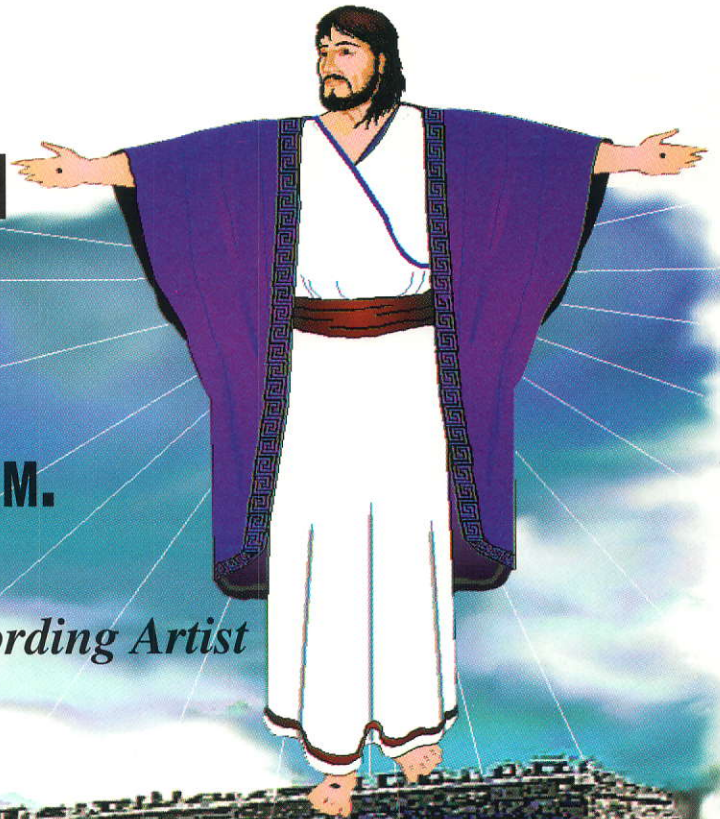


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Were the Preclassic Maya an Amalgam?

by Glenn A. Scott

Archaeologists continue to disagree over the origin of the Classic Maya civilization. Some claim that the ancestors of the Maya entered the Peten lowlands from the Gulf coast. Others claim that they entered from the highlands to the south. There is ample archaeological evidence to obviate the need to choose between these two positions—rather that the *Late Formative* or *Preclassic* Maya civilization (250 B.C.-A.D. 250) resulted from an amalgamation or fusion of two separate cultures, which had converged on the lowlands from both north and south. Recent evidence will reveal that even the writing system, so typical of the Maya, probably developed from a similar fusion and blending of two separate communication systems. To Book of Mormon believers this should come as no surprise but be viewed as reassurance that science and religion are also converging.

Perhaps the oldest theory about the origin of the Classic Maya was the one (now discredited) that they were a direct outgrowth of the Olmec culture of the Gulf coast to the north and west.

Archaeologist Gordon Willey (1977) asked, "In view of the [earlier] occupation of the Gulf and Pacific coasts . . . why not the lowlands? The fact that pottery making and farming peoples were established . . . at no great distance from the Maya lowlands "does make it strange that these lowlands were not also occupied at the same time, but such are the facts to date."

Stanley Boggs (1950) wrote, "Although I would not contend that . . . the Mamom (very early occupants of the Maya lowlands) were Olmec . . . I would suggest that under Olmec influence, slash-and-burn agricultural knowledge could have been transferred, so that when a particular people encountered the Peten terrain, they were able to take advantage of it and spread from their riverine habitat into . . . the Peten, where we find their deposits lowermost in the great [site of] Uaxactun" (Willey, Culbert, and Adams 1967).

Dennis and Olga Puleston (1971) have stated, "We have little reason to suspect that the Preclassic Maya were derived from indigenous [native] groups." The bulk of available archaeological evidence points to an original influx of agriculturists from riverine sites. The next stage was achieved when these Formative groups moved into the interior. The transition to this state appears around the beginning of the sixth century B.C.

Richard Adams (1977) claimed that the Peten lowlands were likely colonized by agriculturists from the lowlands of the nearby Veracruz-Tabasco Gulf coast.

On the other hand, Michael Coe (1966) says it is known that in the southern highlands, especially at Kaminaljuyu, there were produced architectural and sculptural achievements earlier than in the Maya lowlands. "Crucial to the problem of how higher culture came about among the Maya is the Izapan civilization because it occupies a middle ground in time and space between the Middle Formative

Olmec [1000-400 B.C.] and the Early Classic Maya [A.D. 250].” He also saw Olmec themes in the art of the Maya. One problem of Mesoamerican archaeology is how such a transfer could have taken place, for he admits there seems to have been little direct contact between the Olmec and the Maya.

Gareth Lowe (1977) agrees that Olmec ceramic traits were carried into Yucatan, however, he also believes there was an additional migration into the lowlands from the Guatemala-Salvadoran highlands.

Robert Sharer and James Gifford (1970) point out that if the southern highlands were the region of origin of some early lowland colonists, the intervening areas through the Copan, Poloche, and Mojo valleys . . . would have provided the most direct route for migration to the lowlands.

