el***.

Ya'ax ch'el. Green Jay, *Cyanocorax yncas*.

Ch'el. Yucatan Jay, *Cyanocorax yucatanica*. Probably echoic.

Yankotij. Wrens, and, by extension, all small brown birds. The focal one is the Tropical House Wren *Troglodytes musculus*, which is literally the "one under the wall" (see main text). Many other species occur but are not named separately.

Po'okin. Black Catbird, *Melanoptila glabrirostris*.

Chiik. Tropical Mockingbird, *Mimus gilvus*. Echoic. Often Hispanicized to ***chica***.

K'ok'. Clay-colored Robin, *Turdus grayi*. Echoic. By extension, any medium-sized brown bird that is at all similar, such as wintering thrush species from North America. Hispanicized to ***coquita***.

Ooxil. Yellow-green Vireo, *Vireo flavoviridis*. Name means "the one in the breadnut tree." Also called ***ts' i'kalants'i'***, which is echoic of the bird's commonest song phrase. One of the few cases of a bird with two names.

Ch'uyin. Rufous-browed Peppershrike, *Cyclarhis gujanensis*. Echoic. Extended to other birds with songs vaguely like "***chuyin***."

Sojlin. Ant-tanagers, *Habia rubica* and *H. fuscicauda*.

Ts'apim. Saltators, *Saltator* spp. Possibly echoic. Two species occur but are not distinguished. Name routinely extended to unknown birds that look even vaguely like saltators.

Ya'ax bech' lu'um ("green ground-quail"). Olive Sparrow and Green-backed Sparrow, *Arremonops rufivirgatus* and *A. chloronotus*. These two virtually identical birds are not distinguished. They are not regarded as related to the Black-faced Ant thrush, in spite of the similarity in name.

Azulejo. Indigo Bunting, *Passerina cyanea*. A Spanish name; there is no Yucatec Maya name, as is usual with winter visitors.

Chinchinbakal. Any small yellowish bird, including goldfinches, warblers, tanagers with yellow underparts, etc.

Pich'. Melodious Blackbird, *Dives dives*. Extended to other blackbirds that may occasionally appear.

K'aaw. Great-tailed Grackle, *Quiscalus mexicanus*. Echoic. Almost always said with the diminutive: ***xk'aaw***.

Ts'iu. Red-eyed Cowbird, *Molothrus aeneus*. Echoic.

Yuyum. Large orioles, focally the Alta Mira Oriole, *Icterus gularis*. Often Hispanicized to ***yuya***.

Jonxa'anij ("the one who nests in palmettos"). Smaller orioles, focally the Hooded Oriole, *Icterus cucullatus*, which is the one that really "nests in palms." There are controversies about where the rarer orioles fit, but usually they are called ***yuyum***.

Mut'. Yellow-billed Cacique, *Amblycercus holosericeus*. This name appears to be the Yucatec reflex of the widespread Maya root ***mut*** "bird." (***Ch'ich'*** is a Yucatec form that may reflect an ancient alternate root or may simply be onomatopoeic.) I do not know why the Cacique is "the" bird *par excellence*, but perhaps it is related to the tight pair-bonding of the birds (they always answer each other—the Maya assume one of the pair has died if a call is not answered). There are other indications that this is a very important mythic bird; see Anderson and Medina Tzuc, forthcoming.

K'uubul. Wagler's Oropendola, *Psarocolius wagleri*. Echoic.