The Ancient Astronomy of Easter Island: Aldebaran and the Pleiades

Sergei Rjabchikov

1The Sergei Rjabchikov Foundation - Research Centre for Studies of Ancient Civilisations and Cultures, Krasnodar, Russia, e-mail: srjabchikov@hotmail.com

Abstract

There is a good cause to assert that the Easter Islanders constantly watched Aldebaran and the Pleiades in the past. The Russian scholar Irina K. Fedorova and the American scholar Georgia Lee were the first who contributed significantly to the archaeoastronomical studies of these celestial bodies. I have decoded the Mataveri calendar completely. The ceremonial platform Hekii 2 was oriented on Aldebaran and nearby stars. The disappearance of the Pleiades during the dawn period in the north at the end of August could be an important mark before the arrival of sooty terns and before the elections of the next bird-man. The calculated dates of several solar eclipses have been used for composing the chronology of Easter Island from 1771 till 1867 A.D.

Keywords: archaeoastronomy, writing, folklore, rock art, Rapanui, Rapa Nui, Easter Island, Polynesia

Introduction

The civilisation of Easter Island is famous due to their numerous ceremonial platforms oriented on the sun (Mulloy 1961, 1973, 1975; Liller 1991). One can therefore presume that some folklore sources as well as rongorongo inscriptions retained documents of ancient priest-astronomers.

A Farther Remark about a Rapanui Rock Calendar: A Key to the Mataveri Observatory

On a boulder at Mataveri (a crucial area of bird-man rites) some lines were incised; most of them were the directions of the setting sun according to Liller (1989). I have calculated the corresponding days for the year 1775 A.D. (Rjabchikov 2014a: 5, table 2; 2015: 2, table 1; 2016a: 1, table 1). Here and everywhere else, I use the computer program RedShift Multimedia Astronomy (Maris Multimedia, San Rafael, USA) to look at the heavens above Easter Island.

Table 1. The Dates Calculated (with the interpretation for October 1 and 3 as well as November 14):

June 22 (the azimuth of the sun = 296.2°): one day after the winter solstice;
July 21 (292.5°): the star Capella (α Aurigae) before dawn;
August 11 (286.7°): the star Pollux (β Geminorum) before dawn;
September 2 or 3 (277.9°): the star β Centauri [Nga Vaka] before dawn;
September 24 (268.7°): the new moon;
September 27 (267.4°): the fourth night: the measure of the visible dimensions of the moon; the waxing crescent was well seen in the sky; one night before the beginning of the first Kokore lunar series;
October 1 (265.9°): the eighth night: the measure of the visible dimensions of the moon; the first quarter of the moon;
October 3 (264.7°): the gibbous moon (the 10th night); the end of the first Kokore lunar series;
October 22 (256.8°): near the new moon;
November 8 (250.7°): the star Spica (α Virginis) before dawn;
November 12 (249.3°); Venus as the Morning Star before dawn;
November 14 (248.7°); one night before the last quarter of the moon;
November 23 (246.3°): the new moon;
December 20 (the azimuth of Aldebaran = 339.1°): the star Aldebaran (α Tauri) at night;
December 21 (the azimuth of Aldebaran = 322.1°; the azimuth of Canopus = 177.5°): the stars Aldebaran (α Tauri) and Canopus (α Carinae) on the same night (Rjabchikov 2013a: 7); the day of the summer solstice; one night before the new moon.
Aldebaran is the bright red star and due to its colour this heavenly body could have the sacramental value. Canopus is the second brightest star after Sirius (α Canis Majoris). The observations of both stars together just before the day of the summer solstice were remarkable.

Since in the old days on Rapanui the New Year began with the new moon of the month Maro or Maru(a) ‘June chiefly’ (Rjabchikov 1993a: 133-134), the first morning appearance of Aldebaran prior to the new moon of June was a peculiar mark before the day of the winter solstice.

The big royal astronomical complex at the western area of Rapanui could include the solar observatories at the sites Orongo (Ferdon 1961; 1988) and Mataveri (Liller 1989) as well as at the ceremonial platforms Ahu Huri a Urenga and both Ahu Vinapu and Ahu Tahiri. On the last two platforms located closely near each other 15 statues stood, hence one can suggest that all they represented the phases of the waxing moon from the new moon to the full moon (Vina Pua = Hina Pua). So, the Vinapu and Tahiri (ta-hiri ‘the elevation’) platforms oriented on the sun (Mullroy 1961) were the distinctive lunar calendar device, too. The Ahu Huri a Urenga with the single statue oriented on the sunrise at winter solstice (Mullroy 1973) could be a mark of the transition of short days of winter to long days of summer. The name of this place contains the terminology of the darkness (huri, uri) and fertility (ure-nga; cf. also Maori uri ‘offspring, issue’) associated with the ghost Hauriuri (The Blackness). In this way it is necessary to understand the cultural context of the observations of the Pleiades and Aldebaran in the past.

It is of interest that another boulder in the environs of the Mataveri has several cupules that give the precise map of several stars of the Sagittarius constellation (Hockey and Hoffman 2000).

The star Aldebaran in the Rapanui Script

Fedorova (1982) read at first glyphs 7 70 (H)etu Pu ‘Aldebaran.’ Unfortunately, later on she gave this correct interpretation up (Fedorova 2001).

1(Br 3):  
2(Hv 11):  

Figure 1.

The stellar name 7 70 Tuu Pu ‘Aldebaran’ is put down in the records of the Aruku-Kurenga (B) tablet and Great Santiago (H) tablet, see figure 1. The latter fragment is shown between some other signs, see figure 2. In the light of my last research, the text reads as follows.

Hv 11:

(a)  
(b)  
(c)  
(d)  
(e)  
(f)  

Figure 2.
Hv 11: (a) 3 12 (b) 75 30 75 7-70 24-24 (c) 70 25var (d) 70 14 (e) 70 39 26 (f) 4-45 4-45 4-45 Marama Ika: ko ana, ko Tuu Pu Ariari, (Tuu) Pu Hua, (Tuu) Pu Haua, (Tuu) Pu Raa maa. Tupu, tupu, tupu. The moons of the Fish (as in the first part of the Manari calendar text): The star Aldebaran shone (on the nights) Ariari (= Ari), Hua, Haua (= Atua), and the bright Rakau. The growth, the growth, the growth.

In the text there are names of four nights (moons) of the local lunar calendar. These names are compared with their related names in the famous calendar on the tablet Mamari (C), see table 2.

### Table 2. The Comparison of Some Signs from the Two Boards

| The Mamari tablet  
| (Ca 6-7) | 12 + 3 | 24-24 | 25a | 14 | 106 = 139 8var |
| -------- | ------- | ------ | ---- | --- | -------------- |
| **The Readings** | Ika + Marama | Ariari [Ari] | Hua [Hua] | Haua [Atua] | Raa Kau [Rakau] |

| The Great Santiago tablet  
| (Hv 11) | 3 12 | 24-24 | 25var | 14 | 39 26 |
| -------- | ------- | ------ | ------ | --- | ----- |
| **The Readings** | Marama Ika | Ariari [Ari] | Hua [Hua] | Haua [Atua] | Raa [Rakau] |

The key readings of glyphs 24-24 Ariari and 14 Haua, the 4th and 13th nights (moons), are presented in Rjabchikov 1989: 123-124, figure 3, fragments 1 and 3. The names Ariari and Haua are associated with the names Ari and Atua in the calendar list by Métraux (1940: 50). The first case is obvious: the form Ariari is the complete reduplication of the form Ari. In the second case the moon was an incarnation of the moon goddess Hina known also as Haua, the wife of the solar god Tiki-Makemake, and the words atua, etua meant ‘god; goddess.’ The scribes therefore substituted the word Atua (the Goddess) for the divine name Haua. Glyph 24 represents the garland and reads ai as well as ari because of the alternation of the sounds r/- (cf. Rapanui hei ‘garland,’ Rarotongan ‘ei ‘ditto’ and Kapingamarangi hai, hei ‘to put on;’ the variations of the sounds h/-, ela are very frequent as well). Glyph 14 represents the headgear (cf. Rapanui hau ‘hat’). The scribes chose such a shape of these signs that resembled the crescent.

One can read this inscription on the Aruku-Kurenga tablet, see figure 3.

![Figure 3](image-url)

(a) 30 69 Ana Moko. (It was) the house of the Lizard [at the sacred village of Orongo].
(b) 44-44 7-25 9 33 44 7-25 33 Tahataha Tuu Hu niva ua. Taha Tuu Hu ua. The star Aldebaran (appeared first in the rainy season) turned. The star Aldebaran (appeared first in the rainy season) turned.
(c) 80 17 44 43 44 6 30 33 9 45-50-45-50 Ui te tamata Hanau Niva Puhipuhi. The man (tamata = tangata, cf. also Maori tama ‘man’) Puhipuhi from the Miru tribe watched it.
In accordance with this text, the priest Puhipuhi served inside a stone house (ana) of the religious centre of Orongo. That house was dedicated to the god Hiro; per the local beliefs, the Lizard was an incarnation of this deity (Barthel 1978: 251). The duties of Puhiputi were the predictions of the whether and of eclipses as well as writing calendar records. Tuu hu ‘Aldebaran’ was a variant of the stellar name (Rjabchikov 1993b: 6, table 3). Puhipuhi was a known person, and his name could be retained in the people’s memory. Kopuhi Angataki was a famous wizard ivi atua (Brown 1996: 125). The particle of personal names, ko, is added to his name. So, the well-known astronomer Puhipuhi was called Ko Puhi anga taki = ‘Puhi (Wind) who predicts (taku) and counts (tataku).’ One can mention Maori taki ‘to repeat; to multiply’ also. I surmise that his another name was Rangi Taki (Felbermayer 1971: 29-32).

Having compared line (d) with line Ca 7 of the calendar text inscribed on the Mamari tablet, one can conclude that natives omitted one day (night) of 30 days of the month not only in the end of the month, but also in the centre, choosing, for instance, the night (moon) Maure. The while was diminished one time during two months to achieve the average length of the lunar month approximately 29.5 days.

Popova (2015) has made a great contribution to the studies of the archaic Rapanui beliefs about the star Aldebaran.

The Pleiades in the Rapanui Script

Lee (1992: 80) reasons that in some cases the turtle represents the stellar cluster of the Pleiades (M45; NGC 1432). In her opinion, the ancient towers tupa were exploited to watch these stars (Lee 2004: 36). On the basis of my own research I have deduced that this hypothesis is correct; on a Rapanui panel are rendered the drawing of a turtle, seven cupules as well as one stylised glyph 49 (ariki) mau (Rjabchikov 2001: 218).

