

ANTHROPOLOGICAL PERSPECTIVES

VOLUME I, MAY 2017



ANNUAL JOURNAL OF THE NORTHERN KENTUCKY UNIVERSITY GAMMA CHAPTER
OF THE LAMBDA ALPHA NATIONAL ANTHROPOLOGY HONORS SOCIETY

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Ancient Egypt in the History of Mathematics

Lexie Lowe

Ancient Egypt in the History of Mathematics

Africa has consistently been reduced to a footnote in the pages of world history, limited to primitive and exotic connotations in the western civilization model that denied African history to legitimize oppression and enslavement (Zaslavsky 1997, 6). Historians of recent decades have challenged the notions through the utilization of methods that go beyond evidence in the written record. Within these new methods of understanding culture, the field of ethnomathematics has emerged to play a role in placing the contributions of ancient African cultures in the context of mathematical history. Ancient Egypt has consistently been symbolically isolated from the rest of the African continent, where its significance was attributed to Mediterranean antiquity. It is necessary to reclaim its mathematical developments within the context that it was an African civilization in a geographically, cosmopolitan location. By analyzing the mathematical characteristics of one ancient African civilization, namely Egypt, the assumption that ancient Africans did not generate mathematical development on the global scale is squashed. Suddenly, the “Greek miracle” of mathematics begins to seem underwhelming (Lumpkin 1997, 103).

Ancient Egyptian Numerals

The iconic image of ancient Egypt includes hieroglyphics as one defining cultural characteristic. As early as 3400 BCE, this written language—which included numerals—consisted of thousands of designated symbols. The use of a hieratic script was an efficient transition using simpler and fewer symbols, which were primarily used on papyri for everyday records; the effect of time has yielded scarce examples relative to hieroglyphic numerals that were utilized for monuments and engravings (Zaslavsky 1973, 20-22). Through written evidence, the conversion between hieroglyphic and hieratic numerals is better understood. Comparatively, hieroglyphic numerals used repetition in certain base numbers to represent an increase in numerical value, whereas the hieratic numerals are credited as one of the earliest known uses of cipherization to assign specific names and symbols to numbers one through nine, as well the “first nine integral multiples of integral powers of ten” (Zaslavsky 2003, 115-116). The Egyptian system required the knowledge and use of thirty-six distinct numeric symbols centered around a base power of ten (Payne 1986). The visual examples throughout this paper are represented in their hieroglyphic forms.

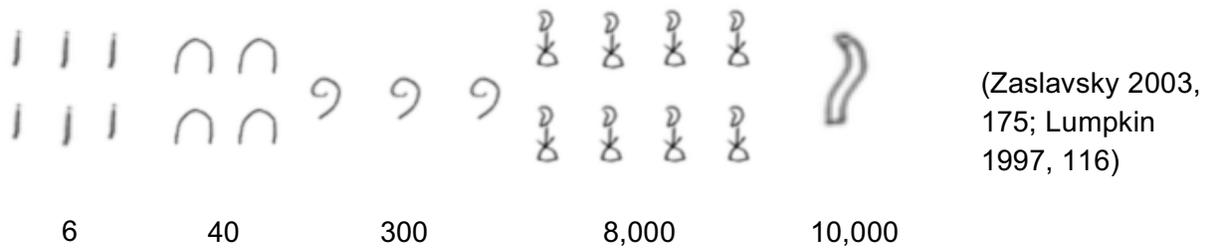
For years, many historians believed that the concept of zero was denoted in numerical sequences by blank spaces. Though there was no need for a zero place-holder in this chronology, the ancient Egyptians did in fact designate a symbol for the numerical value of zero; this consonantal value *nfr* was the same hieroglyph for “beautiful” and “complete” (Lumpkin 1997, 114).



Egyptian symbol for zero, *nfr*.
(Lumpkin 1997, 114)

The concept of zero was necessary in referential horizontal measurements. Leveling lines were used in the construction of larger structures to mark the position of cubits of stone that had been placed above or below the ground level; monumental structures required deep foundations. These points of marked reference can still be seen carved into the sides of Egyptian structures today: i.e. “two cubits above nfr” or “one cubit below nfr” (Lumpkin 1997, 114-115). Zero was also utilized in Egyptian bookkeeping, at least by the Middle Kingdom, to balance accounts at the end of each month.

