

A Triple Crown for Padre Neumann: The First Reported Earthquake, Comet, and Eclipse in Chihuahua

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ABSTRACT

We describe a portion of the journal kept by Fr. Joseph Neumann, S. J., who served as a missionary in the Northwest of present-day Mexico from 1681 until his death in 1732. In this journal he described the only report of the bright comet of 1695 from North America, and the first report of an earthquake (1696) (and possibly the preceding "earthquake lights") in that part of Mexico. He also mentions a partial solar eclipse (1696), but gives an incorrect date for it. His interest in these natural events was strengthened greatly by his belief that they had presaged the largest (and last) uprising of the Tarahumara Indians in 1697 against Spanish rule.

INTRODUCTION

The years 1695 and 1696 may or may not have been a special time in the Sierra Madre of western Chihuahua, in the northwest of present-day Mexico (Florescano 1976; Lindgren and Neumann 1981; Masse 1997). However, Father Joseph Neumann, S. J., who served as a missionary at the time in that area, mentions in his report of the time he spent there (González Rodríguez 1991) about a number of special natural events that all too often go unreported. Within one eight-month period (October 1695 to May 1696) he mentions--it is not clear that he personally was a witness--a comet, an eclipse, and an earthquake (and possibly the associated precursor II earthquake lights"), that were important to him since they were thought to foretell ominous events (González Rodríguez 1969, 1991).

Such early reports of natural phenomena, often by those who may be untrained scientifically but are nonetheless keen observers, can be of particular use in scientific studies because they extend the time base over which such phenomena can be studied, as well as giving more information on some infrequent events. They also tell us about the reactions to them at different times and places, and how the understanding of such phenomena has evolved. In what follows, we explore Fr. Neumann's own account, and then seek corroboration from other relevant sources.

THE TIMES OF FATHER JOSEPH NEUMANN

Neumann was born of a German father and probably a Belgian mother in Brussels on August 5, 1648. At that time his father worked for the Archduke Leopold Wilhelm of Austria and in 1656 when the Archduke returned to Vienna, the Neumann family went with him, before moving on to Moravia in 1661 [end p. 121] or 1662. In spite of these moves, the young Joseph received a classical education that stressed Greek and Latin. On September 24, 1663, he was accepted by the Jesuits and spent the subsequent 15 years studying and teaching before leaving Prague for the New World (González Rodríguez 1991).