Consider a record on the Tahua tablet (A), see figure 4a.

Figure 4a.

In segment (a) the rising (glyphs 6-44 hata, cf. Maori whata ‘to elevate’) of the Pleiades (glyphs 68 Honu, 68 Honu) before dawn (glyph 57 tara, cf. Maori tara ‘rays of the sun, shafts of light, appearing before sunrise’) on the 13th night/day (glyphs 3 14 marama Haua = Atua) of the lunar month is described. In segment (b) seven combinations of glyphs 6-33 hau (king) are inscribed (although the inverted reading is also conceivable: 33-6 uha ‘woman’). Here glyph 12 ika may denote a cluster (Maori ika ‘ditto’), and two glyphs 25 hua (fruit) may be a hint at one Maori name of the Pleiades, Hoko-kumara (Best 1922: 33), cf. Rapanui oko ‘ripe.’ Alternatively, glyphs 25 hu(a) may denote the star Aldebaran.

The natives of different Polynesian islands saw in the sky this cluster consisting of seven and even of six stars. The next explanation is available: cf. Rapanuiho honu, Marquesan hono ‘turtle,’ and Rapanui ono ‘six.’ On Easter Island six boulders were a model or a map of the Pleiades (Métraux 1940: 53). A Mangaian myth tells that god Tane broke one brilliant star with the assistance of Sirius and Aldebaran, and six shining bits formed the Pleiades (Gill 1876: 43).

In conformity with the mythology of the inhabitants of Pukapuka (the Cook Islands), the god Matariki was son of Tamaei who came there from Tonga (Gill 1912: 122-123). I presume that this Tamaei (Tama ‘ei ‘The Forefather decorated with garlands’) still was the potent sun god Tama (Father, Ancestor) known later as the god Tangaroa of the sea, sailors and fishermen (Rjabchikov 2016b, 2016c).

According to the Hawaiian mythology, the name Makari’i [Matariki] reads Maka ari’i [Mata ariki] ‘Eyes of the Chief’ (Beckwith 1970: 367). In the Maori beliefs the Pleiades were seven chiefs (Tregear
1891: 226). Moreover, the Maori data witness that the Pleiades are Mata-ariki (mata: face; ariki: lord) (White 1887: 5).

Consider now a record on the Santiago (I) staff that once belonged to king Nga Ara, see figure 4b.

\[ \begin{array}{c}
I 13: \\
\text{Figure 4b.} \\
\end{array} \]

\[ I 13: 68 (102) 15 4 60 49c (102) 6-44 \ldots \text{Honu: roa atua Mata ariki (mau), hata...} \] (They were) the Pleiades: the deity (deities) of the Pleiades lifted himself (themselves), (it was) the elevation...

Notice that glyphs 102 ure were inserted here as determinatives (fertility, abundance). This text has been partially decoded earlier (Rjabchikov 2001: 217-218, figure 2).

**The Linguistic Background**

Glyph 49 reads mau and ariki mau, so I point this reading as (ariki) mau. But in some cases it reads ariki, and I point it as ariki (mau). This glyph represents king or chief. This person wore a hat indicated with feathers, and in many cases the headdress is put on the head of the sign. Besides, in several cases glyph 41 (different variants) is represented instead of his legs. This latter glyph reads re meaning ‘winner.’ Even if glyph 49 contains glyph 41, the whole sign reads (ariki) mau, or ariki (mau), or ariki mau (Rjabchikov 1998). Typologically, in the Maya script some glyphs include of parts of other glyphs.

In compliance with Métraux (1940: 231), the wooden pendants rei-miro were in the midst of the royal insignia. Consider the brief record on the London rei-miro (J), see figure 5.

\[ \begin{array}{c}
J: 49a 22 \text{ Ariki mau ao. The king has authority.} \\
\text{Figure 5.} \\
\end{array} \]

No name was inscribed, so this object was a symbol of high rank and a tribal sign of the fertility in the possession of several kings.

Consider the record on the Small Washington tablet (R), see figure 6.

\[ \begin{array}{c}
\text{Rb 5:} \\
\text{Figure 6.} \\
\end{array} \]
Rb 5: 22 6 49a 44-44 17 69-50 Ao a ariki mau tahataha te Makoi. King Makoi [Kai-Makoi the First] died (= the authority of king Makoi disappeared literally).

Rapanui taha means ‘to set (of sun).’

Consider a record on the Santiago staff, see figure 7.

Figure 7.

I 1: 22 (102) 4.49c 59-33 (102) 28 6-39-6-39 Ao atua, (ariki) mau, kaua Nga Araara. Nga Araara (= Nga Ara) who is the lord, the king (and) the progenitor has authority.

In all three records both terms, ariki mau ‘king’ and ao ‘authority,’ are rendered. Butinov and Kno-rozov (1957: 10, 13, 16, table 2, fragment 10; table 5, fragment 10; table 8, fragment 2) have read glyph 49a ariki (king; chief) on the basis of the “readings” of the native Metoro. In my studies of the rongorongo I have ignored his information as unreliable in the majority of cases.

The Continuation of Our Studies of the Information about the Pleiades

Consider another record on the Aruku-Kurenga tablet, see figure 8.

Figure 8.

Bv 11: 68 15-25 5 7-25 Honu (Hono, Ono) ro(h)u atua Tuu Hu. The Pleiades bore the deity Aldebran.

The main idea of this observation was such: the Pleiades as a share of the Taurus constellation always appear in the sky before Aldebaran. Old Rapanui ro(h)u, ra(h)u ‘to create’ (glyphs 15-25, 27) correspond to Samoan malaualau ‘to grow vigorously’ and Maori whakarau ‘to multiply.’

Now one can investigate groups of glyphs 68 written together with subsidiary glyphs on the London (K), Mamari, Great Washington (S), Small Santiago (G) and Keiti (E) tablets, see figure 9.

Figure 9.
In five cases the texts begin with glyphs 6-4 a atua ‘deity,’ and in one case the expression 6-4-24 a atua ai ‘deity-place’ is taken down. These glyphs as well as glyphs 4-32 atua ua and 6-4-32 a atua ua ‘deity-dwelling’ denote names of deities, corresponding statues (moai < mo ai ‘for the place’) and other sacred places (Rjabchikov 1988: 316-317, figure 3, fragment 9; 2001: 216-219, figures 1 and 4; 2009a, figures 2 to 4, 6 to 10, and 39; 2014b: 172-173, figure 9, fragment 6). Side Ca = Cr and side Cb = Cv (Rjabchikov 1995: 51-52).

A part of the inscription in fragment 1 has been investigated earlier (Rjabchikov 2000: 68, figure 5). There I disclosed two symbols (glyphs 68 of the Pleiades. I suppose that the god Atua-Matua (glyphs 4 8) was associated with the Maori god Tane-matua ‘Tane-parent’ (Rjabchikov 2011a: 8-10) and with more archaic god Tama (Tama loa and so on). Tane as the personification of the sun who had broken the initial radiant star into six pieces was a paramount personage. We must realise now the names of six or even seven stars of the Pleiades. Best (1922: 32-33) reports the following data of the Maori: Matariki ‘the Pleiades,’ Te Huihui o Matariki ‘ditto,’ Ao-kai ‘ditto,’ Hoko-kumara ‘ditto’ as well as the names of six stars of the Pleiades: Tupua-nuku, Tupua-rangi, Waiti, Waita, Waipuna-a-rangi, Uururangi. One can recognise these components in the last six names: tupu: Maori tupu ‘to grow; to increase;’ nuku: Maori nuku ‘distance,’ rangi: Maori rangi ‘sky,’ wai: Maori wai ‘water,’ puna: Maori puna ‘spring of water,’ ti: Maori tiia ‘to stick in;’ ta: Maori ta ‘to strike, to beat;’ uru: Maori uru ‘head; chief; top.’

**Table 3. Different names of six stars of the Pleiades taken from figure 9**

| 44-12 | 17 5 | 18 23 | 24-24 | 18 or 17 | 26 |
|-------|------|-------|-------|----------|----|
| ta ika | te ti | te uru | ariari | tea      | maa |
| beaten, broken | pierced | the upper part, the head | visible, clear | white, clean | clean, bright |

The supplementary terms in the texts in figure 9 are written with glyphs 4 atua ‘deity,’ 49 (ariki) mau ‘king,’ and 56 po ‘night.’ The terms ari, tea and maa describe the increasing light of the sun, the moon, and stars. So, Ariari, Tea and Maa are the brightest ones among all the stars of the Pleiades.

A Tahitian song (Caillot 1914: 74-75) contains the Pleiades’ name in the form Matarii ma [Matarii maa] giving the word ma without any translation. This phrase indeed means ‘The bright (= well visible) Pleiades.’ Thus, the interpretation of glyph 26 maa in table 3 is true.

In my opinion, different celestial bodies are described in the Rapanui song “Ka turu ki hare mortaie pura e” (Campbell 1999: 210). The observations occurred in December (o Koro, o Matua e). The Pleiades are called Hare o Uru (The house of Uru) and Pahere, cf. Rapanui pahera ‘shell of turtle.’

To offer correctly the further information, it is necessary to say some words about the war that occurred on island about 1682 A.D. The reasons of that situation are understandable because of the economic factors. The timber was close to the end, and the serial production of statues stopped, and in this condition the aristocratic eastern union could not exploited the western craftsmen and other commons as in old days. In this connection, let us interpret the results of the recent archaeological excavations at the ceremonial complex Ahu Urauranga te Mahina (Ayres, Wozniak and Ramirez 2014). I surmise that Statue UU-15 was transported at the end of the Middle period. It could be the image of the dark moon. It had comparatively small dimensions and was without well elaboration because the king of the eastern
tribes demanded to cut and erect this idol as soon as possible. The statue was transported to the Urauranga te Mahina (The Lobster-the Moon) since this area was located near the border with the western tribes. That territory which was included in the next Ahu Akahanga as the single ceremonial centre played the significant role in the bird-man cult (Rjabchikov 2009b). It is clear that there were too few logs, and the statue stayed to lie near the ceremonial platform. The archaeological dating of this statue from 1650 to 1700 A.D. is essential. It is indirect evidence that the timber vanished at that time and the war between the western and eastern tribes happened. It was perhaps the last monument produced at the Rano Raraku quarry.

The addition data about that terrible war are presented in the record put down by a scribe of the Tupa-hotu tribe (Rjabchikov 2012a: 567) on the Mamari tablet, see figure 10.