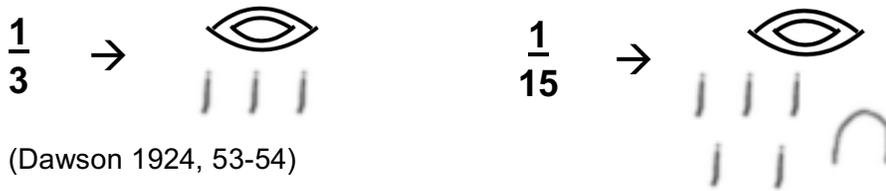
To denote compound numbers in hieroglyphic numerals, the number would be broken down into its individual place-holders, then visually represented through repetition of the designated base-10 hieroglyphs. For example, 18,346 would be understood as $10,000 + 8,000 + 300 + 40 + 6$, as shown below (Lumpkin 1997, 116):



Numbers were written in chronologically decreasing value, typically from right-to-left. Applying the standard of hieroglyphics, the number could be read from left-to-right if the order of compound values was oriented in decreasing value in that direction, opposite to what is shown above (Oliver 2003, 14). In addition, the orientation of the individual hieroglyphs would be flipped appropriately to lead in that direction (the bent finger—10,000—would point opposite and above if the number was to be read left-to-right). Numerals could also be read from top-to-bottom; or, as has been frequently found, the individual repetitions of numerals within a base-ten place-holder could be stacked in top to bottom to reduce horizontal space (Oliver 2003, 15).

Fractions in Egyptian Numerals

Differing from the Mesopotamians, the ancient Egyptians employed the sole use of fractions that possessed numerical unity—unit fractions that held a numerator of one (Oliver 2003, 15; Dawson 1924, 53). Fractions were used extensively regarding account statements and measurements, especially to denote prescription doses in medical papyri (Dawson 1924, 53). Fractions in parts also provided a mode of general comprehension for everyday tasks; it was much easier for the common subject to understand parts of a whole loaf of bread through the addition of partial slices cut over an x number of ways. The simplifying of fractions into parts is best understood through an example: in ancient Egypt, the fraction $2/5$ would be converted to a sum of fractions that possessed a numerator of one; $2/5$ would be expressed as $1/15 + 1/3$ (Lumpkin 1997, 105). As Jack Oliver explains, $2/5$ would *not* have been represented as the sum of $1/5$ and $1/5$, challenging our contemporary assumptions and methods of simplified partial addition (Oliver, 16).



(Dawson 1924, 53-54)

In hieroglyphic numerals, the denominator of a fraction was chronologically rendered as explained above; the accurate repetition of the place-holding powers of ten in sequential order. The numerator, which was always assumed to be one, was denoted by the hieroglyphic character for “mouth” (Dawson 1924, 54). This symbol was positioned above the denominator value, as is shown below. In hieratic numerals, the “mouth” hieroglyph would be exchanged for a dot. For unit fractions that were commonly used—such as $1/2$, $1/3$, and $1/4$ —distinct characters were assigned for efficiency in documentation and computation. Despite the Egyptian preference for numerical unity, they did recognize the $2/3$ with a special hieratic symbol: “it is clear that this conception was a fundamental one, for one-third of a number was invariably found by first obtaining two-thirds and then halving it” (Dawson 1924, 54). This reflected certain patterns in thirds that the Egyptians found compatible with their systems of multiplication and division, which relied on halving and doubling whole numbers.

Multiplication: Duplication & Mediation

In arithmetic formulas, the Egyptians relied on the multiplication and division of two—doubling and halving numbers repetitively. Unlike our modern technique of memorizing a multiplication table that consists of units 1 through 12, they used a parallel system of simultaneous “duplication and mediation” that incorporated the fundamental understanding of odd and even numbers (Zaslavsky 1973, 20). For example, to find the product of 13 and 29, two columns would be formed, one under each number. One column would be doubled, while the other was halved in the same number of intervals until the halved column reached one; for odd numbers, the next halved number would be the half of the even number that exits before it. The layout for this

	13*	29			
Odd					
numbers	6	58			
notated	3*	116	Then →		29 + 116 + 232 = 377 = 13 x 29
by *	1*	232			

(Zaslavsky 1973, 20-22)

equation might look something like this (in Hindu-Arabic representation):

From there, the doubled numbers that correspond sequentially to the odd halved numbers are added together. The sum equals the product of the two original numbers. Beyond multiplication, the ancient Egyptians utilized place-holding techniques for the individual powers of ten for the addition and subtraction of compound numbers; the uses of arithmetic operations in this regard were applicable to the everyday uses in Egyptian society.