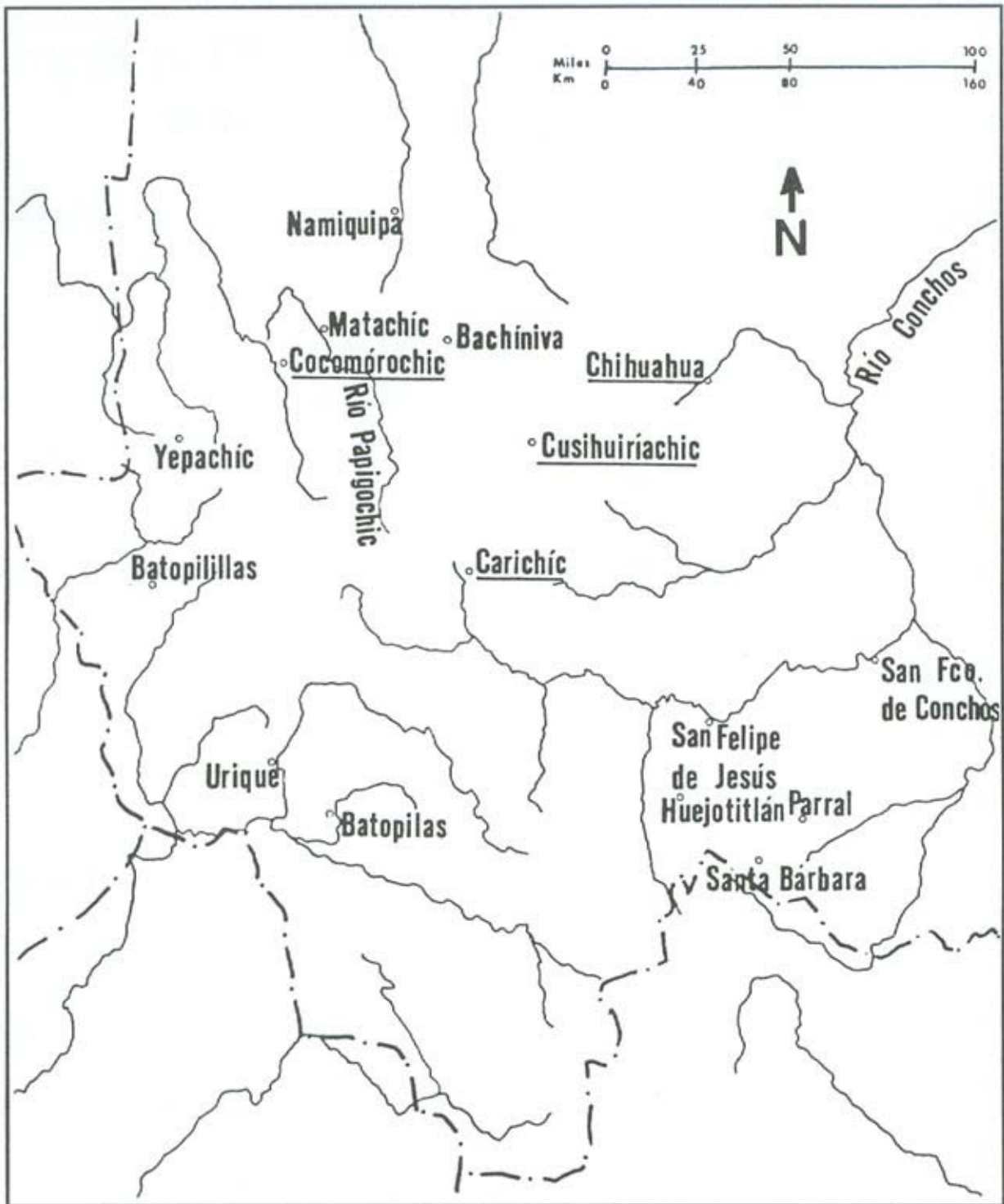


Figure 1. The Tarahumara Region, ca. 1600. Source: After Sheridan and Naylor (1979).

Fr. Neumann and his fellow Jesuits arrived in Cadiz just after the departure of the fleet to face a wait of almost two years. They boarded the designated ship on July 11, 1680, only to be shipwrecked within site of the port. They were rescued and subsequently placed on another ship that delivered them to Veracruz two months later. From Veracruz this party of Jesuits went to Puebla, where they rested before going on to Mexico City and their

final destinations. Fr. Neumann and Johann María Ratkay, a Croat of noble birth, continued north and by February of 1681 they had reached the mission of San Ignacio Coyachi in the Sierra Tarahumara. In March Neumann reached Sisoguichi, where he stayed for seventeen years before moving to Carichi in 1698. Fr. Neumann held a number of different posts and walked from one end of the Sierra Tarahumara to the other (see Figure 1). He lived in Carichi until his death on May 1, 1732 (González Rodríguez 1991). He is buried behind the altar of the parish church.

As a missionary, Fr. Neumann was part of the Spanish colonial enterprise and actively wanted to introduce new ideas and stamp out ideas and activities that he considered inappropriate. His goal was to modify the autochthonous culture to fit his ideas. In the Sierra Tarahumara, the colonial authorities used the missionaries as their principal agents of penetration, but in spite of the colonial authorities' desire to [end p. 122] incorporate the Tarahumara into their sphere of influence and the Jesuits' commitment to convert them to Christianity, the Tarahumara resisted this cultural assault as best they could.

With the discovery of silver in Coyachic and Cusihiuriachic in the 1680s, the situation went from bad to worse and many Tarahumaras "were pressed into service as miners, construction workers, burden bearers, and wood cutters" while the Spaniards expropriated their lands. They undertook campaigns of civil disobedience and, when they saw no alternative, they retreated further into the mountains and took up arms to chastise and chase out the agents of their oppression. The resultant malaise reached its peak and " .. in 1690 the Tarahumara revolted ... across a broad front...The 1697 revolt, while the largest of the Tarahumara uprisings, was also the last" (Sheridan and Naylor 1979: 39-40).