To gain a better insight into all these celestial names of the six stars of the Pleiades, consider the following fragment of the same tablet, see figure 11.

This text says that the king (ariki mau ao) Aringa (Tupa-Aringa-Anga) of the whole island was killed near the ceremonial platform Ahu Hoonu [Ahu o Honu] (cf. Rapanui honu ‘turtle’), and in the local beliefs his soul travelled from that spot to the ancestral distant land called Hiva (Niva literally = the West, the Sunset, Havaiki) of the power and the supremacy; (b) (it happened) near the ceremonial platform Ahu Hoonu [Ahu o Honu] (all its statues were dedicated to the stars of the Pleiades).

The Juan Haoa manuscript published in the works of the Norwegian expedition (Heyerdahl and Ferdon 1965: figures 145-146) contains some interesting additional details about that time:

(1) Koe e paoa e he oho mai ananake ko kua Mataka roa. (2) He oho mai ki Haga Hoonu, i ira te papaku. (3) Ku tuu ro ai, ku teretere ro ai: “I toona ao, iaia te ao!” (4) He ravaa, he tuitui, he avai ki a Mataka roa. (5) He oho mai ananake ki te hare Toke Takapaau, i avai era tou moa era ki a Mataka roa. (1) All the guards went together with Mataka roa and his companions (kua). (2) (They) went to Hanga Hoonu (Hanga o Honu), the corpse was there. (2)
(The people) came, run (saying): “(It is) his authority, he (is) the authority!” (They) seized, bound, (and) gave (that corpse) to Mataka roa. All they went to the house Toke Takapau (the house at Orongo where the statue Hoa-hakananaia stood) and the priest (tau = taua, taura) gave Mataka roa a chicken. (The translation is of mine.)

Hence, king Aringa (Tupa-Aringa-Anga) was killed at the bay Hanga Hoonu (Hanga o Hoonu, Hanga Honu) somewhere near a ceremonial platform at this area. Only after that moment Mataka roa’s authority (ao) was proclaimed over the island. Aringa’s name was prohibited (cf. the mention about the unnamed bounded corpse, a “gift” for Mataka roa). It is of value to note that the main priest of the religious centre of Orongo blessed the new king of Easter Island.

Now it is apparent that all the records in figure 9 describe the deity (deities) (6 4 a atua) of the Pleiades. Moreover, the statues on that platform at the bay Hanga o Hoonu represented the Pleiades.

According to Wallin and Martinsson-Wallin (1997: 1), the ceremonial platform Ahu Hekii 1 at this bay was called Puapua, Hanga O Onu, Hanga-o-honu and Hekii. It had seven statues. The platform Ahu Hekii 2 located alongside had four statues. I suggest that Ahu Hekii 1 (described in the Mamari record read above) was dedicated to the Pleiades. Van Tilburg (1986: 9) says that the seventh monument was in fragment, so, I think, it could be a hint at the archaic myth about the origin of the Pleiades from the broken star. In any case, the seven statues can comply with the seven stars of the Pleiades. As among the names of this complex Puapua was called, one can suggest that the platform Ahu Hekii 2 was devoted to the star Aldebaran (Tuu Pu) and other stars of the Taurus constellation.

Liller (1991: 275) reports about the orientation of that ahu: 76.0° azimuth. As Hekii 1 was dated back to about 1200 to 1390 A.D. (Wallin and Martinsson-Wallin 1997: 14), I have looked at the sky those years. The azimuth of the rising Aldebaran on June 21, 1200 A.D. and June 21, 1300 A.D. was 73° 51' 55'' and 73° 33' 20'' respectively. Hence, Hekii 2 was oriented on Aldebaran and nearby stars.

Now one can examine another record about the Pleiades on the Tahua tablet, see figure 12.

Figure 12.

Ab 6: (a) 6 17-17 4/33 75 5 (b) 17-17 5 26 (c) 17-17 5 24 (d) 17-17 5 6 68 65 4 (e) 68 4 (f) 4 21 68 56-56 4 (a) Ha teatea atua ua ko Ti, (b) teatea atua Maa, (c) teatea atua Ari, (d) teatea atua a Honu Rangi atua, (e) Honu atua, (f) atua ko Honu po, po, atua. This text tells of the rising of the Pleiades. Old Rapanui teatea ‘to appear; to shine; to be visible’ corresponds to Rapanui tea ‘to appear (of stars); white, clean.’ Ha is the verbal particle of the past tense. Here six stars of the Pleides are described, at the beginning three names are Ti, Maa, Ari (= Ariari) as in figure 9, the last three names contain the word Honu (Turtle; Six = the Pleiades). The term rangi ‘sky’ was presented in one of Maori names of those stars. Besides, Hawaiian Ka-lalani-a-Makariki ‘the Pleiades’ (Pukui and Elbert 1986: 121) contains the term lalani (lani) [rangi] ‘sky.’ The names of the cluster are introduced in the text with the particles ko and a. It should be remembered that the Tahua tablet was a lesson book in the rongorongo school of king Kai Makoi the First (Rjabchikov 2012a: 566). One of the texts in the Rapanui manuscripts begins with the words: Ko Make-make. A Makemake. ‘Makemake. Makemake’ (Fedorova 1965: 397).
The Calendar and Mathematical Records in the Rongorongo

Consider the record on another London rei-miro (L), see figure 13. The text has been decoded (Rjabchikov 2009c). The following segments have engaged our attention: (A) 44 24 44 27 9 tari Taha rau Niva (the Frigate Bird, an image of sooty terns, is carrying the fruits, including eggs, from the legendary homeland Hiva), (B) 79 Heke (Tua-ma-Heke, the legendary king and ancestor of the Miru tribe), (C) 135-135 vera, vera, vera (vero 'spear;' vera 'heat'), (D) 6-15 Hora (the month Hora-nui, September chiefly), (E) 68-68 44 hohiu-nui taha (the great collection of birds = frigate birds literally), (F) 44-70 19 12 tapu ki ika (the prohibition of the fish), and a fertility formula: (G) 73 64 19 73 64 62 64 44b-17 64 23 64 12 64 18 4 64 4 64 4 64 73 64 He mea ku, he mea toa, mea tua tea, mea ura, mea ika, mea tetu, mea atu, mea atu, mea, he mea. ‘I obtain, (I) obtain the sugar canes. (I) obtain the sweet potatoes (called) tua tea. (I) obtain the lobsters. (I) obtain the fishes. (I) obtain the big (fishes) (= the tuna fish etc.). (I) obtain the atu fish. (I) obtain the atu fish. (I) obtain. (I) obtain.’2

The arrival of sooty terns in the spring-time was a good sign that the inhabitants would receive copious eggs and fruits. It was the season of the increasing warm (cf. the words vera, vera, vera). According to local beliefs, the king of the island was a person who granted the abundance to all the people.

In the folklore text about the power of king the following mysterious formula is repeated many times: Anirato maniroto (Métraux 1937: 52-54). It can be read thus: Anirato to, manu (= mani) roto ‘Add (or take) now, that is inside the bird!’

Consider the record on the Aruku-Kurenga tablet, see figure 14.

By 8: 

Figure 14.

By 8: 68 33 26-15 Honu, vai (or ua), Maro. The Pleiades, the season of rains, the month Maro (June chiefly).

Here the word Maro (Old Rapanui Maru, Marua) is written as two syllables ma and ro. The New Year began with the new moon (June chiefly) after which the Pleiades rose first before dawn. The sequence of the Rapanui months gives Maro (June chiefly), Anakena (July chiefly), Hora-iti (August chiefly), Hora-nui (September chiefly), and so forth.

Consider the continuation of the list of the months on the same tablet, see figure 15.

By 10: 

Figure 15.

By 10: 17 30-44 17 30-51-30 17 14 17 6-15 te Anakena, te Anakena, te Haua, te Hora
(the month) Anakena, (the month) Anakena, (the month) Haua (= the month Atua), (the month) Hora

The scribes avoided using signs for the sun (ra, raa) to write the syllable ra; they used the syllable ro (glyph 15) because of very frequent alternations of the sounds ola in the Rapanui language. The sign added to elbow of the raised arm of the figure of a man (glyph 6 ho, ha) in the last word does not read, this special mark denotes that the “arm” (glyph 15 ro) is a separate sign here. Glyphs 6-15 reads Ho-ra. (Glyph 6 represents a man, cf. Rapanui hoa ‘friend;’ but in many cases this sign reads ha.) It should be remembered that this tablet was a lesson book in the rongorongo school of king Nga Ara. The name Anakena (Ana Kena) is repeated twice in the text, and the word kena is rendered as the whole word (glyph 44 taha, ta; the designations of birds: manu, kena, tavake etc.) and as the pair of quasi-syllables ke and (a)na. All the names in the record are introduced by the definite particle te.

The name of the month Maro (Maru, Marua) could be written not only in the syllabic form, but also as an ideogram. Consider the record on the same tablet, see figure 16. In that text the winter solstice during the rainy season is described.
Bv 6: 17 32 62 32 62 32 4 74-74 38 (= 34 39) 4-6 3 53 Te ua, to(nga), ua, to(nga), ua. Atua tinitini raa tuha hina Maro. Rains, rains, rains. (It was) the deity of the solstice during the time (tuha) of the month Maro.

The motif “two raised arms” is well known in the local rock art at the area called Mata Ngarau (The Painted Faces = Makemake’s images) in the religious centre of Orongo. The drawing of it and neighbouring symbols have arrested my attention (Lee 1992: 63, figure 4.31). First, the surrounded signs are bird-man figures and representations of birds (frigate birds). Second, the drawing of “two arms” is glyph 53 Maro (Old Rapanui Maru, Marua) carved on a rock. Third, beside this emblem the row of four cupules is incised. The months Maro, Anakena, Hora-iti (the small Hora) and Hora-nui (the big Hora) are four months from the beginning of the year in the local calendar. Thus, the month Hora-nui, when sooty terns arrived in the majority of cases (since the lunar calendar was used) and the bird-man was elected, was the fourth month. It is clear that the natives during the winter waited for the beginning of the Hora-nui month. The key indicator in the decoded rock figures is the record of the number four.

One can consider now the record on the same tablet, see figure 17.