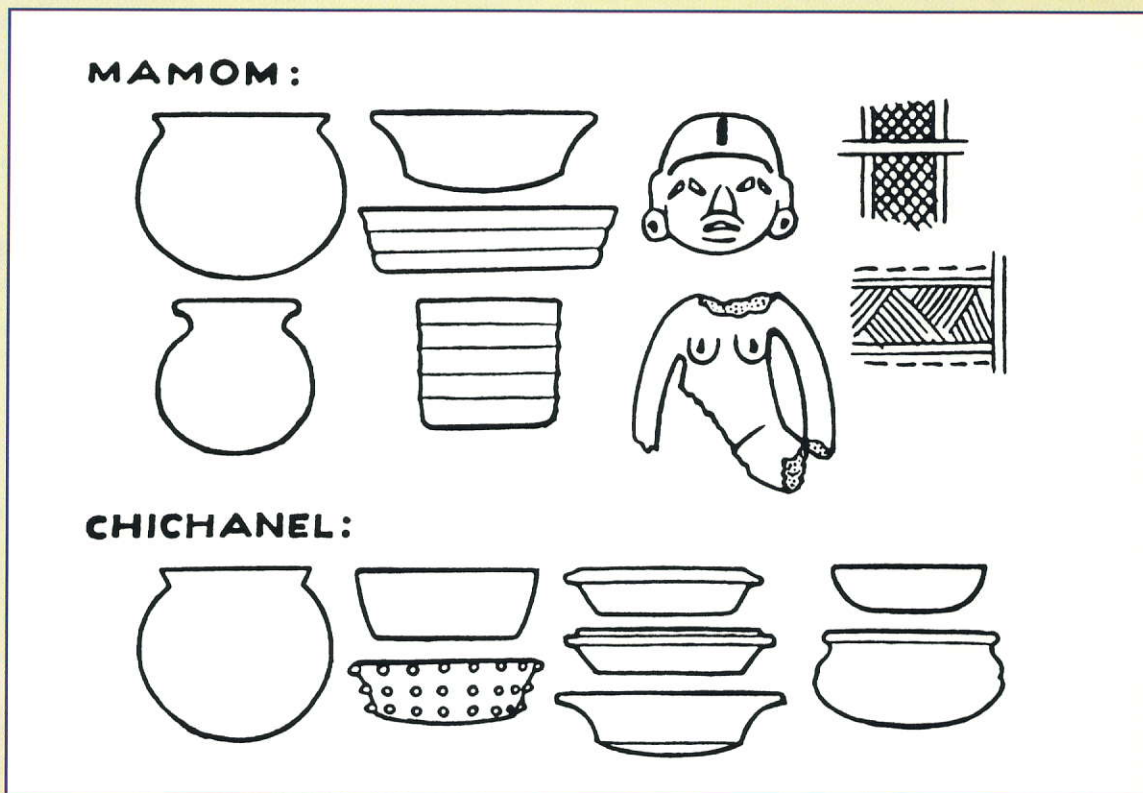
Michael Coe and Kent Flannery (1972) speculate that the first immigrants into the region were pioneers

moving into an essentially vacant area in search of agricultural lands. This movement of people might reflect population pressures already radiating from the Pacific coast and southern highlands.

David Sedat and Robert Sharer (1972) continue the story, “These migrating peoples can reasonably be assumed to have pushed on north until they reached the lowlands of the Peten, for it is only a week or less away by foot travel. There, they may have found other recently established populations, possibly from the lowlands of Tabasco.”

William Coe (1965) has described excavations at Kaminaljuyu where a carved monument with a hieroglyphic text closely resembling lowland Maya forms was found. “These discoveries reinforce suspicions that Classic lowland Maya achievement was highland in origin.”

Richard Adams (1977) concluded, “It would probably



Mamon and Chicanel Pottery

Glenn A. Scott

be safest to hold open the possibility that the earliest ceramics, traditions, and peoples of the Maya lowlands could have come from more than one geographic source and could have entered by more than one route." He adds, "The lack of close relationships between early ceramic complexes in the southern Maya lowlands seems a strong argument for multiple migration into that region from different source areas."

One would expect that emigration from a single source . . . would begin with a pattern of initially close similarities, followed by increasing divergence. However, exactly the opposite occurred. Instead, the pattern was one of convergence that culminated in the monolithic ceramic homogeneity of the Chicanel ceramic sphere. (Willey, Culbert, and Adams 1967)

Evidence indicates that around 600 B.C. a people (called Mamom by the anthropologists) moved up the rivers into the Peten lowlands and a population explosion followed. Michael Coe (1987) writes, "Excavations at the great Maya centers of Uaxactun and Tikal have shown that Mamom is the dominant culture of this time and have thus far failed to turn up anything substantially earlier."

Mamom was a simple village culture. Except for one small structure at Altun Ha, Belize, no known Mamom public architecture has been found. However, because it was the custom of the Maya to build new structures over older ones, there could be others buried under some later Maya centers. At Tikal, a collection of Mamom pottery was found sealed in a chultun (a bottle shaped storage cavity carved into the limestone bedrock).

Proponents of a southern origin of the Maya, present evidence that around 600 B.C. another regional culture arose on the Pacific coast of Guatemala or El Salvador. This culture (called *Chicanel* by anthropologists) flourished in the southern highlands until about 250-200 B.C. About that time, population pressures or warfare with nearby tribes caused the Chicanel to migrate north into the Peten lowlands. It is not clear to anthropologists how, but it is clear that

Chicanel culture did become dominant. Regional pottery style soon converged into the monolithic Chicanel ceramic sphere.

Concurrent with Chicanel dominance the manufacture of Mamom religious figurines ceased, which William Coe (1987) stated, "can only be seen as an abrupt change in religious practice."

It should be obvious to Book of Mormon readers that the above evidence carefully researched by archaeologists, closely matches the events recorded in The Book of Mormon: Mamom (Mulekites) enter the lowlands (Alma 13:74 RLDS; Alma 22:30-31 LDS) soon after 600 B.C.; Chicanel (Nephites) leave the southern highlands and merge with the Mamom (Mulekites) about 250-200 B.C. (Omni 1:20-24 RLDS; Omni 1:12-14 LDS); pagan practices of the Mulekites end under Mosaic law (Omni 1:25-31 RLDS; Omni 1:14-17 LDS).

Contrary to opposing views over the origin of Maya civilization, there is really no need to choose between them because the high culture of the Classic Maya resulted from a Preclassic fusion and blending of two separate cultures that entered the Peten lowlands from both the Gulf Coast to the north and the Pacific highlands to the south.

Recent research by archaeologist David Sedat, who presents evidence that even the writing system of the Classic Maya was probably developed from a similar fusion and blending of two separate, earlier graphic communication systems.

Sedat (1992) writes, "The origins of the hieroglyphic writing tradition that is so characteristic of Classic Maya civilization has long been a fascinating issue, but . . . the actual process through which Maya writing developed has remained an enigma.

It has been believed that this hieroglyphic system . . . crystallized out of earlier Mesoamerican pictographic traditions around the second century B.C., but that approach led nowhere because the trail of earlier forms ends around 400-300 B.C., and the system is too mature and widespread to be