In 1724, Neumann wrote a history of the Tarahumara rebellions using the documentary sources available to him, as well as information gathered by fellow Jesuits and his own experiences. While the rebellions hold the central focus of this work, they provide an excellent literary device to underline the difficulties faced by the Jesuit missionaries at that time (González Rodríguez 1991). However, it is not the missionary work that interests us here, nor the accounts of the Indian rebellions, but rather a portion referring to a series of natural events that were seen as portents of the rebellion that was launched in 1697.

An Extract from Fr. Neumann's History

While leading up to the outbreak of the 1697 rebellion, Fr. Neumann relates the following events, which in the common sense of the time, forebode misfortune (Sheridan and Naylor 1979; González Rodríguez 1991). The original Latin text has been successfully translated into French (González Rodríguez 1969), Spanish (González Rodríguez 1991), and English (Sheridan and Naylor 1979: 4778):

In the meantime the missionaries divined that some dreadful calamity was impending; for in the previous year certain portents of evil had appeared which I think should be noted at this point. In the month of April of 1696 this Province of Alta Tarahumara was shaken by an earthquake, notwithstanding the fact that earthquakes are unusual in this region. At the end of October [of the preceding year, i.e. 1695], just before dawn, a dreadful comet became visible. At first it had no head, but later a head, though very dark, took shape, while the tail streamed toward the west. For about three weeks it shone in the sky, terrifying all beholders, and then vanished from sight. On the first night when the comet appeared, fires were seen on the hills near the church of Papigochi, they darted to and fro, making a ghastly light, and a fiery ball hung in the air, which presently fell to earth with a crash like that of a thunderbolt. During the night between Friday and Holy Saturday the bells of this same church twice sounded a mournful peal, though no man laid a hand on them; the sound was like the tolling heard at a funeral. The river which flows through Papigochi was seen to break into waves. They rose to a great cone, twelve feet in height, then, with a mighty roar, sank back into the channel, and the stream resumed its flow. At the mission of Cocomurachic, in the month of May, 1696, on a clear day and at about three o'clock in the afternoon, the missionary chanced to be at the door of his house. Suddenly, on the hill close by, he saw a giant standing. He was of enormous size, so that the tallest of the trees around him reached only to his breast. His face was

averted and he bent down as if to gather stones. For nearly a quarter of an hour the Father watched him and then he vanished. And this same year in Tarahumara, on April 18, two days before the full moon, in a cloudless sky a part of the sun was observed to be in eclipse, and darkness covered it. All the spectators marveled at the strangeness of the sight. Orally or in writing, the missionaries described these portents to the Father Visitor, and he, too, felt that they presaged some sad and terrible misfortune for the missions. Therefore, he instructed the Fathers to pay close heed to all that the Indians did and to learn as much as possible about their plans. He himself, when the summer rains were over, began his round of visits.

To summarize, before the rebellion of 1697 broke out, Fr. Neumann observed or learned about a number of natural events--in 1695 a comet (and possibly earthquake-precursor lights), and in 1696 an earthquake, an eclipse, and a giant--that he thought were bad omens, or portents of disaster, announcing the imminent arrival of unspecified threats to the missions. The fact that the report was written more than twenty years after the events described in the text, and the inclusion of the giant, clearly can raise questions concerning the validity of the specific details of the report. We now look at each of the reeported events and discuss the corroborative evidence available. [end p. 123]

ONE EARTHQUAKE OR TWO?

As just mentioned, according to Neumann: "During the night between Friday and Holy Saturday the bells of this same church twice sounded a mournnful peal, though no man laid a hand on them; the sound was like the tolling heard at a funeral. The river which flows through Papigochi was seen to break into waves. They rose to a great cone, twelve feet in height, then, with a mighty roar, sank back into the channel, and the stream resumed its flow"-- a classic description of a strong earthquake and its aftershocks. While earthquakes are not common in northern Mexico and the Sierra Madre, they are not unknown. There are historic reports from Saltillo in 1841, and from Sonora in 1887 (Dubois and Smith 1980). The occasional newspaper reports of superficial cracks suggest that Chihuahua is extending (García Gutierrez 1996).