Egypt in the Context of Mediterranean Mathematical History

Claudia Zaslavsky and Beatrice Lumpkin have contributed significantly to the scholarship of understanding African mathematics in the context of global education, and often referring to the

inaccurate cultural assumptions of the ancient Africans. About Egyptian ethnomathematics, Zaslavsky acknowledges that “mathematics as a discipline originated in ancient Greece with the formulation of logical systems based on definitions, postulates, and formally proved theorems” (Zaslavsky 1973, 6). Indeed, the common assumption was that Egyptians never incorporated the use of standard arithmetic principles, working only in finite examples, case-to-case, as exemplified in the Rhind Papyrus by the scribe Ahmose (c. 1650 BCE), generalities were applied and referred to along with outlines for specific mathematical calculations (Lumpkin 1997, 104). The construction of the pyramids required a firm understanding of geometrical and trigonometric concepts. The accuracy of ancient Egyptian scholars in these calculations is reflected in their numeric value for pi—approximately 3.16—which was closer to true value than the Mesopotamian and biblical values (3.0). They also used the correct formula for the volume and dimensional proportions of a frustum pyramid (Lumpkin 1997, 103; Zaslavsky 1973, 23)

Lumpkin explains how the eurocentric version of world history separates Egypt from the rest of the African continent, generating an engrained assumption that the Egyptians were not ethnically African, but rather Greek during the Ptolemaic Rule of Egypt in Alexandria (Lumpkin 1997, 105-106). The population was predominately African (excluding, perhaps, the ruling family), with immigrants from West Asia, Greece, and neighboring African kingdoms; there is a misrepresentation in the mental portraiture of “fair Greeks” that is associated with the scholars based in Alexandria (Lumpkin 1997, 106). The Macedonian policy of intermarriage and cultural appropriation in Egypt (following the trend set in motion by Alexander) solidified the continuation of ethnic Egyptians. Despite this, Greek mathematics itself was highly dependent upon the numerical knowledge and study of Egyptian mathematics centuries before (Langer 1941, 110). The Attic and Ionian numerical systems of ancient Greece parallel the hieroglyphic and hieratic systems from which they are based; the Greeks adapted their own alphabetical symbols to the Egyptian numeration system (Zaslavsky 2003, 175).

In the wake of Islamic rule, following the decline of the Roman Empire in the west, similar policies of cross-culturalism affected Egyptian understanding of mathematics (Lumpkin 1997, 107-109). In fact, their system of unitary fractions was the primary fractional notation in Europe until the Moors from North Africa introduced decimals as a replacement system for partial numbers.

Looking Outside of Egypt: The African Continent

Although the focus of the above argument has been on the geographical and cultural local of Egypt, it is important to acknowledge the recent scholarship of mathematics in relation to the rest of the African continent. The discovery of the Ishango Bone in central Africa presents a timeline of numerical theory that predates the unification of the Nile valley by at least 14,000 years (Lumpkin 1997, 112). The three columns demonstrate numerical patterns of addition and subtraction based around a base of ten in relation to operations of doubling; the carved notches provide ample evidence that there was some understanding and recognition of prime numbers (Zaslavsky 1973, 17-19).

In West Africa, particularly Nigeria, ancient numerical systems were utilized by gestures and verbal designations rather than a written record, which may further explain why there is less understanding in the West African systems of mathematic relative to more abundant evidence in Egypt. The creation of a standardized numerical system grew along with economic necessity; as trade along the southern Nigerian coast grew, the need for a currency system based on cowrie

shells became the dominant mathematical feature of the Yoruba and Igbo peoples (Zaslavsky 1970). Within the marketplace, outside of the local village, the use of numerical hand gestures to suggest calculative exchange was necessary between people who did not share a common language. Even in ancient Egypt, the frequent use of finger counting was documented among mathematical papyri (Zaslavsky 1973). The use of mathematics in these regions provided a practical application in the estimates of exchange in goods and currency. In ancient Greece, the theoretical—rather than the practical—understanding of mathematics progressed because it restricted to the leisure class (Lumpkin 1997, 106).

As Zaslavsky states: “prior to the rise of modern imperialism, historians had acknowledged that the ancient Egyptians were dark-skinned people. However... Africans had to be portrayed as less than human and denied their history, in order to justify their enslavement, while Egypt was detached from the African continent” (Zaslavsky 1997, 312). Despite the centuries of the domination of the eurocentric model of world history, ethnomathematics provides an alternative method for the reclaiming the contributions of Africa to the development of modern mathematics. Through future research, more can be known about the ancient mathematical systems of the regions of central and southern regions of Africa. Mathematics can be a means of championing the case for ancient Africa, which has long been neglected within the context of global history.

