the spokesperson of the Jaguar, an official title designating the prophet of the "katun," or cycle of 20 360-day years in the Maya calendar. On this difference hinges a completely new understanding of the books of Chilam Balam as given by Edmonson. For rather than interpreting the books as a compressed compilation of events and declarations occurring in the decades just before and after the Conquest and pertaining primarily to a single prophet, Edmonson envisions a whole series of Chilam Balams spanning centuries. He proposes the books to be enduring chronicles of katun prophecies and of the power politics accompanying the right to "seat" the katun and the spokesperson of the Jaguar in different towns allied to different major factions of Maya, the Xiu and the Itza. As described by Edmonson in his introduction, these ancient enemies struggle to command the prophecies of the cycles over generations, with time providing not merely a passive framework but rather an instrument of action and aggression as they fight over the organization of the cycles themselves.

Edmonson's view of the books of Chilam Balam will no doubt raise controversy among scholars of the Maya. Among other things, he has reorganized the text completely to follow his posited scheme of katun cycles. Further, he proposes that the Maya maintained knowledge of their ancient Long Count well after the Conquest—a view that challenges established opinion that the Maya had reverted completely to a Short Count of katuns by the time of the Spanish arrival. There are also many ways to translate the often obscure passages of the manuscript into English. One clear organizational advantage of Edmonson's work is the parallel display of the English and Maya texts. This allows immediate comparison and evaluation of the translation.

Despite the controversy, Edmonson's Chilam Balam of Chumayel must be regarded as a masterly and substantive contribution to the ethnohistory of the Maya. From the ongoing decipherment of Maya texts rendered in stone from the Classic Period of the civilization, centuries before the Spanish Conquest, it is certain that Maya politics indeed revolved around prophecies that tied historical events to cycles of time as declared by great leaders. The meaning of the ritual passages in Edmonson's poetic translation of the Chilam Balam of Chumayel is perhaps obscure, but the metaphors display certain intriguing correspondences to those of Classical texts of the 6th through 9th centuries A.D. In sum, Edmonson has usefully tapped into the essential nature of Maya political rhetoric. The last independent Maya state did not fall in the deep forest of Peten, Guatemala, until 1697—nearly two centuries after the advent of the Europeans. It is now clear that the Maya of Yucatan, despite their European masters, only gradually and grudgingly yielded their vision of destiny and the statecraft it underwrote.

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A Museum Centenary

Raven's Journey. The World of Alaska's Native People. SUSAN A. KAPLAN and KRISTIN J. BARSNESS, with contributions by six others. University Museum, University of Pennsylvania, Philadelphia, 1986. 208 pp., illus. $39.95; paper, $24.95.

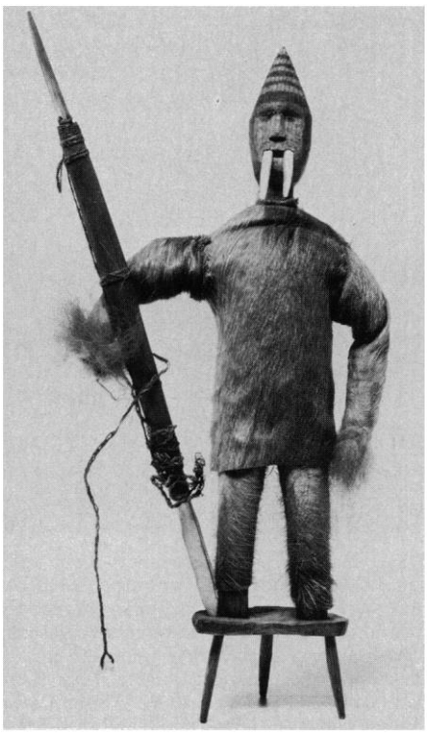
Raven's Journey celebrates the centenary of the University Museum and the study of anthropology at the University of Pennsylvania. The handsome catalogue documents a newly installed exhibit of the museum's Alaska collections from the Athapaskan peoples of the interior, the Eskimo of the Bering Sea and north coast, and the Tlingit Indians of the southeastern coast. Among many northern peoples of the New World the Raven was an important creator-trickster figure; here he represents a unifying theme of the exhibit.