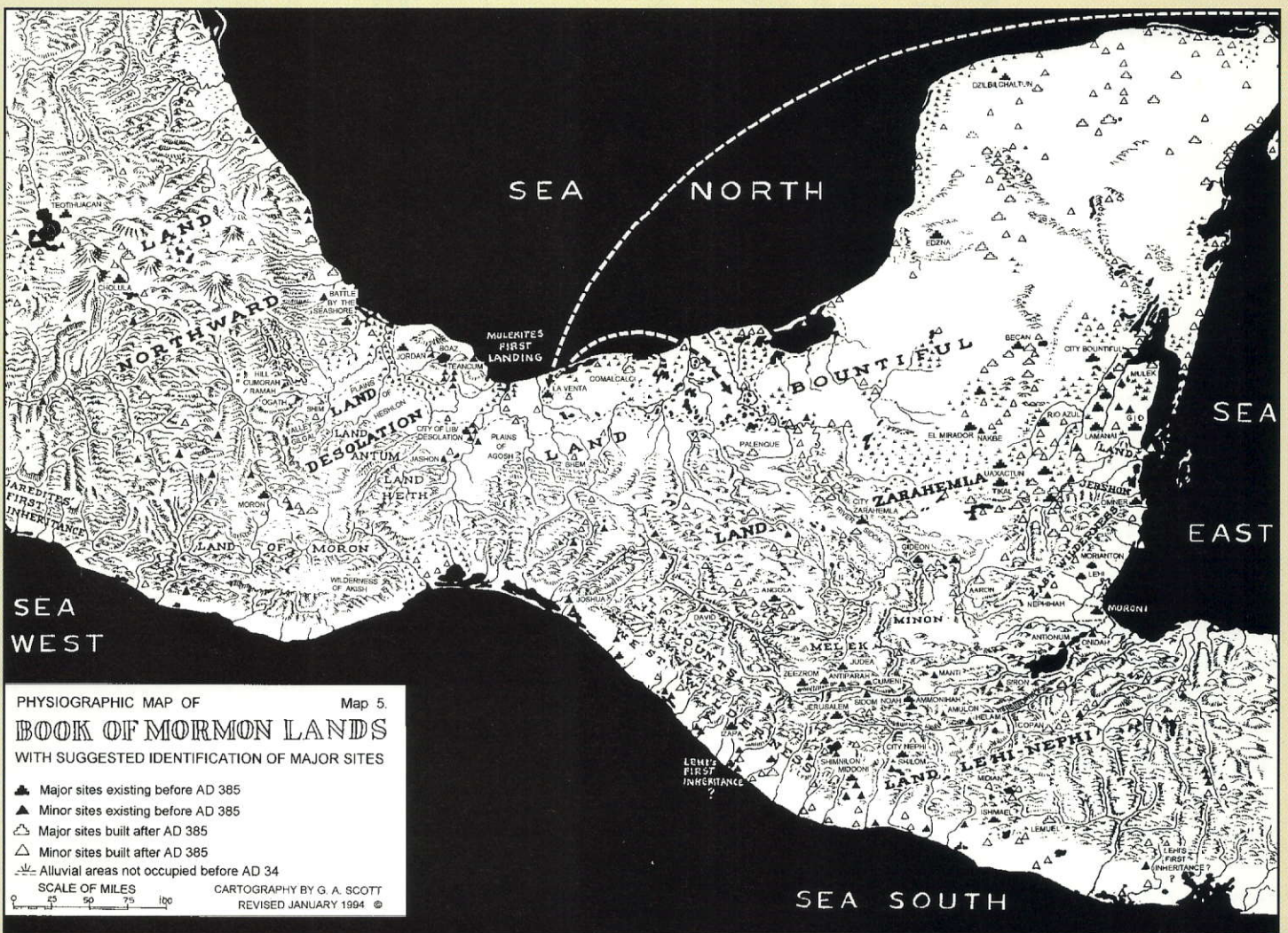
near its beginning.”

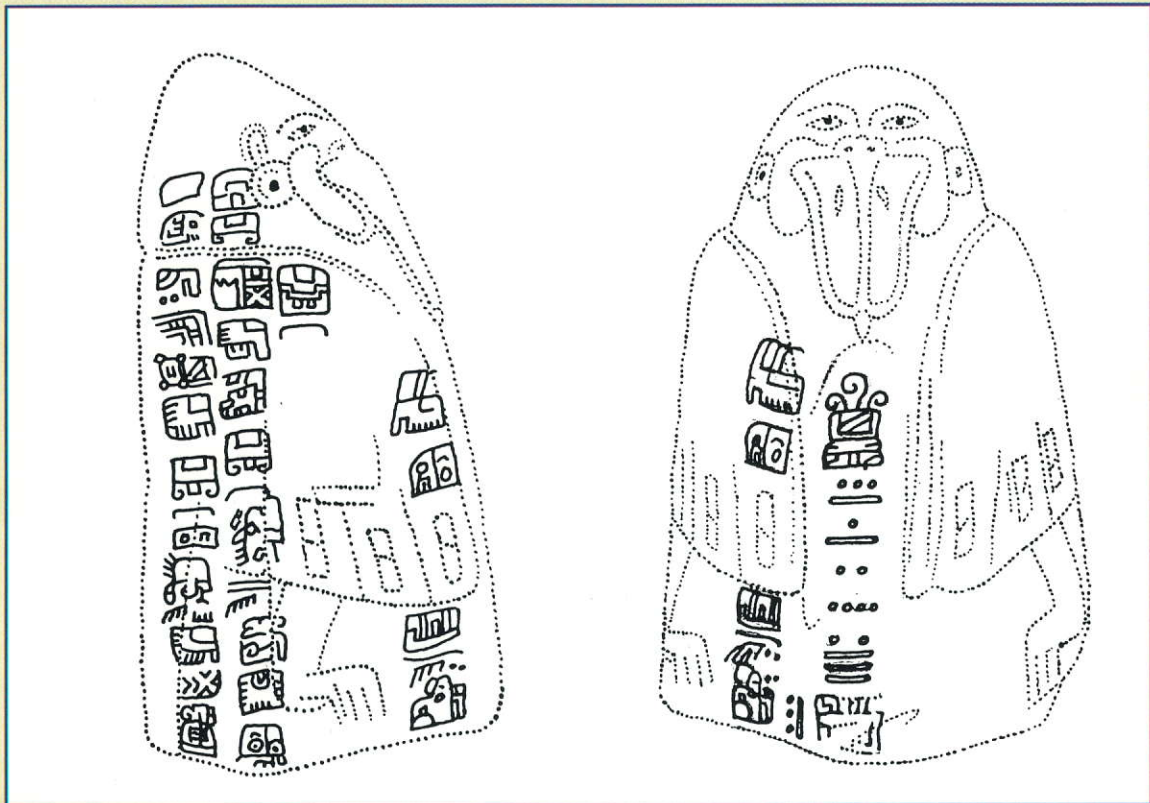
The Classic Maya script is thought to have originated outside of the Peten lowlands, probably in the southern highlands. While the Olmec have often been claimed as the inventors of Mesoamerican writing, Michael Coe (1976) points out that they seem to have passed along very few recognizable symbols to the Maya.