Bv 4-5: (a) 17-4 17 5-6 Te ha te tuha. Four time intervals.
(b) 43 2 44 47 30-44 Ma Hina Taha avae Anakena. The moon goddess during the night Tane of the month Anakena went.
(c) 43 33 6-15 24 6-15 52 6-15 24 Ma ua Hora-ari, Hora iti, Hora-ari. The rains (together with) the bright sun of (the month) Hora, (otherwise) Hora-iti, (and with) the bright sun of (the month) Hora went.
(d) 4-15 21-15 26-15 ... Atua roa Koro, Maro... (They were) the great gods Koro (December chiefly; Father literally) (and) Maro (June chiefly)...
(e) 26 44 62 5 47 80 44 Matatoa-atua ava, ui taha (= manu tara figuratively). The warriors-lords elevated themselves, they watched the arrival of sooty terns.
(f) 73 68/65-68/65 4 E Honu RANGI-Honu RANGI atua. The great god: the Pleiades. (It was a celestial mark.)

I have decoded an instruction for teachers in the rongorongo school of king Nga Ara (Rjachchikov 2012a: 568-569, figure 8). Specifically, pupils wrote four lizard signs 69 moko together with the quasi-syllabic signs 26 mo, ma, maa and 21oko, ko. The number of the lizards was brought out as the combination of glyphs 17-4 te ha (four). A variant of the article te, ko te, introduced the number one (tahi) in a Rapanui manuscript (Fedorova 1965: 398). In the read rongorongo text the beginning of the count was probably the new moon of the month Maro. Koro and Maro were days of the summer and winter solstices.
respectively. In the parallel fragment presented on the Great Washington tablet (Sa 5) both names of solstices are replaced with the term 26-4 Matua (Father) as a synonym for the term Koro. The warriors, the commanders of different troops, waited for the arrival of sooty terns. The Pleiades were the peculiar sign in the heavens during a long period.

Look at the sky above Easter Island again. In 1780 A.D. the Pleiades were seen almost precisely in the north before dawn on August 30. (August 20, 1780 A.D., beginning of dawn: 5:24 a.m., the Pleiades: azimuth: 08° 51' 15''; August 29, 1780 A.D., beginning of dawn: 5:16 a.m., the Pleiades: azimuth: 00° 45' 19''; August 30, 1780 A.D., beginning of dawn: 5:15 a.m., the Pleiades: azimuth: 359° 52' 56''; August 31, 1780 A.D., beginning of dawn: 5:14 a.m., the Pleiades: azimuth: 359° 00' 34''). In 1820 A.D. the Pleiades were seen in the north before dawn on September 1. (August 31, 1820 A.D., beginning of dawn: 5:14 a.m., the Pleiades: azimuth: 00° 30' 53''; September 1, 1820 A.D., beginning of dawn: 5:13 a.m., the Pleiades: azimuth: 359° 38' 40''). It was a signal of sooty terns at the beginning of September.

Consider the record on the Santiago staff, see figure 18.

Figure 18.

I 9: (a) 62 44-26 (102) 62 60 (a vertical line) 58 (102) 25 Too tama, too mata paoa tahi hua. A young man took, a guard (warrior) took the first egg.
(b) 19 (102) 53 3 (a vertical line) Ki Maro hina From the month Maro
(c) 17 (102) 69 4 te Moko ha (it was) the fourth new moon (Moko = Hiro, the first moon of each month).

Here the term mata paoa ‘guard = soldier of a tribe’ was used instead of the term matatoa (mata toa) ‘warrior of a tribe.’ In the text the basic topic of the bird-man festival is informed. A young man (servant) found and carried the egg of the sooty tern (manu-tara). This first egg was the incarnation of the god Tiki-Makemake in the local religious beliefs. The guard (warrior) who received that egg was declared the bird-man till the next elections.3 We can see that the month Hora-nui (September chiefly) was fourth in the local calendar. In this text the word mata (tribe) is presented with the aid of the face glyph 60, but in the record in figure 17 the same word is given as glyphs 26 ma and 44 ta. The vertical lines in the script were a late invention. They separated words to keep the text in the correct form. In the first case the line was written to read tahi hua (the first egg) merely, and the reading mata paoa tahi (the first guard) was unfeasible. In the second case the reading hina (marana) tea (the white moon) was not possible, too.

A manu (bird) song sounded on Easter Island in the old times:

Aaku te ono i kouhau manu o te matangi o ure te ono (Routledge 1914-1915).

It was the charm to gather (ono, hono) birds looking like a fertile (ure) wind. Rapanui kohukohu means ‘storm, cloud,’ kohu raa ‘solar eclipse,’ cf. the term kouhau = kou hau in the text, and the terms hau and matangi mean ‘wind.’

I presume that such a chant must be inscribed on the staff. I have found it, see figure 19.

Figure 19.

I 8: 12var 68 (102) 72 9 6 48 15 17 60 (102 123) 28 102 (a vertical line) 47 (102) 46 68-68
Aku (h)ono manu Niva hau, roa te matangi ure, ava na (h)ono(h)ono.
Presently the birds from (the western land) Hiva are added (united, gathered) with the wind, the fertile wind grows, (it is) the ascent (ava) of the united (birds). \{It is the new reading of mine on the base of new data.\}

Glyph 12\text{var} (12+34?) \text{ika} reads \text{aku} here (cf. the Rapanui names \text{aku}, \\text{ihe aku}, \\text{nanue para akuaku} of fish species). Old Rapanui \text{aku} `presently’ fits Mangarevan \text{akunei} ‘ditto.’ The term \text{matangi} (wind) was put down as the signs \text{mata-nga}. The term \text{hau} (wind) was put down with the help of syllables 6 \text{ha} and 48 \text{u}. Glyphs 102 and 123 are certain symbols of abundance and fertility, and they do not read in many cases. But here one glyph 102 is decorated with short lines as a badge and reads \text{ure}. Glyphs 68-68 44 \text{hohuionui taha} rendered in figure 13 can just as readily be read (h)ono(h)ono taha ‘ditto’ due to the variations of the sounds. Thus, the song in Routledge’s collection is a real quasi-bilingual text for the decipherment of Easter Island writing system.

Consider the record on the Aruku-Kurenga tablet, see figure 20.

\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure20.png}
\caption{Figure 20.}
\end{figure}

I have analysed this record earlier (Rjabchikov 2016d: 2-3, figures 2-4). The motions of Aldebaran \((7 \text{Tuu}, 70 \text{Tuu Pu})\) and the Pleiades \((68 \text{Honu}, \text{Hono, Ono};\) where 65 \text{rangi} ‘sky’ is the generic determinative) in the month \text{Maro} (53 \text{Maru}; June chiefly) are described. Since I held in my hands that splendid board, I can examine the text in detail. In fragment 3 glyphs 62-29 reads \text{toru} ‘three.’ The glyph looking like three rounds after the next sign 35 may be a variant of glyph 17 \text{tea}. On the other hand, it may be the determinative for the word \text{toru}. Consider fragment 1. Here glyphs 29 \text{rua} and 29 \text{rua} are inscribed. By the way, the second reading is questionable, it can be a version of glyph 17 \text{tea}. Be it as it may, at least the numbers two and three are found in these records. The number two gives such a result: it is the month \text{Anakena} (July chiefly), the next month after the month \text{Maro}. The number three gives the month \text{Hora-itii} (August chiefly). If both glyphs 29 \text{rua} and 29 \text{rua} are rendered in fragments 1 and 2 indeed, we shall receive the month \text{Hora-nui} (September chiefly). All three records terminate with the descriptions of arriving birds. They contain glyphs 40\text{var} 81 \text{(re)re manu} ‘birds are flying,’ 81 \text{manu} ‘birds,’ 44 \text{taha} ‘frigate birds (sooty terns figuratively),’ and the epithet referring to the sun god \text{Tiki-te-Hatu} (glyphs 6-4, 6-7 \text{Hatu}, \text{Hotu}). It is the designation of the month \text{Hora-nui} (September chiefly). It is amply evident that the
ancient priests-astronomers counted lunar months watching different phases of the moon as well as other celestial phenomena.

The onset of counting the time is the new moon of the month *Maro* in all the records. But it was an unusual year. Fragment 3 has the following segment: 50 3 (= an inverted variant) 1 *Hi* (= the 16th moon *Ina-Ira* as it is written in line Ca 7 of the Mamari record) *marama uri, Tiki*; it was the description of the partial (almost total) lunar eclipse before the sunrise on June 20, 1796 A.D.

The second *manu* (bird) song sounded on Easter Island in the old times:

*Matai epa kureri hoki te manu ture hau maru na te rangi na te werowero na te re re na te hohoku nui he atu hereri ati angaroi* (Routledge 1914-1915).

The corrected version of the song is as following:

*Mata(h)i e pa ku rere. Hoki te manu. Tuu, (re)re Hau(a). Maru na te rangi, na te verovero, na te rere, na te hohoku (= hohoki) nui. He atu(a) he re re ai (H)anga Roi. The glyph (pa) of the first month (ma-tai, ma-tahi) (is here): the flight (of the birds) began. (The incantation:) Oh the birds, return! Oh (the moon goddess) *Haua*, come, fly! (It was the first month) *Maru* (June chiefly): (the incantation:) the sky (the first month), the spears (= heat) (the second month), the flight (the third month), the great return (the fourth month, September chiefly). The deities have been flown from the site (ai) *Hanga Roi* (*Hanga Oroi*? The bay of king *Oroi* from Hiva?).

The Rapanui folklore text "*Apai*” contains both terms *matai* (the first month) and *Maru(a)* (the first month, June chiefly) (Rjabchikov 1993a: 133-134). These terms were preserved in the Maori language: cf. *Maruaroa* ‘name of the second month; and *Mātahi* ‘first month; it begins with the first appearance of *Matariki* (Pleiades) before sunrise in June.’ In the Rapanui calendar system those terms are united: *ku hakairi Maru matai, Maru matai*. ‘The lunar month *Maru* (June chiefly) began (elevated itself literally).’ The word *pa* (to write; to carve; glyph) is presented many times in a *rongorongo* lesson book known as the tablet Keiti (Rjabchikov 2013b). In the song the months from June till September are called with different epithets. It is apparent that the priest-astronomers stared at the starry heavens (*rangi*) to predict the beginning of New Year. The word *veravera* (heat) is presented in the *rei-miro* (L) record (see figure 13) as the thrice repeated word *vera* (heat). The arrival of sooty terns was a real signal of the growing warmth, many eggs, the bloom of plants, and the great harvest. The astronomical device at Orongo, the so-called “sun stones,” served particularly to determine the day of the winter solstice exactly. According to Andersen (1969: 411), the Pleiades were connected with the spring and planting season in Polynesia.

Consider a segment of the archaic version of the famous song “*He timo te akoako*” on the Tablette échancrée (D), see figure 21.