While there is insufficient information to evaluate the intensity of the first mentioned earthquake, the subsequent comments that the church bells rang on their own would suggest an intensity of Level VI or VII, while the erratic behavior of the Papigochi River (presumably during a second tremor that occurred during daylight) would suggest an intensity of Level X or more on the Modified Mercalli Intensity Scale. However, a Level VI earthquake would have been noticed easily by more than just the bells ringing, and a Level X earthquake would be expected to damage demonstrably the missions, if not totally destroy them. While the absence of comments concerning cracked missions, falling images, falling trees or shaking ground in other locations throughout the Sierra Madres may have been an oversight, a more parsimonious solution suggests that they were not reported because they were not observed, that an earthquake did not occur, and that the bells were rung by pranksters and the river flow interrupted by an as yet unidentified local event.

THE COMET OF 1695

The actual wording of the original Latin text, as well as the description of the comet, makes it most likely that Neumann was describing a comet --today known as C/1685 VI Jacob-Bouvet--that was reported by several others at the same time elsewhere in the world over a three-week period in October 1695. The most complete account would seem to be that of Fr. Jacob, a French Jesuit missionary living in Todos-os-Santos, Brazil, who reported seeing it on October 28 (Yeomans 1991; Kronk 1998).

According to Fr. Jacob's description, only the tail was initially visible an hour before sunrise. Two days later Fr. Jacob reported that the head was about 15° from the sun and that the tail covered an arc of 30° to 40° from Virgo to Libra. The same night, Fr. Bouvet, a Jesuit living in Surate, India, reported "a comet without a head one-half hour before the beginning of twilight." It was also observed that night at the Cape of Good Hope, South Africa (Kronk 1998). These descriptions are quite similar to Neumann's: the comet tail was visible in the hours before dawn, while the head (normally the brightest part) was at first hidden by the glare of the rising sun. This comet would not have been easily visible in northern latitudes because of its southerly location in the sky. It

is interesting that the report by Fr. Neumann is the only one we know of from North America.

The church of Papigochi is in the present-day town of Ciudad Guerrero, Chihuahua, located in a bend of the Río Papigochic with an unobstructed view of the hills and mesas a few kilometers distant and about 400 meters higher to the west and south-west. The fires that Neumann reported were most likely the luminous phenomena, often resembling ball lightning, that precede and accompany earthquakes. Their appearance at the time of the comet was almost certainly a coincidence (but one that would be remarked on at that time as significant), and they are much more likely to be associated with the earthquake that occurred six months later (Derr and Persinger 1992; Persinger and Derr 1993). If this association is correct, this is the first report from North America of this phenomenon.

There is a world-wide tendency to use places that acquire the reputation for being 'special' or 'holy' in some sense for worship by successive religions. If it turns out that the church of Papigochi was built on the site of a temple of an earlier pre-Christian religion, it is possible that the site had developed a special character through time because of the tendency for these luminous phenomena to occur there (Derr and Persinger 1989). Neumann is not alone in reporting what was presumably ball lightning in this region. One hundred and fifty years later Adolph Wislizenus (1848) reported a similar phenomenon while crossing the Samalayuca dunes just south of present-day Ciudad Juárez.

PARTIAL SOLAR ECLIPSE

Fr. Neumann describes what would seem to be a partial solar eclipse occurring on April 18, 1695. A full moon had occurred early in the morning of April [end p. 124] 17, 1696 (local time). (Fr. Neumann was in error in saying that the moon was full on April 20 of that year. In fact, there was no full moon on April 20 of any of the years 1695-1698.) The event that he describes thus could not have been an eclipse on that day since a solar eclipse can only occur at new moon, 143/4 days away from full moon.