Sedat says that until recently we have failed to recognize that the Maya writing system is a mixture of logograms and phonetic elements (much like Egyptian hieroglyphics). He agrees with John Justeson

(1986) who postulated that writing develops, not within a single graphic pattern, but rather by the combined use of more than one such pattern in a single context. For example, our own writing system incorporates its numerals from the Arabic and its alphabetical signs from the Phoenician.

Sedat’s evidence comes from a number of stone monuments found in the Salama Valley in the northern highlands of Guatemala. He notes that this valley is on the most direct land route between the Pacific highlands (where much Preclassic development occurred), and the Peten lowlands where Maya





The Tuxtla Statuette

Glenn A. Scott

culture flourished.

Sedat and Robert Sharer (1987) determined that the erecting and carving of stone monuments (stelae) had begun by at least the end of the Middle Formative period (500-400 B.C.). Sharer had previously (1985) discovered that monuments of that period shared two very different sculptural patterns.

The first of those patterns was a pecked and grooved technique. Examples included two small stelae that have been reused as lintels in a later tomb at Los Mangeles in the Salama Valley. These have been designated as Monuments 13 and 14. They feature a series of dots (or cupules) and grooved symbols in a vertical sequence. Another large stone, designated Monument 21, found at Piedras de Sacrificios in the Salama Valley, features groups of pecked dots

(cupules) in pairs and triads, plus cross shaped and T shaped grooved elements in horizontal hands. Such intentional spacing was clearly intended to promote comprehension as an abbreviated code used to convey information.

These and several other monuments in the Salama Valley that display similar markings imply a tradition containing all the criteria of a partial writing or notational system which Sedat calls the "Cupulate Tradition."

Elsewhere throughout Mesoamerica similar pecked and grooved markings on boulders have been noted, but usually have attracted only a passing mention. Where they have been studied they have frequently been assigned to an early period in the local culture history (Gay 1971, 1973; Murray 1985).

A more familiar form of stele with vertical columns of glyphs, designated Monument 1, discovered at El Porton in the same Salama Valley, was clearly associated with a radiocarbon date of 410-370 B.C.

Sedat also believes it highly significant that the famous Tuxtla Statuette, found in Chiapas, is engraved in two different styles of symbols. One set (on the front center) shows an early long count date, and except for introductory and terminating glyphs, is shown in simple pitted dots (cupules) and grooved lines without any of the associated glyphs which are so customary in the later Maya tradition. This column of pitted dot and grooved lines is stylistically different from the other (as yet undeciphered) glyphs seen elsewhere on the statuette.

This evident difference between the numerical system and the columns of glyphs suggests to Sedat a period of transition evidenced by two notational systems on a single artifact. Thus, he postulates that the complex Maya hieroglyphic writing tradition probably derived from a fusion of two different notational systems sometime in the Preclassic period.

As additional support for his evidence of a cupulate notation system, Sedat calls attention to the use of dots, linear crosses, and other grooved symbols on cylinder seals identified with a late Middle Preclassic context, excavated at many sites throughout Mesoamerica, including the Salama Valley.

As to how and when such a transition may have occurred, Sedat proposes that as the site of El Porton emerged as a major Preclassic center in the strategic Salama Valley, economic, social, and ideological rankings of centers, and the prestige of ruling lineages, together with linguistic differences, would have influenced preference in writing systems, resulting in some elements being abandoned and others elaborated.

So, the glyphic tradition from the southern highlands attained superior status and eventually superseded the cupulate notation system used earlier in the Valley. However, some of the useful attributes of that

system, such as the bar-and-dot numerical system, and certain other cupulate elements, were incorporated into the glyphic system as symbolic or phonetic modifiers. Thus, the Salama Valley may typify the nexus from which the Classic Maya, basically hieroglyphic, writing system evolved.

Glenn Scott has made numerous trips to Mesoamerica. He is the author of Voices From the Dust published in 1996.

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Where Are They Now?

by Bonnie Anderson



Jeff Anger

A dream of Thelona Stevens materialized in the summer of 1992, almost two-and-a-half years after her death, in the form of the FRAA Internship Program. That summer eight young people began a six-week journey of learning, service, witnessing, and fellowship. Six years and 65 interns later, we look forward to the seventh summer internship and ten more interns. Through the years the interns have had opportunities to grow in their understanding and testimony of Jesus Christ through The Book of Mormon. For six weeks each summer, interns attend classes, provide service to the community, take trips to historic restoration sites, and share their testimonies and talents at Book of Mormon Days and with the youth at camps. This summer they will also help at a youth camp on the Blackfoot Nation reserve near Calgary, Canada, at the invitation of the Indian Ministries Council of America (IMCA).

What happens when the period of six weeks is over? Where are the interns now, and what are they doing? This new feature in *The Witness* will introduce you to former interns who have gone on to serve the Lord in many different ways. Former interns have met twice this past spring to organize and possibly provide ministry as a group. They have chosen the name, Former Interns Restoration Ministry (FIRM). If you are a former intern, would like to be involved, and have not yet been contacted, please call or write Linda Guin at FRAA.

This month we want to introduce you to Jeff Anger, one of the interns in 1992 who returned for a second year in 1993. The Lord had always been important to Jeff, but the internship opened up the bigger picture of service to him. "I found that there were many ways to minister for the Lord outside of my branch." Jeff, who

holds the office of teacher and is a member of the South Chrysler Restoration Branch, has responded

to that insight. In August, 1993, he went to New Jersey for the Youth Missionary Corps. He spent about ten months witnessing of Jesus Christ along the East Coast. According to Jeff, the internship "gave me the mindset for the Youth Missionary Corps."

In the intervening years, Jeff has spent a great deal of time at junior/senior high and older youth camps; has organized older youth retreats, a young men's retreat, and summer Wednesday night older youth gatherings. He serves on both the Youth Missionary Corps and the FRAA boards. He also was the Liahona chaplain while attending college at the University of Missouri at Columbia. He graduated in May and will be teaching sixth grade this fall. This summer he is continuing his education in school administration for a position sometime in the future.

Jeff says he has tried to keep his priorities focused on the Lord. Since "Christ gave life to us, we should give our life back to him in service." His advice to those young people who may consider applying for the internship: "Don't do it because your friends are applying. This has to be something you are committed to. This is the time of your life to dedicate to the Lord—not next year or the year after that, and definitely don't think you will become more dedicated once you get married, or have children. This is the time to take the opportunities of service. Use the internship as a way to consecrate your life now."

The FRAA Internship Program has provided spiritual growth opportunities to young people for nearly seven years. We invite both churches and individuals to help us in continuing this ministry. It takes \$1500 per intern for the six-week program. Expenses include a small weekly salary, travel expenses, supplies and equipment. This summer we have the money for only ten interns compared to sixteen last summer. If a congregation, branch, or individual would be willing to sponsor part of one internship, or one or more full internships, please write Linda Guin, FRAA, 210 W. White Oak, Independence, MO 64050, or call her at 816-461-3722 for more details.