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Joint Forest Management: State and Community Collaboration as Conservation in Eastern India

Laura Bronte Murrell

Introduction

This paper reviews the Joint Forest Management (JFM) conservation program in eastern India. Originating in West Bengal in 1990, the JFM encouraged the state government and forest communities to collaboratively manage and protect national forests. This paper discusses the stakeholders that benefit from and contribute to the program, examines how the knowledge and opinions of forest communities are incorporated into the program, and speculates on the future of the JFM. Unlike the community forestry programs implemented throughout most of India, the JFM utilizes a top down approach requiring high levels of government involvement, making it unique and relevant to study.

History

Community forestry initiatives in eastern India exist to repair the environmental degradation caused by British colonialism and the Indian government's failed attempts to combat colonial damages. Before colonial forces governed Indian communities and their lands, many cultural groups of eastern India maintained sustainable relationships with their forests (Poffenberger 2011, 229). When the British began controlling forests during the mid-nineteenth century, they not only limited indigenous access to forests but also cleared trees for agricultural use (Bandopadhyay 2010, 55). Villagers could only obtain forest products, such as fuelwood, if they purchased it from loggers (Poffenberger 1994, 57). While the Indian government attempted to gain control over the forests after independence from Britain in 1947, landowners divided and sold their parcels before the forest departments could acquire them (Poffenberger 1994, 57). Forest departments eventually regained control over the lands, but permitted contractors to cut in the forests, resulting in nondiscriminatory and widespread deforestation (Poffenberger 1994, 57).

Over the next several decades, local communities fought to regain control over their forests, consequently, many of their essential resources. During the late twentieth century, due to their dependence on forest products, tribal communities began promoting forest protection, forming grassroots organizations to support themselves (Poffenberger 2011, 230). With the passing of both the National Forest Policy (1980) and National Conservation Strategy and Policy Statement (1992), the Indian government provided support for community control and protection over local forests (Bandopadhyay 2010, 56). The JFM initiative allocated responsibilities and rights to forestry communities while also providing guidelines for management (Poffenberger 2011, 230). Today, JFM programs play an important part in the revitalization of Indian forests, which stimulate forest resource utilization and village economies (Bandopadhyay 2010, 66).

Stakeholders

India's JFM initiative calls for collaboration between state governments and forest communities to protect and manage national forests. JFM offers village communities the opportunity to involve themselves in the revitalization of forests, which provides villages with fuel, timber, and other resources (Sarker 2009, 15). While the JFM allows indigenous communities to have

control over forests, their control is only partial due to state involvement (Poffenberger 2006, x). Forest departments give usage rights to villages securing the protection of national forests, which benefits both parties; however, states still hold more power in this relationship (Poffenberger 2006, x). The benefits of the JFM vary depending on location. Forest communities in West Bengal and Bihar do not often benefit from joint management because sale proceeds of timber and other forest products are not distributed amongst those communities (Sarker 2009, 16). The JFM in East India successfully protects national forests, but forest communities in many of these states do not benefit from the relationship.

Even though a forest community is a single stakeholder, only some community members contribute to the JFM. Because women are the primary users and acquirers of forest products, they are essential to the JFM projects (Poffenberger 1994, 74). Women have been excluded from forest management decisions in the past, but have been given more power as their importance to the JFM has been realized by male community members and forest departments (Poffenberger 1994, 75). In addition to women, forest guards are pivotal for maintaining the JFM programs, because they protect and manage forests, as well as provide communication between forest communities and forest departments (Kurian and Bhatia 1997, 553). In a study performed in West Bengal, villages with motivated field staff also experienced greater JFM participation throughout the rest of the community (Kurian and Bhatia 1997, 553). Participation throughout the community is important, because only those households that contribute to the JFM receive benefits (Das and Sarker 2011, 246). While a forest community can be grouped together as a single stakeholder, only certain community members contribute to the JFM.

The Commons

The commons in East India's JFM programs are composed of national forests and watersheds that are maintained by forest communities. Throughout India, the JFM is responsible for 22 million hectares of forest and the involvement of 100,000 villages (Poffenberger 2011, 230). The national forests provide many local villages with access to forest products, which are necessary resources for these communities (Poffenberger 2006, x). While forest protection is essential to the preservation of communities that depend on them, it also secures the conservation of India's natural resources, such as the watersheds that contribute to the hydrological flows of densely populated regions (Poffenberger 2006, ii).