Occasional prominent sun spots, or groups of spots, are visible to the naked eye. But it is clear that this is not what Neumann was reporting. Such a spot would have been visible for some days, and would have been seen world-wide. The decade of the 1690s was towards the end of the "Maunder Minimum," when virtually no sun spots were observed (Eddy 1976). There was only one spot reported in 1696, in late May, and that was the only one reported that decade (Hoyt 1997).

There were three solar eclipses that decade that would have been clearly seen as partial eclipses in this part of Mexico: August 23, 1691; June 22, 1694; and April 10, 1698 (Mucke and Meeus 1983). Any one of these could have been the one he reported, but we cannot explain his error both in the date and the year. If he is reporting an eclipse, even with a faulty date, it is the first such record from North America of which we have knowledge. Consequently, one is left to surmise that while an eclipse may well have been seen by one or more of the Jesuits in the Sierra Tarahumara during the last decade of the seventeenth century, the sighting did not correspond to the date reported by Neumann.

THE GIANT

We do not know what to make of the clear description of the "giant." One of this paper's anonymous reviewers felt that the account should not be discredited because of this reference. He/she goes on to say that, "Given his time and place and the fact that the present-day Tarahumar, Tepehucln and Mountain Pima refer to stories about *gigantes*, the reference by Neumann to a giant is not unusual. He may have looked at the landscape during a time of haze, and confused *demoiselles* (columns of volcanic tuff topped by volcanic breccia, of which there are many in the central Chihuahua area, as near Norogachic, for example). It is interesting that the Tarahumar sometimes refer to these features as "people."

SUMMARY AND CONCLUSION

An analysis of part of Fr. Joseph Neumann's report of the events that preceded the Tarahumara rebellion of 1697 has shed light on the first earthquake presently known to be reported in Chihuahua. Although the

evidence is contradictory, the report suggests that this earthquake was quite strong (church bells wrung without assistance and the waters of the river Papigochi pirouetted), and may have reached Level VII, if not X or XII on the Modified Mercalli Intensity Scale at its epicenter. However, since such a strong earthquake would have destroyed or damaged a large number of the missions, and there are no reports of wide-scale damage, its nature remains in doubt. The report of the luminous phenomena six months before the earthquake fits a pattern of such events preceding seismic activity, and is the first known report of such a sighting in North America.

Neumann also gave us the only report from North America of the passage of a comet which coincides with observations made by other Jesuits in Brazil and India. The 1695 comet has since been identified as a member of the Kreutz sun-grazing group, with a period in excess of 100,000 years. The report of the eclipse is problematic since neither a solar or a lunar eclipse could have occurred on the date given. It is most likely that Neumann was referring to a partial solar eclipse seen by him and/or his fellow Jesuits in 1691, 1694, or 1698.

To many readers, the mention of a giant in this text would be sufficient to discredit the author. But we must view Fr. Neumann's history as a product of its time, with a mixture of fact and legend. And the scientific tradition fostered by the Jesuits, especially in the area of astronomy (recall that the Vatican Observatory was founded, and is maintained, by Jesuits), suggested that a detailed inspection is warranted. The available literature certainly confirms the report of a comet in 1695, but there are no other reports to substantiate the earthquake. It seems likely that this earthquake was little more than a very local event similar to the superficial movements that are reported throughout the Sierra Madre (García Gutiérrez 1996), just as it is likely that the reported eclipse possibly refers to another eclipse visible that decade in Mexico.

The major problem seems to be the lack of detailed notes and the time that was allowed to elapse between the reported events and the elaboration of the report. As any researcher knows, as time goes by the memory loses precision and detailed notes are required to recall details of what may have seemed to be quite simple events. It may well be that further corroboration of these events could be gleaned from Spanish military or governmental records of the time, particularly those dealing with the Indian rebellions, [end p. 125] or other Jesuit records or correspondence. Also, an extensive investigation of 18th-century Indian vocabularies for Northwest Mexico might provide evidence for earthquakes in the area (we are grateful to the anonymous reviewers for pointing out these possibilities). Unfortunately such investigations are beyond the scope of the present work.