Lehi and El Niño

A Method of Migration

by David L. Clark

The acceptance of ad hoc ideas on Book of Mormon geography has been a continuing problem in Church history, and for a very good reason. Specifics are generally lacking, and attempts to quantify missing geographic data are frequently met with considerable skepticism. Some Church members find it equally difficult to accept the suggestion that naturally occurring events played a role in anything that is more easily explained by supernatural activity. Fully cognizant that addressing either subject is analogous to welcoming the African killer bees across the southern borders of our country, I offer a new idea on Lehi's transoceanic voyage, an idea that is firmly rooted in recent atmospheric and oceanographic observations.

After traveling for eight years, Lehi's party arrived at what many LDS scholars have assumed was the tip of the Arabian Peninsula, and there the group "beheld the sea" (1 Nephi 17:5 LDS; 1 Nephi 5:62-64 RLDS). "And . . . the voice of the Lord came unto [Nephi], saying: Arise, and get thee into the mountain" [1 Nephi 17:7 LDS; 1 Nephi 5:68,69 RLDS). The land travel was completed, and it was time for the serious business of securing material to construct a ship: "And we did work timbers of curious workmanship . . . after the manner which the Lord had shown unto [Nephi]; wherefore, it was not after the manner of men" (1 Nephi 18: 1-2 LDS;

1 Nephi 5:168-171 RLDS). Details concerning the construction are not known, but eventually a ship was constructed, the party "prepared . . . much fruits and meat . . . and honey in abundance," the ship was loaded, and the Lehi group "put forth into the sea and were driven forth before the wind towards the promised land" (1 Nephi 18:6,8 LDS; 1 Nephi 5:176-181 RLDS).

If we assume, as have many Latter-day Saint scholars, that the launching site was somewhere on the Indian Ocean,¹ one of the most serious questions that need answering is simply how this curious ship was able to travel across the Indian and the Pacific Oceans in a direction that is directly opposed by the wind patterns and surface currents of those oceans. The fact is that the tip of the Arabian Peninsula furnished great access to the Indian Ocean twenty-five hundred years ago (as it does today), but it was an unlikely place to begin a voyage that would move eastward through the Indian Ocean, around or through Indonesia, and then across the Pacific Ocean to the Western Hemisphere.² During much of the year the predominant currents of the Indian Ocean would carry a ship southward, toward Africa, and the predominant North Equatorial and South Equatorial Currents of the Pacific move in a direction and surface ocean circulation patterns, how did Lehi cross the Indian Ocean and then the Pacific Ocean?

The Indian Ocean crossing can be more easily explained. For thousands of years, mariners have exploited the seasonal monsoon circulation in the western Indian Ocean for trade between India and the east coast of Africa.³ Simply put, monsoonal circulation is produced by differential cooling and heating of the Indian Ocean and adjacent Asian and Indian land masses during different parts of the seasonal cycle. Thus, the cooling of southeast Asia and India during the winter season produces a land mass that is colder than the adjacent ocean. As the warmer atmosphere over the ocean rises, it pulls the cooler air from the continent oceanward. Winds produced by this activity drive the surface ocean currents from the north to the south (fig. 1).

and northeast-moving currents and during February for the south and southwest moving currents.⁴ Sailing from India to Africa (northeast to southwest) is improved during the winter season, while a trip to the north or northeast is most easily accomplished during the summer.

Crossing the Indian Ocean from the west to the east is not difficult if a ship is launched in August at the peak of the monsoonal cycle. Perhaps this is when Lehi did sail, just as other mariners had done and would continue to do for thousands of years if they wished to travel eastward. Clearly, monsoonal oceanic circulation could have aided Lehi at the beginning of his migration to the promised land.

The real problem came after sailing across the Indian Ocean into Indonesia. No such monsoonal circulation is available for travel through the East Indies or for crossing the Pacific Ocean; in fact, the major wind and ocean surface currents move in the direction opposite to that traveled by Lehi. What was the method of migration after reaching Indonesia?

If Nephi's brothers had been able to look at a surface current map of the Pacific Ocean (not to be available until at least two thousand years later), they would have raised an even larger objection to the whole idea of sailing to a new home than the protest recorded in the Book of Mormon (1 Nephi 17:17,18 LDS; 1 Nephi 5:85-89 RLDS). The dominant currents in the general area of the Pacific where Lehi probably sailed—twenty degrees north and south of the equator—are the North and South Equatorial Currents⁵ (fig. 1). Both these equatorial currents have strong movement from east to west, the opposite of that needed by Lehi.

One possible explanation for the ability to sail eastward across the Pacific Ocean in the area of westward-moving currents involves the existence of a small current that moves just a degree or so either side of the equator in an eastward direction and between the major westward currents. This is the Equatorial Counter Current⁶ (fig.1). The problem for Lehi (or Micronesian sailors for thousands

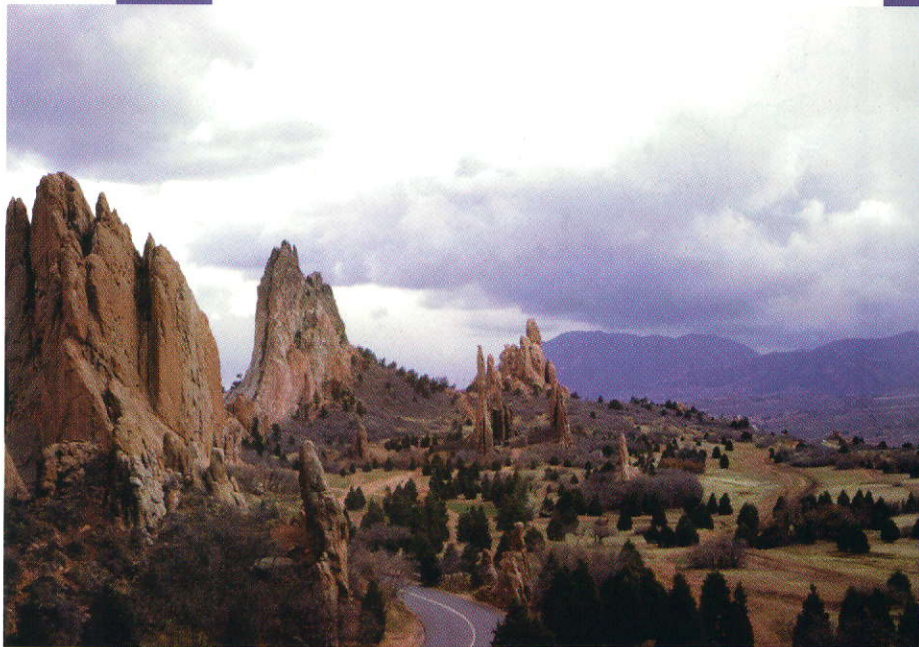
During the summer season, the process reverses. The land is warmer than the ocean, and as the warm air rises over the continent, vertical circulation is produced that pulls the cooler ocean air in over the warmer land. The result is monsoonal rain on land as well as surface ocean currents that move from the south or southwest to the north or northeast, a general ocean-to-land direction that is opposite to that of the winter season (fig. 2). The result of a year of such seasonal changes is summer surface currents that move from south to north and winter surface currents that move from north to south. The surface winds and resulting surface currents peak during August for the north