While the JFM provides forest departments and villagers the opportunity to co-manage national forests, the private sector, government regulations, and insurgency groups prevent this relationship from functioning properly. The JFM has been one of India's most successful forest conservation projects, but forests are still threatened by illegal loggers and forest clearing by businesses, resulting in the obscured or weakened property rights of forest departments and villages (Poffenberger 2006, ii). Because forest departments wanted to form JFM programs in those forests that were in desperate need of conservation, only national forests that have less than 40 percent tree cover are eligible for the JFM (Guha 2001, 232). The JFM communities that increase their tree cover to over 40 percent are graduated from the program, which not only abandons the relationships between local communities and legislators, but also causes former JFM villages and forests to collapse (Guha 2001, 232). Despite insurgency groups physically preventing forest users from protecting and using the national forests, implementation of forest management is limited and leads to the disbanding of JFM programs (Poffenberger 2011, 230).

The Noble Savage

The concept of the noble savage, while not present in most writings about community forestry or the JFM program in east India, is present in those works written by conservation programs. In an assessment of the viability of community forestry in India, the Rights and Resource Initiative proposed that the management of national forests should be the sole responsibility of the people that live in or near them (Rights and Resource Initiative 2015, 3). In a report by the United Nation's Reducing Emissions from Deforestation and Forest Degradation (REDD) program, anthropologist Mark Poffenberger argues that indigenous groups are more capable of managing forests than government programs, because of the indigenous groups' conservational values (Poffenberger 2011, 229). In the REDD report, Poffenberger uses the Khasi people of Northeast India as examples of indigenous conservationists (Poffenberger 2011, 229). Poffenberger cites the Khasi's oral histories and sacred groves as evidence of their inherent conservationism (Poffenberger 2011, 231). While the traditions of the Khasi might result in respect of their natural resources, there is no evidence of intentional conservation in the traditions of the Khasi.

Within scholarly literature, the noble savage ideology does not appear, but instead recognizes the contributions indigenous groups made to deforestation in the twentieth century. Deforestation was initiated by colonialists, but was perpetuated by loggers and indigenous groups (Poffenberger 1994, 57). While Poffenberger's activist works ignore the role indigenous groups have played in deforestation, his academic writings recognize their role. In a review of India's forestry history, Poffenberger mentions the indiscriminate logging performed by forest communities in the 1970s and 1980s (Poffenberger 1994, 57). In works that did not carry a conservationist agenda, the noble savage ideology was not present, which may indicate that the noble savage is perpetuated to advocate for the rights of indigenous people.

Traditional Ecological Knowledge

Although the JFM is advertised as a co-management system that encourages input and cooperation from forest communities, community members do not have a voice in how their land is managed, causing the JFM programs to disregard the traditional ecological knowledge (TEK) of these communities. When the JFM was enacted, it was intended to be a mechanism to create partnerships between forest communities and forest departments, giving both stakeholders partial control of the surrounding forest lands (Ormsby 2011, 785). The JFM was envisioned to give communities management rights and access to non-timber forest products in exchange for their protection of national forests, but the JFM functions because community members protect forests in exchange for goods without members having managerial rights (Kurian and Bhatia 1997, 553). Rather than adhering to the mission of the JFM, forest departments require communities to plant, maintain, and protect trees on government property (Kurian and Bhatia 1997, 553). The disregard of TEK by forest departments can be attributed to their preference for western science, which can be dismissive of the communities' harvesting techniques and knowledge of ecosystems (Guha 2001, 232).

The JFM is an improvement from previous forest tenure systems in many regions of India but its existence is encroaching on tenure systems that do utilize TEK. In the East Kameng District, several tribes still practice forestry techniques that reserve areas for conservation or protect forests surrounding their villages and watersheds (Poffenberger 2006, 6). Community-based conservation is successful in producing subsistence products for its users and conserving the forest, but governments and international organizations do not support non-profit driven

schemes (Poffenberger 2006, 6). While the JFM provides more benefits for forest communities and their ecosystems than most government or private programs, consideration of TEK could improve their success.

Community-Based Conservation

While the mission of the JFM program should indicate that the initiative practices community-based conservation (CBC), the JFM's managerial approach only utilizes certain aspects of CBC with forest departments holding more control over forests than the people who conserve them. The JFM program was intended to encourage forest departments and forest communities to collaboratively manage forests, acknowledging that forest communities would have access to non-timber forest products and would cultivate forest products that the state could sell (Sarker and Das 2008, 19). Today, India's forest communities are less involved in decision-making and are relied upon only to provide upkeep and protection for forestlands (Sarker 2009, 15). Communities perform a function within this conservation project, but the project is not community-based. For a project to be considered CBC, it should empower those who depend on the resources in question and provide an alternative to top-down approaches (Western and Wright 1994, 7). The JFM does not practice CBC, because it is a top-down program ignores the prospects of community forestry and disregards the importance of local government (Poffenberger 2006, 7).