ACKNOWLEDGMENTS

The authors wish to thank John Derr, Carlos García Gutiérrez, Douglas Hoyt, Bruce Mase, Enrique Servín, Luís Urias Hermosillo and Donald Yeomans for their help in preparing this paper. One of us (REB) wishes to thank William Merrill and Edmundo Vallejo for their help in locating and helping him understand the original Latin text. We thank the anonymous reviewers for several helpful suggestions.

REFERENCES Derr, John S. and Michael A. Persinger. 1989. "Geophysical variables and behavior: LIV. Zeitoun (Egypt) apparitions of the Virgin Mary as tectonic strain-induced luminosities," *Perceptual and Motor Skills* 68: 123-128.

Derr, John S. and Michael A. Persinger. 1992. "Luminous phenomena (earthquake lights?) preceding two New Mexico earthquakes," *Seism. Res. Letters*. 63: 22.

Dubois, Susan M., and Ann W. Smith. 1980. "The 1887 Earthquake in San Bernadino Valley, Sonora: Historic accounts and intensity patterns in Arizona," *Special Report, no. 3*, Arizona Bureau of Geology and Mineral Technology, University of Arizona, Tucson AZ.

Eddy, John A. 1976. "The Maunder Minimum," *Science* 192: 1189-1202.

Florescano, Enrique. 1976. *Origen y desarrollo de los problemas agrarios de México: 1500-1821*. Mexico, DF: Ediciones Era.

González Rodríguez, Luis. 1969. Joseph Neumann, S. J. *Revoltes des Indiens Tarahumars (1626 -1724)*. Paris: Institut des Hautes Etudes de l'Amérique Latine.

_____. 1991. *Historia de las Rebeliones de la Sierra -Yarabumara: 1624-1724*. Chihuahua: Colección Centenario, Editorial El Camino.

Kronk, Gary. (1998-in press) *Cometography, Vol. 1: Ancient Times to 1799*. New York: Cambridge University Press.

Lindgren, S., and I. Neumann. 1981. "The cold and wet year 1695: A contemporary German Account," *Climate Change* 3: 173-187.

Masse, W. Bruce. 1997. "Sky as Environment: Solar Eclipses and Hohokam Sociopolitical Cosmography," in *Environmental Change and Human Adaptation in the Ancient Southwest*. Salt Lake City: University of Utah Press.

Mucke, Hermann, and Jean Meeus. 1983. *Canon of solar eclipses--2003 to +2526*, 2nd edn. Wien: Astronomisches Büro.

Persinger, Michael A. and John S. Derr. 1993. "Geophysical variables and behavior: LXXIV. Man-made fluid injections into the crust and reports of luminous phenomena (UFO reports)--is the strain field a seismically propagating hydrological pulse?" *Perceptual and Motor Skills* 77: 1059-1065.

Sheridan, Thomas E., and Thomas Naylor. 1979. *Ranimuri: A Tarahumara Colonial Chronicle, 1607-1791*. Flagstaff AZ: Northlands Press.

Wislizenus, Adolph F. 1848. *Memoir of a Tour of Northern Mexico, connected with Col. Doniphan's expedition: 1846 and 1847*, Washington, DC: 30th Congress, 1st. session, Senate Miscellaneous, Number 26, Tappin and Strepper.

Yeomans, Donald K. 1991. *Comets: A Chronological History of Observation, Science, Myth and Folklore*. New York: John Wiley & Sons.

RESUMEN

Este ensayo describe parte de la Historia de las rebeliones en la Sierra Tarahumara, escrito por el Padre Neumann, S.J., quien vivió como misionero en el noroeste de México desde 1681 hasta su muerte en 1732. En dicho informe, se registra la única mención para América del Norte del cometa de 1695, la primera referencia a un terremoto (1696) (y lo que podría ser el alumbrado asociado) en esta parte de México. También, menciona un eclipse parcial del sol (1696), aunque equivoca en la fecha. En parte, el interés del padre Neumann en estos fenómenos naturales se debe a la creencia que eran portentos de la última y más grande sublevación de los Tarahumaras en 1697. [end p. 126]