![Figure 21](image)

Db 4: 6-19 1-4 4 *Hoki Tikitiki atua*. The great god *Tiki* returned.

In the version of the song “*He timo te akoako*” from the manuscripts that were published in the works of the Norwegian expedition (Heyerdahl and Ferdon 1965: figure 127) the last words *ara taha* (the road of frigate birds = sooty terns figuratively) correlate with the read record. One can cite a sentence from a Rapanui myth: *He hoki Makemake raua ko Haua. ‘Makemake and Haua returned’* (Barthel 1957: 72). *Makemake* was of an epithet of the sun god *Tiki* (Tane) (Métraux 1940: 314), and *Hau(a)* was an epithet of the moon goddess *Hina* (Rjabchikov 1987: 364-365, figure 2, fragment 5; 1988: 314-315, figure 1, fragments 5-8; 2014b: 165-166, 172, figure 9, fragment 3).
New Readings of the Rongorongo Records Confirming My Decipherment

(1) The Odd Form ma-ha Denoting Sharks

Consider the records on the Great St. Petersburg (P), Small Vienna (N) and Aruku-Kurenga tablets, see figure 22.

1 (Pv 4):

2 (Nb 1):

3 (Br 8):

Figure 22.

1 (Pv 4): 43-6 11 ma-ha, or ma-ho, or mo-ha, or and mo-ho SHARK ‘shark’
2 (Nb 1): 11 43-6 SHARK ma-ha, or ma-ho, or mo-ha, or and mo-ho ‘shark’
3 (Br 8): 43-6 11var ma-ha, or ma-ho, or mo-ha, or and mo-ho SHARK ‘shark’

I have read earlier these texts as designations of sharks (Rjabchikov 1988: 318-319, figure 4, fragments 8, 9, 10), cf. Rapanui mango ‘shark.’ Glyphs 43-6 read not only ma-ha, but also ma-ho, or mo-ha, or mo-ho. The alternation of the sounds ẖng is possible in the Rapanui language. Glyph 11 reads mango, or niuhi, or paki(a), or even taoraha etc. (shark, dolphin, seal, whale etc.).

On the wall of the famous cave Ana o Keke different signs are represented, and among them one can see the drawing of a whale or shark (cf. glyphs 11b, 91) and glyph 64 mea united together (Lee 1992: 47, figure 4.2; the interpretation in Rjabchikov 1994: 40, table 4), they read ma-ha, or ma-ho, or mo-ha, or and mo-ho (mango, niuhi, paki, taoraha and so forth) mea (red). Here the red colour was the emblem of the sea god Tangaroa.

In the Rapanui song “Koro-rupa, te hare” (Campbell 1999: 208-209) there are such words:

Ko te tai:
Te a hua, maho mea.

The ocean (is round us):
(They are) solar rays (i, hi) of a calf (and)
a whale. (The translation is of mine.)

I prefer to read the expression maho mea as ‘whale’ in this context because I have disclosed a solar symbol (cf. glyph 137a raa depicting the sun with rays) on a drawing of a whale where three ones are shown (Lee 2004: 32, figure 2). To the third whale glyph 40 (here) is attached and it denotes that this mammal bears a calf. The solar symbolism of whales in the Proto-Polynesian times is discussed in Rjabchikov 2014b: 163.

Consider the record on the Santiago staff, where is rendered the description of elaborated carved drawings on slabs of the ceremonial platform Ahu Naunau at the royal residence Anakena, see figure 23.

15:

Figure 23.

15: 4-23 56-56 (102) 18-4 44-26 (102) 4 73 60 26 25 (102) 11 6-6 (102) 6 91 (102-123) 21 56 (102) 51 (102) 15 Tuura popo “Te atua Tama”, “Atua e Mata” maa, “hua, Mango [Maho]”, “Haha”, “A Taoraha, oko”, “Po kero”. “The priests (tuura, taura, tahura) keep (the pictures) “The god Tama [Tangaroa],” “The god ‘The Face’” made skilfully, “The whale-calf (and) the whale”, “The darkness”, “The whale (and) the whale-calf”, “The dark night (The lizard)”. (Cf. Rjabchikov 2009a: figure 28, fragment 3. The repetitions of some motifs indicated their importance for king Nga Ara.)
One can attempt to find the form *maho* (maha, moha, moho) ‘shark etc.’ somewhere outside Easter Island. The personage *Ka moho-ali‘i* (Shark god of the Pele family) [*Ta moho-ariki*] was mentioned many times in the Hawaiian folklore sources (Beckwith 1970: 90ff). The name has not been translated yet, although the meaning of the term *ali‘i* (chief) is apparent. Standard Hawaiian *mango* (< *mago*) means ‘shark.’ But now it is clear that Hawaiian *moho* means ‘shark’ as well, cf. Rapanui *mango*, *mongo* ‘ditto.’

I think that the forms *maho*, *moho* and *mango*, *mongo* coexisted in the archaic times, and the forms *maho*, *moho* could be Proto-Tahitian variants (innovations).

Consider the record on the Berlin tablet (O), see figure 24.

![Figure 24](image)

**Figure 24.**

O 4: (a damaged segment) 75 11 65/44b (a damaged segment) … *ko Maho (= Mango) Rangi tua …* … the Shark ‘Spica’ of the sky was in the western sky …

As a parallel one can offer the words of the song “*He ika uru atua*” (Campbell 1999: 206-207) where in my view the total solar eclipse in September 16, 1773 A.D. is described in the religious terms:

```
Ra te na.  
Ko He Ho, ko Maho-Rangi,  
ko Rangi-Hetu.  
Kohukohu Renga-Mitimiti.  
Ko te Nuahine Huri.  
Taua; a rae reka.  
...  
```

The sun is hidden.  
The stars in the sky (are seen:) *He-Hoa* [the star He on the eclipse] ‘Castor or Pollux’ (and) the Shark [*Maho = Mango*] ‘Spica’ of the sky.  

```
...  
The stars in the sky (are seen:)  
*He-Hoa* [the star He on the eclipse] ‘Castor or Pollux’ (and) the Shark [*Maho = Mango*] ‘Spica’ of the sky.  
```

Does the form *mango* (shark) sound exactly somewhere in the *rongorongo*? Yes, this record on the Santiago staff answers the question, see figure 25.

![Figure 25](image)

**Figure 25.**

1 7: 11 (102) 28 48-15 (a vertical line) 56 (102) 28 61 8 (102) 11 56/39

*MANGO-ngo uri = Mango Uri. Po nga hina (= marama) Matua Mango po raa.*

(It was) the Black Shark (of the god *Tangaroa*) (= *Tapu mea*, the 24th night = *Tangaroa* with different epithets in some other Polynesian calendars). The night of many crescents (of the end of a lunar month) (called) *Matua* (= the 25th night) (has been produced by) the Shark (= *Tapu mea*, the 24th night) of the night/day.

I have demonstrated earlier (Rjabchikov 2009a: figure 14) that a syllable can be added to the ideogram to read the word correctly. In the Tahitian mythology the *ma‘o uri* (black shark) is associated with the sea god *Ta‘aroa* [*Tangaroa*] (Henry 1928: 355-359).

It should be pointed out that glyph 15 has the basic reading *ro*, but in some cases reads *ra* or *ri*, as such alternations of sounds were very frequent in the Old Rapanui language. For instance, Rapanui *aringa* ‘face’ has an unclear origin. But it reads *ari-nga* < *aro-nga*, where Rapanui *aro* means ‘face; front.’ Cf. also Rapanui *iti* ‘to pile up’ and *tito* ‘frugal,’ *tito koroi* ‘saving; economical;’ *tingi* ‘to beat; to hit,’ *tingo*tengo ‘to beat to death,’ *tingai* ‘to kill’ (< *tinga-i;* veri ‘monstrous,’ *veveri* ‘execrable,’ *vero* ‘spear’ as well as *karikau* (*kari kau*) ‘hollow’ and *karonga* (*karo-nga*) ‘eye socket.’
(2) Te Haha’s Rongorongo Records on the Paris Tablet (Snuffbox)

Barthel (1958a) does not mention about this specimen of the script at all. A snuffbox made of pieces of a tablet (the Paris tablet) contains brief inscriptions in the classical style.

It is well known that Loti (1988) held a rongorongo tablet in his hands on the board French warship La Flore near the shore of Easter Island in 1872 A.D. I suggest that it was the Paris tablet.

One of panels (the bottom) of this specimen contains three brief lines of the rongorongo; I have featured the glyphs in figure 26.

Figure 26.

(a) ... 🌸 ShoppingCart 🌸 ...
(b) ... 🌸 ShoppingCart 🌸 ...
(c) ... 🌸 ShoppingCart 🌸 ...

Figure 26.

(a) ... 60 44 28 39 (= 115, 139) 69 17 69 ... ... mata Taha Nga(a)ra Moko tea, Moko ... (The king of) the tribe of the Frigate Bird (the symbolism of the Miru tribe per Barthel 1978: 151) Nga Ara (of the tribal union) Moko (= Tuu, Momoko, Miru etc.) of the eastern [and western] (parts of the island)...
(b) ... 4-14 3 12 56 28 25 4 5 21 4 2 ... ... atua roa Ika Hina nga atua Tiko, atua... the great goddess Fish-(the moon goddess) Hina bit the god Tiki...
(c) ... 44 47 108 17 6-6 ... ... Taha. Ava, hiri Te Haha, ... The Frigate Bird. Te Haha elevates himself...

Let us look at the sky above Easter Island. One can calculate that a partial solar eclipse occurred on January 22, 1860 A.D. I suggest that this record says about the death of king Nga Ara soon before or after that event. It is common knowledge that that ruler died before the Peruvian slave raid of 1862 A.D. (Métraux 1940: 91).

Te Haha was a young man (boy) in the entourage of king Nga Ara (Routledge 1998: 242, 271; Rjabchikov 1999; 2012a: 567; 2012b). His name (17 6-6) is written down in segment (c). One can assume also that he (as a priest ariki paka) was a son of the king. After the death of his father, Te Haha could become a real ruler or co-ruler of Easter Island. Although the old man Te Haha aged more than 80 years told Routledge that he could not read and write the rongorongo, it was not the truth. Undoubtedly he was a rongorongo expert.

(3) The Rongorongo Signs on Skulls

At last a book has been published where symbols on skulls from Rapanui are seen well. Let us examine such sources of the script. The signs are presented in figure 27 (my own drawings).