In West Bengal, the role of forest guards demonstrates the effects a top-down approach has on the JFM's communal forest tenure. In this system, forest guards protect the forest while also acting as a mediator between villagers (Kurian and Bhatia 1997, 553). While the duties of a forest guard benefit the forests, the presence of this position detracts from communal management (Kurian and Bhatia 1997, 553). If forest communities were to take control of land management, forest departments would no longer need to provide guards, loosening their control over the practices of forest communities (Kurian and Bhatia 1997, 553). For the JFM to utilize CBC, forest guards must be removed.

Future

The success of the JFM in the future can be predicted by examining its current successes both in economic and welfare development of forest communities. The JFM has shown to be economically successful for most those involved, including agricultural households, landholders, and the government (Sarker and Das 2008, 41). Providing the JFM continues to include forest communities in the protection and maintenance of national forests, the program will continue to be economically successful (Sarker and Das 2008, 41). If the JFM relapses back into exclusively promoting commercial success, then only the government will benefit from the program—not the forest communities (Sarker and Das 2008, 41). The one group that does not currently benefit economically from the JFM is the rural poor, because they are solely dependent on yielding forest products for their income, which does not secure a livelihood (Sarker and Das 2008, 42). When the JFM is to be economically beneficial for every stakeholder in the future, forest product acquisition must pay collectors a living wage.

Should the JFM maintain the same top-down approach that it currently utilizes, it is likely that many of the social inequalities associated with the program will persist. Many of the JFM's critics argue that the current model does not provide an adequate platform for community members to affect the program operation. Since community input is limited, only the elite

members of forest communities can voice their views, excluding women and low-caste individuals from negotiations (Guha 2001, 232). If the JFM continues to be advertised as a community-based program, future adjustments should ensure more community rights. Because the JFM is economically successful and remains a top-down program, it is unlikely that the near future of the JFM will include more community involvement.

Conclusion

The JFM has succeeded in providing a framework that protects national forests by introducing forest guards to the conservation project, but the presence of forest guards detracts from the involvement of community members. The JFM continually fails to recognize the rights and contributions of women and low caste individuals, and fails to give equal control to both forest departments and their forest communities. While the JFM has been successful in revitalizing those forests that suffer from the lowest tree cover, the program's tendency to graduate communities once they are no longer a part of this group does not provide a long term or sustainable solution to deforestation. Compared to community forestry, the JFM's top down approach limits community engagement, but increases its economic success, making it a model for conservation that should continue to be studied.

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Celtic Beliefs and Mythology

Kourtney Zigelmier

The Celts

To understand Celtic life, it is essential to define who the Celts were and from where they came. The terms, “Celt” or “Celtic”, are relatively new identifiers; Edward Lhuyd first used the term in the eighteenth century (Cunliffe 2003, 5). Lhuyd used “Celtic” to describe the languages spoken in the modern-day United Kingdom and Ireland, within which he included Irish, Welsh, Cornish and Breton (Cunliffe 2003, 5). Lhuyd also divided the language group into the Q-Celtic and P-Celtic (Cunliffe 2003, 5). He based the categories on similarities in sounds between the languages (Cunliffe 2003, 5). Q-Celtic includes Irish, British, and Gaulish, while P-Celtic includes Welsh, Cornish, and Breton (Cunliffe 2003, 5). Therefore, Celtic ethnicities can include, but are not limited to, the ancestors of Irish, Scottish, Welsh, Bretons, Galicians, Manx, and Cornish (Aldhouse-Green 2015, 12). These “Celtic” ancestors did not refer to themselves as “Celts”, and yet, Celtic heritage and identity have become an important aspect of modern life (Cunliffe 2003, 5). Lhuyd also proposed the main model of how the Celts arrived in Britain. Lhuyd suggested “Irish [Bretons] moved from Gaul to settle in the British Isles but then were later pushed into northern Britain and Ireland by a second wave of Gauls who settled in the south and west” (Cunliffe 2003, 5-6).

An Introduction of Celtic Beliefs

Ancient Celtic beliefs share many characteristics of a pantheistic belief system. Most of what researchers know about the religion comes from foreign sources such as Julius Caesar or Diodorus of Sicily, which are biased and absent of cultural understanding (Kingsley 1998, 50). Little is known about the religion because of the limited written evidence and complications with archaeological interpretation (Kingsley 1998, 50). The Greek and Roman writers focus on the role of Celtic druids (Kingsley 1998, 50). Diodorus states “Those men called by us philosophers and theologians are held in great honor by them; they call them “Druids” ... and no sacrifice may be performed without a Druid present... for they speak the language of the gods” (Kingsley 1998, 50). Druids proceeded over all religious rituals and ceremonies, dealt with education and legal concerns, and, at times, could even influence the rulers over social and political matters (Kingsley 1998, 50). The druids are thought to have been the creators of the Celtic religious calendar (Kingsley 1998, 53). The calendar is divided into the two periods of summer and winter (Kingsley 1998, 53). The Celts celebrated feast-days such as Samhain, Beltene on May-Eve, and festivals to honor gods (Kingsley 1998, 50).