of years) is that because the small area of the Equatorial Counter Current is dominated by light and irregular winds, this area (the Doldrums) is very undependable for sailing. There is evidence that Micronesian sailors relying on winds and surface currents may have used the Doldrums, at least in part, for the eastward-directed exploration of Fiji and Samoa five hundred years before Lehi sailed.⁷ But Lehi's ship was "not after the manner of men" (1 Nephi 18:2 LDS, 1 Nephi 5:170,171 RLDS), and in the absence of any data, the meaning of this comment is difficult to guess. Perhaps it means their ship had no sail or rudder or was based on an unknown design. Possibly eastward travel relied for a large part on surface currents alone. We know too few details about Lehi's circumstances to view the Doldrums area and its principal transporting current as more than a very remote possibility for carrying the ship across 12,000 km or so of hostile Pacific Ocean. But there is a more reasonable means of travel from the east to the Western Hemisphere.

Since the beginning of the twentieth century, men have known that every three to four years, "normal" atmospheric and oceanic circulation in the tropical Pacific is altered, producing the so-called ENSO effect.⁸ Oceanic changes during these intervals are referred to as *El Niño* (the EN part of ENSO), meaning "the [Christ] child" in Spanish, because effects are commonly noted around Christmas time in the eastern South Pacific. Together with related atmospheric effects, called the *Southern Oscillation* (the SO), the ENSO climate cycle produces profound physical, biological, and even socioeconomic effects across the tropical Pacific from Indonesia (where we left Lehi) to South and North America. In order to understand the ENSO effect, we must consider the atmospheric and oceanic conditions of the Pacific Ocean.

During what have traditionally been considered times of "normal" atmospheric circulation, southeast trade winds converge on low-pressure areas that dominate in the Indo-Australian region (fig.1). As this moisture-laden air rises in the low

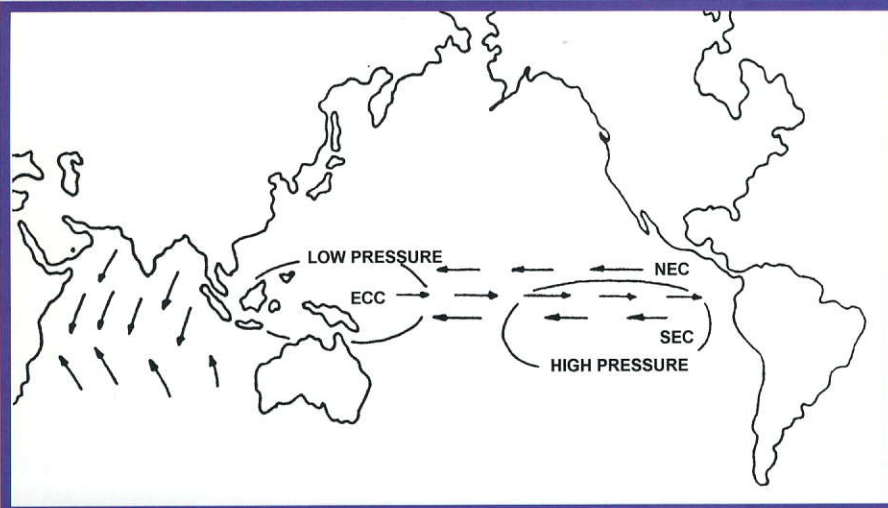
pressure areas, it is cooled, and high precipitation is produced over parts of this region. The air, now depleted of much of its moisture, continues to cir-



culate across the Pacific and descends within a southeastern Pacific area of high pressure which is generally located close to the Pacific area of high pressure which is generally located close to the west coast of South America. The descent of this very dry air causes excessive evaporation. Coupled with a cooling of the ocean-atmosphere boundary layer by widespread upwelling water, this evaporation produces some of the most arid conditions on earth along the coasts of Peru and Ecuador. This pattern is the normal condition.⁹

Periodically, at intervals ranging from two to ten years, this normal pattern undergoes an oscillation called the Southern Oscillation. The normal low-pressure cells of the Indo-Australian region migrate east and replace the high-pressure cells that normally are in place off the west coast of South America. The result is a broad, low-pressure cell that occupies much of the tropical Pacific from the Indian Ocean to the west coast of South America¹⁰ (fig.2).

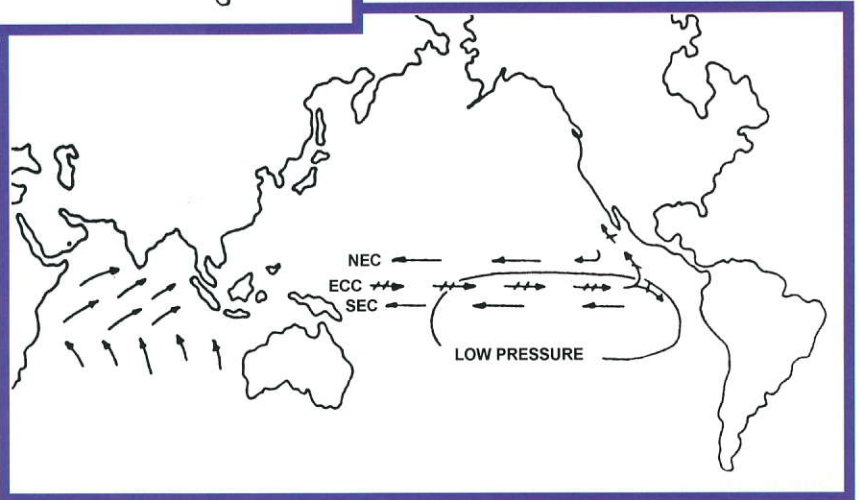
The effect of this atmospheric oscillation on the ocean is profound. Warmer water from the Indo-Australian region begins drifting to the east, spreading throughout the area of atmospheric low pressure, and, most important for Lehi, the movement of the normally weak current in the



Left: Fig. 1. Winter ocean currents in the Indian Ocean and normal ocean currents and atmospheric pressures in the Pacific Ocean. The ECC (the narrow Equatorial Counter Current) is the only Pacific current moving east. The other two, the NEC (North Equatorial Current) and SEC (South Equatorial current) move west.