Figure 27.
1. Consider a complicated motif on the skull of 2-year-old child (Owsley et al. 2016: 260, figure 14.2), see figure 27A. I have read here glyphs 12 23 ika Ura ‘the fish of (the deity) Ura (Lobster) = Uraura-nga te Mahina (an image of the dark phases of the moon).’

According to a Rapanui legend, a little girl once died; then she transformed herself into a fish; so, the girl cried that she in the hands of the spirits Hitii Kapura and Urauraanga te Mahina (Blixen 1973: 10-11). A little boy was mentioned in the same situation in another narration (Métraux 1940: 372).

2. Consider a complicated motif on the skull of a female aged 35 to 39 years from Ahu Naunau (King’s Platform) (Owsley et al. 2016: 262, figure 14.4), see figure 27B. I have read here glyph 149 Hatahatu or Hotuhotu. It could be a late hoax: the name of the legendary king Hotu Matua was engraved on that skull to prove that the king had been buried there. On the other hand, this glyph could be a fertility symbol of a priestess or queen.

3. Consider a motif on the skull of a male (Owsley et al. 2016: 264, figure 14.6 [a]), see figure 27C. I have read here glyphs 16 149var Kahī Hotu ‘The Tuna Fish produces’ or ‘The Tuna Fish of Hotu or Hatu (= king Hotu Matua? or the god Tiki-te-Hatu?).’

4. Consider a motif on the skull of a male (Owsley et al. 2016: 264, figure 14.6 [b]), see figure 27D. I have read here glyph 16 Kahī ‘The Tuna Fish.’

5. Consider a complicated motif on the skull of a male aged around 55 to 59 years that was disclosed under or near a ceremonial platform (Owsley et al. 2016: 264, figure 14.7), see figure 27E. I have read here glyphs 69 (the inverted head of the sign) 16 Moko Kahī ‘the tribal union Moko (Hanau Momoko) of the Tuna Fish.’

In all three cases glyph 16 kahi (the inverted standard sign of the fish), prohibited as the meal for the majority of the people of Easter Island, was written. Various fishes represent the god of the sea Tangaroa in the Rapanui beliefs (Scheffran 1965: 58; Fedorova 1978a: 24; Rjabchikov 2014b: 172). This god was also known everywhere in Polynesia as Tama (Tanga) ‘Father; Ancestor’ with different epithets (Rjabchikov 1988: 316-317, figure 3, fragment 9: 2014a; 2014b: 172-173, figure 9, fragment 6; 2016b; 2016c). According to Métraux (1940: 127), that god (ariki, king) was the forefather of the Rapanui kings from the Miru group. I conclude that all three records were made on the skulls of kings of the Miru group (Tuu, Moko, Hanau Momoko). These crania had the great mana (the supernatural power) per local beliefs. In compliance with the Rapanui legend “Puoko o te ariki” (Englert 2002: 144-145), ‘the sign of a tuna fish as the sign of an inverted fish’ (hai kahi, hai ika hoki) was incised on a king’s skull.4

Consider in this connection the record on the Small Santiago tablet, see figure 28.

Gr 1-2: 

Figure 28.

Gr 1-2: 8 6 35 48-15 44b 48-15 6-15 48-15 6 48-15 6 48-15 6 48-15 6 48-15 6 48-15 27 48-15 12 11 72 48-15 16 Matua a ADZE (= Tara-i or Tara) uri tua, uri Tangata roa [= Tangaroa], uri Tangata, uri Tangata, uri Rau, uri Ika Pakia Manu, uri Kahī (= Tangaroa).
Matua (son of) Tara, son of the open sea, son of Tangaroa [The great man, the great ancestor], son of a man, son of Tinirau, son of Rongo-ma-Tane, son of Tangaroa.

Here a genealogy of the explorer-king Hotu Matua, son of explorer-king Tara tahi (The first Tara), who both arrived from Mangareva (Rjabchikov 2014c; 2014d). His family line went back to the god Tangaroa. The memory about Tara tahi was retained in the image of king Tuu-ko-Iho (Tuu-ko-Ihu). In the Rapanui legend “Te moai kavakava a Tu u-ko-ilo” (Englert 2002: 102-107), the terms kautoki (kau-toki) and taraia (tara-i) mean ‘adze’ and ‘to carve’ respectively.

6. Consider a complicated motif on the skull of a female aged 20 to 24 years (Owsley et al. 2016: 266, figure 14.9[a]), see figure 27F. Glyphs were incised on this skull when its face was turned from the scribe: they are glyphs 26-15 in the cursive style reading Maro and denoting in this case the islet Marotiri. During the horrible wars between the tribal unions Tuu (Miri etc.; Hanau Momoko) and Hotu-iti (Tupahotu etc.; Hanau Eepe) some beautiful young women of the Tupa-hotu tribe who hid themselves on the
islet Marotiri were killed (Métraux 1940: 74-84). Perhaps the skull of such a woman was found many years later; on the cranium the name of the islet was engraved.

7. Consider a complicated motif on the skull of a male aged around 40 to 44 years (Owsley et al. 2016: 266, figure 14.9[b]), see figure 27G. A drawing (glyph?) of a grass skirt (cf. Rapanui kahu ‘dress’) and glyph 64 mea are engraved here. I presume that this record reads Kahu Mea.

According a legend (Englert 1974: 99-100), Kahu Mea was a Tupa-hotu nobleman, son-in-law of the Tupa-hotu chief (king?) Kauaha.

I have read earlier a peculiar glyph consisting of four parallel lines as a variant of glyph 34 raa (the sun) (Rjabchikov 2009a: figure 40). Obviously it was a different glyph with the reading kahu (now it is glyph 174). Consider the record on the Santiago staff, see figure 29.

Figure 29.

I 7: (a) (a vertical line) 49 (102) 6 12 (102) 33-29 62-62 6 11 … (Ariki) mau a ika vairua Toto a Mango…The killed king as the ghost Toto a Mango…

(b) 11 (a vertical line) 70 56 (102) 12 174 25-25 5/28 60/7 … Mango pua Poike Kahu. Huahua tinga mata Tuu … Mango (Toto) killed Kahu (Mea) from Poike; (then) the sons (of the latter character) killed (the people) of the tribe Tuu… {This segment has been decoded anew on the basis of the new data.}

According to this record, the hero (king) Mango Toto of the western tribes killed Kahu Mea during the terrible war around 1682 A.D. The name Mango Toto means ‘The Bloody Shark.’ It retained in the name of the ghost Nuku te Mango (The army of Mango [Toto]). Forster (1777: 591) wrote the name of the statue Mangototo [Mango Toto]. In accordance with Rapanui legends, ten years the authority belonged to the Miru, then about ten years the authority belonged to the Tupa-hotu (Métraux 1940: 382).

8. Consider four circles that were cut from the skull of a female aged 20 to 24 years perhaps from the ceremonial platform Ahu Naunau (Owsley et al. 2016: 259, figure 14.1). I surmise that such rounds had the symbolic value and represent glyphs 115 (139, 39) taka, raa. It was probably the skull of either a priestess of the solar cult or a princess (queen). Per Thomson (1891: 497), at Anakena (in the other words, in the vicinity of the ceremonial platform Ahu Naunau) a female statue called Viriviri Moai a Taka was situated. Barthel (1958b: 254) did not find such a monument there. So, I suggest that Viriviri a Taka (The Motion of the sun) was the name of that priestess or princess (queen) in fact.

(4) The “Sun Stones” are Indirectly Described on the Tahua Tablet

The “sun stones” were a local device at the ceremonial centre at Orongo to determine days of solstices and equinoxes (Ferdon 1961; 1988). A report about such measurements is preserved in the record on the Tahua tablet (cf. also figure 17), see figure 30. I have corrected the drawing.
Ab 3: (a) 6-40-6-40 6 68/62 1 Harehare a Honu, too Tiki. (It was) the big House of the Pleiades; the (sun god) Tiki took (it).

(b) 11-24 19 26 61 1 50 24 65 50 17 65 50 26 Maho (Mango)-ari, ku maa: too Tiki hi ari RANGI, hi tea RANGI, hi maa. (It was) Spica (associated with the sun god Tangaroa); the brightness of the sun increased: (the sun god) Tiki took the clear rays THE SKY, the clean (white) rays THE SKY, the bright rays.

(c) 2 62 73 50 6-15 50 19 8 … Hina too, hei Hora. Hiki Matua… The moon (the moon goddess Hina) took, (this goddess) drove the month Hora (Hora iti or Hora nui, August or September for the major part). The Canoe (β and α Centauri) was rising (in September)…

Here the features of the months (a) Maro (June chiefly; the day of the winter solstice), (b) Koro (December chiefly; the day of the summer solstice) and (c) Hora-nui (September chiefly; the day of the vernal equinox) are mentioned.

The read text was a fragment of an exercise at a late stage in education in the rongorongo school of king Kai Makoi the First. The pupils repeated glyph 50 (h)i several times. On that lesson glyphs 11 24 Maho (=Mango) ari “Spica” were basic.

The similar exercises on those glyphs in the same school are presented on the Keiti tablet (Rjabchikov 2013b: 9, figure 6; 11, figure 10), see figure 31, fragments 1 and 2. In fragment 3 the record on the Tahua tablet is presented that precedes the record in figure 30. During a lesson the students wrote the name of Spica many times.

1 (Er 2):

2 (Er 4):

3 (Ab 3): 21 43 11 4 24 11 24 44 24 44b 24 11 24 Ako ma-MAHO atua ari, Maho ari, taha: ari, tua: ari, Maho ari. Learn (the glyphs) 43 11 4 24 Maho atua (deity) ari, (the glyphs) 11 24 Maho ari, turn (a tablet, a banana leaf): (the glyphs) 24 ari, (write) on the other side (of the tablet or that leaf): (the glyphs) 11 24 Maho ari.

(5) The Farther Analysis of Reports about Elections of Bird-Men

I have deciphered the record on the Great St. Petersburg tablet (Rjabchikov 2013a: 6, figure 7). This text and its parallel record on the Small St. Petersburg tablet (Q) are presented in figure 32.
Moe, hono te Hina, Tiki, hatu. Kio haha, (a damaged segment) ha pa po (h) a Hina. Mau kaua (h) a ake. Tau Utu are a Mango-Ama. The moon goddess (and the sun god) Tiki slept (and) were united, they produced (the eggs). The servant (mata-kio) took (the egg), (a damaged segment) the bird-man touched the round object (popo = the egg) laying (on a piece of tapa) of the moon goddess. The progenitor (= the bird-man) held (a symbol) of abundance. (It was) the year of Utu, son of Mango Ama (or MAHO Maho?).