The Celts worshiped many deities. Most of the gods represented elements found in nature, which explains the worshiping of gods and the placement of sacred places or shrines in tree groves, peat bogs, near bodies of water, on tops of mountains, and unoccupied islands (Kingsley 1998, 54-56). Significant male deities include: Lugh, the god of arts and war; Belenus, god of the sun and springs; Oghma, god of strength; Donn, god of the dead; and Manannán Mac Lir, god of the sea (Kingsley 36-40). The major female deities are: Maia, goddess of wealth and abundance; Sirona, goddess of healing; Brigit, goddess of love; Matres, the earth goddess; and Epona, the horse goddess (Kingsley 1998, 37-48).

Themes in Myths and Legends

Myths and legends serve an important function in human life. They often answer questions involving “the most fundamental human concerns: Who are we? Why are we here? Why is our world like this? How was the world created? What happens to us when we die?” (Aldhouse-Green 2015, 15). They also deal with issues in human life, such as initiation rites, gender roles, morality and duality of good and evil (Aldhouse-Green 2015, 15). Most of the information

researchers have compiled about ancient Celtic beliefs has been interpreted from their myths and legends. Many have common themes, which implies a cultural significance for the ancient society. Common themes include cauldrons, triads, talking heads, curses, heavy drinking, heroes, shape shifting, and women's roles (Aldhouse-Green 2015, 58-156).

Magical cauldrons appear in several myths, which have the power to bring the dead back to life, or never run out of food (Aldhouse-Green 2015, 26). In the Mabinogi, a woman gives her husband a regenerating cauldron, which came from the Irish Otherworld (Aldhouse-Green 2015, 26). The feast of the Irish Otherworld has a magical cauldron that could replenish its contents as well (Aldhouse-Green 2015, 26). In another Irish myth, the king of Ulster bathes in a cauldron while eating the meat of a white horse (Aldhouse-Green 2015, 26). Archaeologists have found evidence of cauldrons all around the Ireland and Scotland regions, usually near bodies of water (Aldhouse-Green 2015, 26). One of the most impressive cauldrons is the Gundestrup Cauldron, which can hold up to thirty-four gallons of fluids, and is decorated with ornamental images of narratives (Aldhouse-Green 2015, 27). Considering its size, decoration and construction, the cauldron was more than likely a sacred object (Aldhouse-Green 2015, 27).

Another theme that appears in Celtic myths is the triad. The number three is a sacred number to the Irish and Welsh (Aldhouse-Green 2015, 30). Several of the gods and goddesses are depicted in threes (Aldhouse-Green 2015, 30). The war goddess Morrigan, Badbh, and Macha often appear together, and even represent Ireland as the three goddesses, Ériu, Fódla, and Banbha (Aldhouse-Green 2015, 30). CuChulain, the mythological hero in Táin Bó Cuailnge, braided his hair into three and vanquished his enemies in threes (Aldhouse-Green 2015, 30). The triad theme also relates to the Christianity concept of the Holy Trinity: the Father, the Son, and the Holy Spirit, and the British triple mother goddess (Aldhouse-Green 2015, 31).

Several Celtic myths have talking heads. The Celts believed the head was the most important part of the body because the soul resided there (Aldhouse-Green 2015, 33). In the Táin Bó Cuailnge myth, the hero, Conall Cernach, dies in battle by decapitation (Aldhouse-Green 2015, 33). It is not the end of Cerach's involvement in the myth; his "hollowed-out skull clearly possessed similar powers to the cauldron of plenty, for the Ulstermen who drank milk for it regained their strength after they had been weakened by a curse" (Aldhouse-Green 2015, 33). In other myths, the theme is portrayed in the removal enemies' heads or placement of decapitated heads in sacred places for protection (Aldhouse-Green 2015, 33).

Curses are another important theme throughout Celtic myths and legends. In legends, it is often referred to as a *gessa*, which warns the individual against preforming a specific action or unwanted consequences will take place (Aldhouse-Green 2015, 35). The Táin Bó Cuailnge myth has several curses throughout the piece (Aldhouse-Green 2015, 33). Queen Medbh sends her people with cursed weapons that could "literally sandblast a man's face, raising boils and rashes" (Aldhouse-Green 2015, 34). CuChulain was also warned to never consume dog meat or he would die shortly after (Aldhouse-Green 2015, 105). Eventually, he does consume the meat to avoid insulting his host and later dies in battle (Aldhouse-Green 2015, 105).