Below: Fig. 2. Summer ocean currents in the Indian Ocean and ENSO ocean currents and atmospheric pressures in the Pacific Ocean. The Equatorial Counter Current is intensified during and ENSO period.

Doldrums belt increases significantly—El Niño is in action (fig. 2). For a period of twelve to eighteen months, the area of the Equatorial Counter Current is expanded north and south of the equator, this eastward-flowing current is strengthened (fig. 2, arrows that are crossed), and together El Niño and the Southern Oscillation—the ENSO effect—produce important changes in the entire tropical Pacific.¹¹



The causes of such a cyclic change in ocean temperature and water circulation are unknown, although the atmospheric and oceanic conditions involved can be modeled and the occurrence of El Niños can be predicted.¹² Recently, however, one explanation for abnormal western Pacific Ocean heating has been proposed. Sophisticated sonar surveys (made during the GLORIA and Sea Marc projects) have mapped large ocean-floor lava flows in this area of the Pacific that exceed 10 km³. These submarine lava flows are capable of transferring significant amounts of heat from the earth's crust to the surface water.¹³ The geologic evidence also supports the idea that this heat transfer occurs semiregularly.¹⁴ Although this activity is not definitely known to be the sole cause of ENSO events, it could be a significant factor. The use of satellite observations coupled with new theories may soon lead to a fuller understanding of the cause.¹⁵

The climatic effects of the change in the distribution of warmer water and atmospheric lows in the tropical Pacific during ENSO events disrupt

weather patterns in a broad area. Rainfall, normally heavy in the Indo-Australian region, is reduced and droughts occur instead. In contrast, the normally arid coasts of western South America become areas of heavy precipitation. Oceanic upwelling, the upward rise of cold, nutrient-rich bottom water along the Peruvian and Ecuadorian coasts, is reduced because of the change in the normal circulation pattern and the infusion of warmer water carried by the Equatorial Counter Current from the west. This intensified eastward-flowing current literally piles water up along the west coast of South America, and the resulting rise in sea level helps push the warmer water poleward, both north and south along the American coasts (fig. 2). Circulation patterns as far north as California are affected. Surface water temperatures in this part of the eastern Pacific may increase several degrees during different intervals of the ENSO cycle. The results of such change may affect weather patterns in much of North America.¹⁶

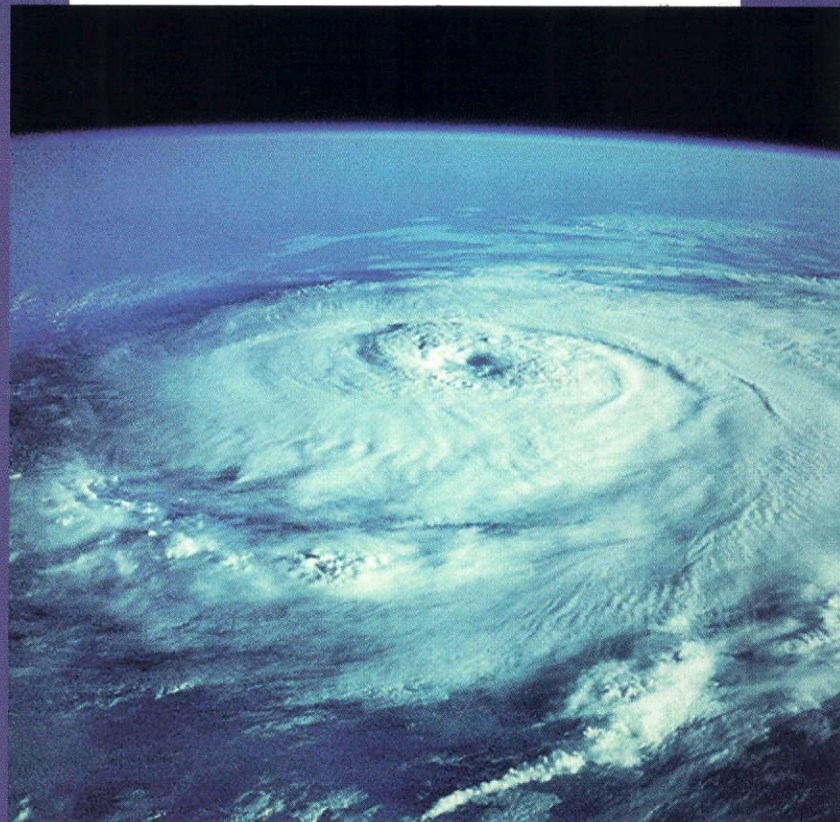
On land, the effect of a strong ENSO is drought with resulting crop loss in Australia and catastrophic rains with resulting flooding, landslides, and agricultural losses in South America. Oceanic effects are equally profound. Reduced oceanic upwelling along the west coast of South America adversely affects the fishing industry of both Peru and Ecuador. The normally abundant anchovies are driven away by the warm, nutrient-poor water that replaces the normally cool, nutrient-rich upwelled water, forcing the larger fish that normally feed on the anchovies to leave or starve. A domino effect of sorts continues as a large bird population that depends on the fish for food is affected; during the 1982-83 ENSO, the bird population decreased by some seventeen million birds. The accumulation of guano, the waste-product produced by the normally large bird populations, decreases as the number of birds decreases. As a result, the economy of Peru, which is heavily dependent on both fish and guano (retrieved for fertilizer and other nitrate needs), is thrown into turmoil. Overall, the 1982-83 ENSO resulted in millions of dollars in damages and extensive loss of life.¹⁷ The ENSO events and the resulting economic hardships normally end a year or so after they begin, due either to cooling of the crustal-generated heat of the equatorial Pacific or to atmospheric oscillations in the tropical Pacific—circumstances that can be simulated on a computer but are driven by factors that are poorly understood.

Some 64 years of Pacific wind data have now been analyzed to document historic ENSO events.¹⁸ So far there are no reasons to doubt that ENSO events have been occurring in the tropical Pacific for at least five to six thousand years, or as long as the earth's climate has been similar to what it is today. And the pattern continues. A moderate ENSO event began in 1986, and the last effects of the most recent El Niño were measured in March 1988.¹⁹ Thus while we do not know about the economic impact of an ENSO event occurring some twenty-five hundred years ago, such an event may have provided an enhanced method of migration for Lehi.