The verb mau ‘to hold’ (glyph 49 mau) in fragment 1 is replaced by the verb ha ‘to touch’ (glyph 6 ha, cf. Rapanui haha ‘to touch tentatively’).

The key indicator of these records is the word ake ‘abundance’ (glyphs 6-51), it is presented in figure 33. Call attention to the two versions of glyph 6 (h)a.

Old Rapanui ake means ‘more’ (Fedorova 1988: 107), cf. Tuamotuan ake ‘ditto.’ In the texts of two Rapanui songs in the common environs the place names Toka-Miti-Ake and Toka-miti-miti are mentioned (Campbell 1971: 400-401, 453). In the Rapanui language the reduplications are often used to augment the force of the morpheme (Fedorova 1978b: 47). Hence, miti-ake = mitimiti, and Old Rapanui ake signifies ‘more; abundant; abundance; many etc.’ Both place names mean ‘Underwater rock in the salt water.’

I agree in general with Horley’s (2012: 58-61, table 1) list of the names of bird-men (97 entries) composed on the base of Routledge’s lists. The bird-man called Utu in the records in figure 32 was known as Utu-Piro; he ruled in ca. 1850 A.D. (Métraux 1940: 339). If we assume that this dating has been estimated exactly, the last bird-man Rukunga or Rokunga ruled in 1867 A.D. Hence, the bird-man called Ko Hake (= Ko Ake ‘The Abundance’) ruled in 1771 A.D.

The total solar eclipse occurred during the bird-man festival on September 16, A.D. 1773. The name of the bird-man was Hopu Eroero, where the last word is comparable with Rapanui eoeo ‘ashes’ (the alternations of the sounds t/- were possible). Maybe the situation was so bad (due to the disappearance of the sun during the feast) that a servant (hopu) was declared as this bird-man. Thus, he was named after the eclipsed sun.

The simple calculation shows that the bird-man Kohu te Tangi from the Miru tribe ruled in 1860 A.D. The partial solar eclipse occurred on January 22, 1860 A.D. The name means The ‘Eclipse Cries’ (perhaps because of the death of king Nga Ara; see above), cf. Rapanui kohu raa ‘solar eclipse.’
The partial solar eclipse occurred on December 31, 1842 A.D. The bird-man *Ko te Piko Kohu* (Hidden, Eclipsed) could rule in 1843 A.D. His number in Horley’s list allows calculating the date of 1842 A.D.

The partial solar eclipse occurred on September 7, 1839 A.D. The bird-man *Ko Hiti ko te Vai Kino* (The Bad Water Rose; the symbolism of the darkness and rains) ruled that year.

The partial (almost total) solar eclipse occurred on March 25, 1838 A.D. The bird-man *Kohe Po ko Rano Kao* (The Darkness [Koe, Kore] of the Night at Rano Kao/Kau) ruled in 1838 A.D.; that eclipse had been predicted. (It is my hypothesis yet.)

The partial (almost total) solar eclipse occurred on October 29, 1818 A.D. The bird-man *Ko Raua Kere* (That who Became [was Created] Black) ruled in 1819 A.D. His number in Horley’s list allows calculating the date of 1818 A.D.

The partial (almost total) solar eclipse occurred on August 5, 1804 A.D. The bird-man *Ko Ta-Uru Ehu* (The Ashes or Smoke Entered) ruled that year. So, a number of bird-men were named after the eclipsed sun.

The presence of several bird-men of the eastern tribes from 1803 till 1808 or 1809 A.D. could imply that the all-powerful king *Kai-Makoi* the First (*Ko To Hi [As the Sunbeams] Tai/Kai*) died at that time. The authority of his son *Nga Ara* was unstable.

According to Routledge (1998: 265), the last bird-man *Rokunga* ruled in 1866 or 1867 A.D.

These data show that we have obtained the quite precise chronology (the error was about one year) of Rapanui ancient history from 1771 till 1867 A.D.

(6) How I Have Suddenly Realised a Rongorongo Text

Only now I understand the record (see figure 34) on the Tahua tablet, though I read it many years ago.

```
Ab 8: (a) 68/65 46 57 69 Honu RANGI naa tara, moko. The Pleiades are (still) invisible before dawn (in June).
(b) 4 65 5 53var 5 2 5 44 Atua Rangi, atua Maru (Maro), atua Hina, atua taha (= manu). The deities (are) the Sky (the description of the month Maru according to the second manu (bird) song, see above), the month Maru (Maro) [June chiefly], the Moon goddess, the birds (sooty terns).

It was an incantation read during the cold season. The natives waited for the arrival of sooty terns which were a certain symbol of the growing warmth of the sun.
```

Conclusions

There is a good cause to assert that the Easter Islanders constantly watched Aldebaran and the Pleiades in the past. The Russian scholar Irina K. Fedorova and the American scholar Georgia Lee were the first who contributed significantly to the archaeoastronomical studies of these celestial bodies. I have decoded the Mataveri calendar completely. The ceremonial platform Hekii 2 was oriented on Aldebaran and nearby stars. The disappearance of the Pleiades during the dawn period in the north at the end of August could be an important mark before the arrival of sooty terns and before the elections of the next bird-man. The calculated dates of several solar eclipses have been used for composing the chronology of Easter Island from 1771 till 1867 A.D. The ancient priests-astronomers watched the sun, the moon, Spica as well as β and α Centauri as well. At least two inscriptions, on the Tahua and Aruku-Kurenga tablets, indirectly witness
that the “sun stones” were a special astronomical device at the ceremonial centre of Orongo to determine the days of solstices and equinoxes.

Acknowledgements

I wish to thank Fr. Paul Lejeune for his kind permission to study four excellent rongorongo tablets (Mamari, Tahu'a, Aruku-Kurenga, and Tablette échangée) in the General Archives of the Congregation of the Sacred Hearts of Jesus and Mary (Rome) in May 2015. I am grateful to Ms. Luana Tarsi for her assistance during that research.

Notes

1. Old Rapanui toke (= toko) ‘great god; deity’ corresponds to Maori toko ‘sacred pole or stick set up in honour of a deity.’ Moreover, Maori term toko denotes several gods including Tane and Tangaroa (Te Rangi Hiroa 1949: 467). Takapau was the name of that statue. Taka means ‘round = the sun’ and pau (pahu) means ‘signs, carvings.’ So, it was really an image of the sun god (Rarai-a-Hova, Rarai-a-Hoa, Makemake, Tiki). Another name of this house was Taura-renga (Métraux 1940: 106). I suggest that this expression, Taura Renga, means ‘The priests taura of the sun (Renga, the Yellow Colour).’ The name of the same statue called Hoa-hakanaaia means ‘The Friend (an epithet of the sun deity) moves quickly.’

2. About fish atu (Old Rapanui atu [ atu] ‘bonito or skipjack tuna; Katsuwonus pelamis) see Rjabchikov 2011b. Perhaps the phrase tapu ki ika in this record describes primarily the tuna (kahi) fish.

3. Glyph 56 po represents the club paoa (Rjabchikov 1987: 366, appendix) and reads pao(a) and even pa in some records. Routledge (1914-1915) recorded a number of names of bird-men. Here I offer the translation of several such names: Ko Paea ko te Manu-Tara e Tahi (The Guard of the First Sooty Tern = The Guard of the First Egg), Pua Ua (The Egg of the Dwelling), Ko Pua Hau (The Egg of the King; or the Egg of the Moon Goddess), Ko Pue ko te Manu (The Egg of the Bird = the Egg of the Sooty Tern), Hihi Pua Moko (The Lift of the Egg of the tribal union Momoko), Ko Tahiti o Hiva (The First from Hiva), Ko te Ara Hiva (The Road from Hiva), Tahiti a Marua (The First Month Marua = Maru), Manu Api (The Hidden Bird), Ko te Manu Renga (The Bird of the Sun), Ko Taha Oi (The Motions of the Frigate Bird in Different Directions), Tahiti Ao Ria (The First Strong Authority or The First Strong Ceremonial Paddle; ria = riri), Ko Hina a Vaivai Tea (The Moon Goddess as a Source of the Clean Water), Ko Hina Manga (The Moon Goddess of the Shark; cf. the same name of a priest connected with king Kai-Makoi the First), Koro Henga (The Month Koro of the Bright Sun), Ta-kero (The Darkness), Ko Ke Hunga (The Hidden [Person] or the Disappearance), Tuu Huto Roa (The Great Abundance Came), Mata Popo Ra (The Face of the Hot Sun, cf. Rapanui popo ‘round’), Mata Roreroe (= Mata Roa, ReRe), The Growing (and) Flying Face = the sun, the arriving sooty terns), Ngata Hora (The Man of the month Hora), Ko te Mau Taka-taka (The Abundance of the Sun), Ko Niu Ka-ka Vera (The Nut [Egg] Associated with the Growing Warm), Ko Hihi (The Solar Rays), Taku Riko (The Count or the Prediction of Riko), Hengahenaha ma Taka (The Bright Light for the Sun), and Papa Haha Raa (A Rock for Watching the Sun).

4. It is the translation of mine. The literal meaning of the expression ika hoki is ‘the fish returning (= diving into the sea.’ Hence, in the reality the tuna fish were available for the local aristocracy only in the past.

References

Andersen, J.C., 1969. Myths & Legends of the Polynesians. Rutland, Vermont and Tokyo: Charles E. Tuttle.

Ayers, W., Wozniak, J. and J.M. Ramirez A., 2014. The Stone Statues at Urauranga Te Mahina, Rapa Nui. In: H. Martinsson-Wallin and T. Thomas (eds.) Monuments and People in the Pacific. Uppsala: Uppsala University, pp. 343-372.

Barthel, T.S., 1957. Die Hauptgottheit der Osterinsulaner. Jahrbuch des Museum für Völkerkunde zu Leipzig 15, pp. 60-82.

Barthel, T.S., 1958a. Grundlagen zur Entzifferung der Osterinselschrift. Hamburg: Cram, de Gruyter.
Barthel, T.S., 1958b. Female Stone Figures on Easter Island. *Journal of the Polynesian Society*, 67(3), pp. 252-255.

Barthel, T.S., 1978. *The Eighth Land. The Polynesian Discovery and Settlement of Easter Island*. Honolulu: University of Hawaii Press.

Beckwith, M., 1970. *Hawaiian Mythology*. Honolulu: University of Hawaii Press.

Best, E., 1922. The Astronomical Knowledge of the Maori. *Dominion Museum Monograph*, 3. Wellington: W.A.G. Skinner, Government Printer.