Another theme occurring in Celtic mythology and legends is the ability to shape shift. Shape shifting could be voluntary gift or a punishment depending on the region from which the myth originates (Aldhouse-Green 2015, 117). Morrigan and Badbh often transformed into crows during battle (Aldhouse-Green 2015, 117). In a Welsh legend, King Math of Gwynedd curses his nephews who conspire against him (Aldhouse-Green 2015, 117). He forces his nephews to transform into a male and female animal to mate with one another as punishment (Aldhouse-Green 2015, 117). The first year they become deer, the next a pair of wild pigs, and at last, a pair of wolves (Aldhouse-Green 2015, 117). The offspring that was produced from these unions could still shape shift even after the curse was lifted (Aldhouse-Green 2015, 117).

Women were portrayed negatively in Celtic mythology in their role as the ugly hags, or lustful mercenaries. The goddess of death came disguised as a hag to King Conaire in the myth, 'Da Derga's Hostel (Aldhouse-Green 2015, 36). The hag had "long black legs, a knee length

beard and her mouth was at the side of her head (Aldhouse-Green 2015, 36). Queen Medbh is described as a lustful individual who “never was she without one man in the shadow of another” (Kingsley 1998, 41). Queen Medbh drank heavily, and was concerned with sex, fighting, and retaining her territory (Aldhouse-Green 2015, 141). She also had the power to shape shift from a maiden to a hag (Aldhouse-Green 2015, 141). This type of transformation was another important motif for mythic women. In an early version of the myth, the Frog Prince, Niall, the founder of the Ui Neill, comes across an old hag while hunting (Aldhouse-Green 2015, 148). She promises to give the hunting party water for a kiss (Aldhouse-Green 2015, 148). Everyone refuses except for Niall, who not only kisses her but has intercourse as well (Aldhouse-Green 2015, 148). The hag transforms into a beautiful maiden named Sovereignty, and Niall legitimizes his right to rule the dynasty (Aldhouse-Green 2015, 148).

Syncretizing Celtic Beliefs with Christianity

Christianity, specifically Catholicism, has been a major aspect of modern Irish life. Throughout Ireland’s history, there have been many religious conflicts, beginning as early as the fifteenth century with the *Cogadh na haon deag mbliana*, or the “Eleven Years War”, to the more recent, Troubles, Ireland faced until the late twentieth century. Ireland has not always had a strong Christian influence. As mentioned previously, Ireland’s early belief system more closely resembled a pantheistic belief system. At an undistinguishable time, the first encounter of early Christianity occurred with the Celts, and like many peoples when introduced to new ideas, they syncretized certain aspects of their beliefs.

The lives of the Celtic saints are an example of this phenomenon. One well-known Celtic saint is Saint Bridgit. The story of Saint Bridgit is a combination of the Celtic love goddess and a Christian saint who lived during the first millennium A.D. (Aldhouse-Green 2015, 198). As the Celtic goddess, she was a Tuatha Dé Danann member, and a goddess of healing, craft working and poetry (Aldhouse-Green 2015, 197). As the Christian saint, St. Bridgit lived during the 5th century, where she founded a monastery in Kildare (Aldhouse-Green 2015, 198). St. Bridgit’s origin story is a combination of Celtic and Christian elements (Aldhouse-Green 2015, 198). She was unable to consume her druidic father’s food because it was contaminated with paganism (Aldhouse-Green 2015, 198). Her father realized the importance of this when he had a prophetic dream where Christian monks give Bridgit her name (Aldhouse-Green 2015, 198).

Many attribute Saint Patrick as having introduced Ireland to Christianity in A.D. 432 (Aldhouse-Green 2015, 199). Early Christians were already present in Ireland before Saint Patrick’s “conversion”, but this fact is overlooked in his hagiography (Aldhouse-Green 2015, 199). St. Patrick often encountered conflict when converting Ireland (Aldhouse-Green 2015, 198). At the hills of Tara, Patrick converts the King of Ireland, Leagaire, and his people by winning a magic trial (Bradley 1999, 13). Another important saint, Saint Columba, has a hagiography mixed with biblical precedents and Celtic mythology (Bradley 1999, 19).

Conclusion

Beliefs and mythology are just one way in which an individual can investigate and understand a culture. These aspects were one important to the Celts and communicated a significant amount about the culture. Their beliefs and myth can inform the reader about their origins and identity, important figures in the community, and how they encounter and deal with other groups.

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