"Raven barbecuing," Tlingit clan hat. "When the Raven killed the king salmon, a large crowd of small birds and squirrels rushed to the scene. Raven saw that one salmon was not sufficient for the crowd. He thought of a scheme. He made the crowd dig a hole in the ground large enough for the salmon to go in, and after this was done, he sent them after some skunk cabbage leaves to wrap around the salmon for the barbecue. They packed in a pile of this, but Raven said that what they brought was unclean." Sending them for more, "Raven cooked the salmon in the leaves that were brought, and ate it all before the crowd returned." [From *Raven's Journey*; collected by L. Shotridge, 1918]

Tlingit men in dancing costumes, about 1895. *Left*, "Chief Coudahwot" wearing painted costume; *right*, Louis Shotridge's father, Yeilgooxu, wearing woven costume. "Ceremonial regalia displayed or worn at potlatches assumed enormous values over the years and became symbols of a clan's noble and ancient ancestry." [From *Raven's Journey*; courtesy Alaska State Library]

Over 200 objects are featured in excellent black-and-white captioned photographs, and 27 of these are additionally shown in color. The pieces are presented functionally, by cultural group. Four essays "featuring some of the Museum's collectors and collections" (p.13) precede the actual catalogue.

Eleanor King and Bryce Little's piece on George Byron Gordon recounts the history of the museum under its first director. A little-known figure in museology, Gordon had high standards for the museum's collections and "sought to build Museum holdings into the finest and most comprehensive in the United States, if not the world" (p. 22). His interests led him to Alaska in 1905, where he visited 18 native groups, collected more than 3000 objects, and acquired over 300 photographs. He returned again in 1907 to complete fieldwork initiated in 1905. Of major interest was Gordon's relationship to George Heye, the fate of whose "Legacy in Limbo" at the Museum of the American Indian is currently awaiting decision. From 1908 to 1916 Heye housed and exhibited the major part of his magnificent collection at the University Museum. At the time of his death in 1927 Gordon had overseen the expansion of collections from all over the world and especially the addition of thousands of objects from North America; he had established at Penn one of the earliest academic programs in anthropology and had overseen construction of a large building complex to house the museum's growing collections.



Walrus-man collected by E. A. McIlhenny, 1897; height 30 cm. "Alaskan Eskimos believed that in the mythical past all humans, animals, and spirits could change their physical forms at will. In the nineteenth century, only spirits and shamans retained [that] ability. . . . The belief in transformation explains the cautious way Alaskan Eskimos dealt with strangers and animals that behaved in peculiar ways. Such beings might have been dangerous supernatural characters or hostile shamans in disguise. The theme of a walrus-man transformation was commonly expressed in Eskimo material culture through the use of the double tusk motif. The walrus-man represented in this carving stands on a sealing stool, wearing a hunting visor, and holding a harpoon in his hand." [From *Raven's Journey*]

The most intriguing of the University Museum's collectors was Louis Shotridge, who is featured in the second essay, by Maureen Miller. A member of Tlingit aristocracy from Klukwan village, Shotridge was one of a handful of ethnographically and linguistically trained Native Americans who worked for museums and anthropologists in the early 20th century. Shotridge was affiliated with the University Museum for 20 years as a collector and documentor of Tlingit artifacts and culture, and he often published in Penn's *Museum Journal*. Shotridge's native status was both an asset and a hindrance to his collecting efforts. Intent on seeing his tribal heritage preserved at Penn, he sought quality and meaning in the pieces he collected, and his documentary notes are superb. At the same time, he was audacious in his pursuit of certain objects. Claiming rights to the contents of the Whale House at Klukwan by virtue of American laws of inheritance, Shotridge was the first of a series of individuals to bid unsuccessfully for the treasures of this clan house (which are today the subject of litigation, resting since 1984 in a Seattle warehouse). Shotridge's life was marred by tragedy; he lost two wives to tuberculosis, and in 1932 the museum was forced to cut him—with no pension—from its payroll. In 1937 he died, the apparent victim of a murder, "impoverished and in obscurity, to the extent that no mention of his death appeared in print" (p. 72). It is fitting that the centennial exhibit finally honors the contributions of this outstanding man.