If Lehi had sailed from the Arabian Peninsula during the August monsoon of an ENSO year, by

the time his ship had been driven into the Indonesian area, El Niño would have intensified the eastward current, thereby enhancing the possibility of the voyage across the Pacific to the Western Hemisphere. The great increase in the strength of the eastward flow of abnormally warm water from the western and central Pacific could have helped the Lehi vessel to cross the Pacific and then travel up the coast of central America.

Monsoon circulation in the Indian Ocean off the tip of the Arabian Peninsula and the development of a strong trans-Pacific, eastward-flowing current during an ENSO event are real physical phenomena. There is evidence that these oceanic-atmospheric phenomena have been continuous at least since climatic "normality" was attained after the melting of the great continental glaciers eight thousand years ago, suggesting that ENSO events were taking place in Lehi's day. What is less certain is whether the Lehi party used



these atmospheric-oceanic events as an aid to migration. Perhaps the real question is whether the Lord uses natural events to accomplish his purposes. I am the first to acknowledge that the

ideas presented here may be pure fiction if the Lord neither wants nor needs to make use of natural law. However, he commonly seems to work with what is available. For example, he uses less-than-perfect people to do much of his work. Miracles may aid, but apparently the day-to-day routines of perfecting the Saints and accomplishing the other appointed tasks rely on the use of normal people and naturally occurring situations and events. The scientific evidence, not available even ten years ago, suggest that El Niño could provide a plausible mode of migration, a naturally occurring event that could have been used to accomplish the Lord's purposes.

If the migration scenario enhanced by atmospheric and oceanographic effects is valid, we can even go a step further in interpretive speculation concerning the Lehi voyage. Lehi probably sailed from the Arabian Peninsula during August of an ENSO year, the time not only of the optimum northeast monsoon circulation but also of the growing season when "fruits and meat and honey in abundance" could be gathered and loaded on board. Lehi would then have had a reasonable expectation of arriving in the Indonesian area in time to catch an ENSO-intensified Equatorial Counter Current. The El Niño-driven current could have delivered Lehi's group to the west coast of Central America in a much more probable manner than could have been employed during a non-ENSO year. In fact, if an El Niño of about twenty-five hundred years ago was not used for migration, Lehi missed a marvelous opportunity.

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He caused an east wind to blow in the heaven; and by his power he brought in the south wind.

Psalm 78:26

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FRED WEDDLE 1916-1998

Remembrances

Frederick Orion Weddle was born at Fargo, North Dakota, July 31, 1916, the seventh child of twelve born to Della and Elmer Weddle. He died on April 17, 1998.

At age seven Fred contracted tuberculosis of the bone and was placed in a body cast. His parents did not tell Fred that the doctors said he would never walk again. Instead, a loving mother with a great deal of faith in God, cut holes in the cast so she could massage the flesh to keep it healthy, although she suffered pain caused by the rough plaster. When the cast was removed after a year, he had to learn to walk again—*walk he did!* In fact, in high school he earned four letters in track, he played tennis until age 75, and served as a military pilot for 21 years with no physical examination ever revealing a flaw.

In 1944 Fred married his Graceland sweetheart, Donna Silsby. Two sons were born: Ronald Milton in



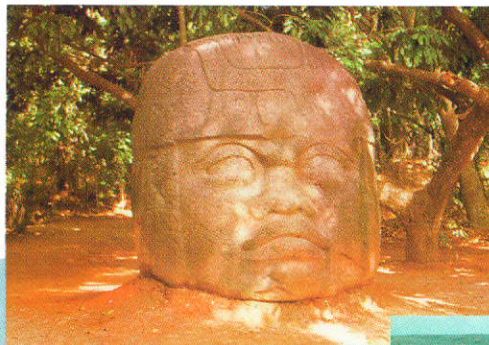
1945 and Dale Frederick in 1947.

Fred was always involved in hobbies. He became a serious amateur photographer whose work was truly professional. He was active in the Foundation for Research on Ancient America and one time made a trip to Mexico for several weeks taking archaeological photographs for FRAA.

Everything Fred did was done with enthusiasm. Underlying his whole life was a desire to be a servant of the Lord. He was ordained a priest in South Dakota, and after he returned to Missouri he was ordained an elder. He

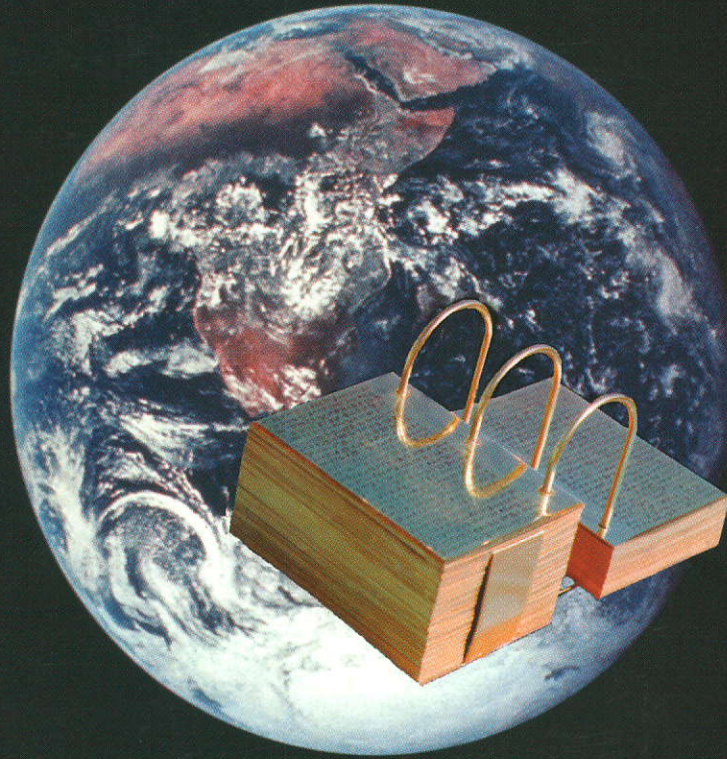
served as music minister at the Stone Church, directing the adult choir and supervising other musicians. He and Donna worked closely together as a team in music and in many other church related endeavors.

Fred's son, Dale, preceded him in death. His wife, Donna, of the home, and son, Ronald, of North Carolina, survive him.



Archaeological photos taken by Fred Weddle

Lehi began it.
Moroni protected it.
God brought it forth.



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