The inclusion of the remaining two essays is perplexing. "The Knight Island robe" by Cheryl Samuel is an analysis of textile fragments recovered from a Tlingit grave during archeological excavations and thus not a study of ethnological collection material. Similarly, Adria Katz's piece on a Tahitian breastplate collected among the Tlingit, though its subject is of interest as an ethnographic anomaly and eminently worthy of a published article, does little to celebrate the richness of the museum's American collections. I believe the interests of the centennial exhibit would have been better served by essays of broader scope and larger relevance to the collections, dealing for example with the "most notable and interesting ceremonial hats and headpieces that . . . ever will be in any museum" (p. 74) collected by Shotridge or with the Sledge Island whaling outfit brought to the museum by schoolteacher W. B. Van Valin or providing an overview of the Athapaskan materials in the collection.

Despite these shortcomings, *Raven's Journey* offers a view of the unique Alaska collections of the century-old University Museum, and its authors remind us that in these materials much work remains for scholars and curators of the future.

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Ethnomathematics

Native American Mathematics. MICHAEL P. CLOSS, Ed. University of Texas Press, Austin, 1986. viii, 431 pp., illus. $35.

Native American Mathematics appears at a time when interest in ethnomathematics is on the increase. Educational projects devoted to developing mathematics materials relevant to the Native American heritage, style of learning, and economic environment are currently under way at Northern Arizona University, Oklahoma State University, and the Fort Ojibway School in Minnesota, to name but a few. An International Study Group on Ethnomathematics has been established, a newsletter on the subject is being published, and international meetings have been scheduled. Writers attempting to develop culturally related materials for schools are seriously in need of sources providing information on the mathematics or mathematics-like mental activities of the ancestors of our present-day Native American students, who find in the recognition of those activities a needed sense of pride. The reader of *Native American Mathematics* will find a variety of such information.

The verbal numeration systems are a source of delight. Who will soon forget that the Abipones of Paraguay express four as *geyenkute*, "the ostrich's toes"? Although the bases of numbering systems of many Native American tribes were 10 or 20 for fairly obvious anatomical reasons, a base of four was used with surprising frequency, and the reason for its widespread use has not been firmly established. Madison S. Beeler suggests a clue in his chapter on Chumash numerals: "I have seen it stated in the literature on quaternary counting systems that some speakers of such languages could report the practice of holding sticks between the fingers." Thus we have four sticks for each hand.

Michael Closs in a chapter on numbers in Ojibway pictography gives a fascinating account of birchbark scrolls with clearly rendered diagrams. His interpretation of the scrolls illustrates the use of numerical concepts in a fraternal order consisting of four lodges or degrees. However, an agreed-upon theory explaining the ubiquitous use of four in Native American mythology is still lacking.

Some of the most attractive illustrations in the book are found in Closs's account of the mathematical notation of the Maya. The diagrams and photographs bring to life the theories concerning the origin, meaning, and purpose of the numerical representations. Most mathematics educators have learned in their course in the history of mathematics that the Maya had a base-20 place-value numeration system in which the basic numerals were represented by configurations of dots and bars. Closs also introduces and illustrates the "head variant numerals." Twenty Maya-style block faces in profile were used to represent the numerals 1 through 19 and 0. Examples of the use of these hieroglyphics on Mayan tablets are not only shown but interpreted in an understandable step-by-step manner.

The ancient Incas employed a device called *quipu* for recording numerical con-