Blixen, O. 1973. Tradiciones pascuenses, II. Ure o Hei y los tres espíritus vengadores. *Tuapoi. La vieja del brazo largo. La niña de la roto*. *Moana, Estudios de Antropología Oceánica*, 1(6), pp. 1-11.

Brown, J.M., 1996. *The Riddle of the Pacific*. Kempton: Adventures Unlimited Press.

Butinov, N.A. and Y.V. Knorozov, 1957. Preliminary Report on The Study of the Written Language Of Easter Island. *Journal of the Polynesian Society*, 66(1), pp. 5-17.

Caillot, A.C.E., 1914. *Mythes, légendes et traditions des Polynésiens*. Paris: E. Leroux.

Campbell, R., 1971. *La herencia musical de Rapanui*. Santiago de Chile: Editorial Andrés Bello.

Campbell, R., 1999. *Mito y realidad de Rapanui: La cultura de la Isla de Pascua*. Santiago de Chile: Editorial Andrés Bello.

Englert, S., 1974. *La Tierra de Hotu Matu‘a. Historia y etnología de la Isla de Pascua*. Santiago de Chile: Ediciones de la Universidad de Chile.

Englert, S., 2002. *Legends of Easter Island*. Hangaroa: Rapanui Press/Museum Store.

Fedorova, I.K. 1965. Versions of Myths and Legends in Manuscripts from Easter Island. In: T. Heyerdahl and E.N. Ferdon, Jr. (eds.). *Reports of the Norwegian Archaeological Expedition to Easter Island and East Pacific*. Vol. 2. Miscellaneous Papers. Monographs of the School of American Research and the Kon-Tiki Museum, No 24, Part 2. Chicago – New York – San Francisco: Rand McNally, pp. 395-401.

Fedorova, I.K., 1978a. *Mify, predaniya i legendy ostrova Paskhi*. Moscow: Nauka.

Fedorova, I.K., 1978b. Nekotorye cherty istoricheskogo razvitiya rapanuyskogo yazyka. In: A.S. Petrikovskaya (ed.) *O yazykakh, fol‘klore i literature Okeanii*. Moscow: Nauka, pp. 39-81.

Fedorova, I.K., 1982. *Issledovanie rapanuyskikh textov*. In: Y.V. Knorozov (ed.) *Zabytye sistemy pis‘ma*. Moscow: Nauka, pp. 23-98.

Fedorova, I.K., 1988. *Mify i legendy ostrova Paskhi*. Leningrad: Nauka.

Felbermayer, F., 1971. *Sagen und Überlieferungen der Osterinsel*. Nürnberg: Hans Carl.

Ferdon, E.N., Jr., 1988. In Defence of the Orongo “Sun Stones”. *Journal of the Polynesian Society*, 97(1), pp. 73-77.

Feder, E.N., Jr., 1961. The Ceremonial Site of Orongo. In: T. Heyerdahl, and E.N. Ferdon, Jr. (eds.) *Reports of the Norwegian Archaeological Expedition to Easter Island and East Pacific*. Vol. 1. Archaeology of Easter Island. *Monographs of the School of American Research and the Museum of New Mexico*, No 24, Part 1. Chicago – New York – San Francisco: Rand McNally, pp. 221-255.

Forster, G., 1777. *A Voyage Round the World*. Vol. 1. London: B. White.

Gill, W.W., 1876. *Myths and Songs from the South Pacific*. London: Henry S. King.

Gill, W.W., 1912. Extracts from Dr. Wyatt Gill’s Papers. *Journal of the Polynesian Society*, 21(3), pp. 120-133.

Henry, T., 1928. *Ancient Tahiti. Bishop Museum Bulletin 48*. Honolulu: Bernice P. Bishop Museum.

Heyerdahl, T. and E.N. Ferdon, Jr. (eds.), 1965. *Reports of the Norwegian Archaeological Expedition to Easter Island and East Pacific*. Vol. 2. Miscellaneous Papers. Monographs of the School of American Research and the Kon-Tiki Museum, No 24, Part 2. Chicago – New York – San Francisco: Rand McNally.

Hockey T. and A. Hoffman, 2000. An Archeoastronomical Investigation: Does a Constellation Pattern Appear in Rapanui Rock Art? *Rapa Nui Journal*, 14(3), pp. 85-88.

Horley, P., 2012. Name Lists Connected with the Birdman Cult of Easter Island in the Field Notes of Katherine Routledge. *Rapa Nui Journal*, 26(2), pp. 55-74.

Lee, G., 1992. *The Rock Art of Easter Island. Symbols of Power, Prayers to the Gods*. Los Angeles: The Institute of Archaeology Publications (UCLA).
Lee, G., 2004. Rapa Nui’s Sea Creatures. *Rapa Nui Journal*, 18(1), pp. 31-38.
Liller, W., 1989. Karl Schanz’s Calendar Stone: Part 2. *Rapa Nui Journal*, 3(2), pp. 4-5.
Liller, W., 1991. Hetu’u Rapanui: The Archaeoastronomy of Easter Island. In: P.M. Lugger (ed.) *Asteroids to Quasars: A Symposium Honouring William Liller*. Cambridge: Cambridge University Press, pp. 267-286.
Loti, P., 1988. L’île de Pâques, Journal d’un aspirant de La Flore. Ville-d’Avray: Éditions Pierre-Olivier Combelles.
Métraux, A., 1937. The Kings of Easter Island. *Journal of the Polynesian Society*, 46(2), pp. 41-62.
Métraux, A., 1940. Ethnology of Easter Island. *Bishop Museum Bulletin 160*. Honolulu: Bernice P. Bishop Museum.
Mulloy, W., 1961. The Ceremonial Center of Vinapu. In: T. Heyerdahl and E.N. Ferdon, Jr. (eds.) *Reports of the Norwegian Archaeological Expedition to Easter Island and East Pacific*. Vol. 1. Archaeology of Easter Island. Monographs of the School of American Research and the Museum of New Mexico, No 24, Part 1. Chicago – New York – San Francisco: Rand McNally, pp. 93-180.
Mulloy, W., 1973. Preliminary Report of the Restoration of Ahu Huri a Urenga and Two Unnamed Ahu of Hanga Kio’e, Easter Island. *Bulletin 3*, Easter Island Committee. New York: International Fund for Monuments.
Mulloy, W., 1975. A Solstice Oriented Ahu on Easter Island. *Archaeology and Physical Anthropology in Oceania*, 10, pp. 1-39.
Owsley, D.W., Simon, V.E., Barca, K.G., Van Tilburg, J.A. and D. Whitmore, 2016. Demographic Analysis of Modified Crania from Rapa Nui. In: V.H. Stefan and G.W. Gill (eds.) *Skeletal Biology of the Ancient Rapanui (Easter Islanders)*. Cambridge: Cambridge University Press, pp. 253-268.
Popova, T., 2015. The Rapanui rongorongo Schools. Some Additional Notes. *Anthropos*, 110(2), pp. 553-555.
Pukui, M.K. and S.H. Elbert, 1986. *Hawaiian Dictionary*. Honolulu: University of Hawaii Press.
Rjabchikov, S.V., 1987. Progress Report on the Decipherment of the Easter Island Writing System. *Journal of the Polynesian Society*, 96(3), pp. 361-367.
Rjabchikov, S.V., 1988. Allographic Variations of Easter Island Glyphs. *Journal of the Polynesian Society*, 97(3), pp. 313-320.
Rjabchikov, S.V., 1989. Novye dannye po starorapanuyskomu yazyku. *Sovetskaya etnografiya*, 6, pp. 122-125.
Rjabchikov, S.V., 1993a. Rapanuyskie texty (k probleme rasshifrovki). *Etnograficheskoе obozrenie*, 4, pp. 124-141.
Rjabchikov, S.V., 1993b. *Tayny ostrova Paskhi*. Vol. 2. Krasnodar: Severny Kavkaz.
Rjabchikov, S.V., 1994. *Tayny ostrova Paskhi*. Vol. 3. Krasnodar: Ecoinvest.
Rjabchikov, S.V., 1995. *Tayny ostrova Paskhi*. Vol. 4. Krasnodar: Ecoinvest.
Rjabchikov, S.V., 1998. Polynesian Petroglyphs: Reports about Solar Eclipses. *Journal de la Société des Océanistes*, 107(2), pp. 231-232.
Rjabchikov, S.V., 1999. Astronomy and Rongorongo. *Rapa Nui Journal*, 13(1), pp. 18-19.
Rjabchikov, S.V., 2000. An Easter Island String Figure and Rongorongo Records Demonstrate Trans-Pacific Contact. *Bulletin of the International String Figure Association*, 7, pp. 66-69.
Rjabchikov, S.V., 2001. *Rongorongo Glyphs Clarify Easter Island Rock Drawings*. *Journal de la Société des Océanistes*, 113(2), pp. 215-220.
Rjabchikov, S.V., 2009a. Rapanui Proper and Place Names versus Rongorongo Texts. *AnthroGlobe Journal*: <http://www.anthroglobe.org/docs/srjabchikov_rongorongo_9_2008/rrongorongo_ssrjabchikov_main.htm>.
Rjabchikov, S.V., 2009b. Arkeologichesky pamyatnik Akahanga – Urauranga te Mahina na ostrove Paskhi. Krasnodar: The Sergei Rjabchikov Foundation – Research Centre for Studies of Ancient Civilisations and Cultures.
Rjabchikov, S.V., 2009c. *Rongorongo Reports about Rapanui Spring Feasts*. Krasnodar: The Sergei Rjabchikov Foundation – Research Centre for Studies of Ancient Civilisations and Cultures.
Rjabchikov, S.V., 2011a. On a Rapanui Rock Motif about the Eel. *Polynesian Research*, 2(4), pp. 3-16.
Rjabchikov, S.V., 2011b. On the Identification of the Easter Island Atu Fish. *Polynesian Research*, 2(3), pp. 4-12.
Rjabchikov, S.V., 2012a. The rongorongo Schools on Easter Island. *Anthropos*, 107(2): 564-570.
Rjabchikov, S.V., 2012b. On Mazière’s *Rongorongo* Tablet: A Preliminary Report. *Polynesia Newsletter*, 1, pp. 2-5.
Rjabchikov, S.V., 2013a. The Astronomical and Ethnological Components of the Cult of Bird-Man on Easter Island. arXiv:1309.6056 [physics.hist-ph].
Rjabchikov, S.V., 2013b. Research Notes on Decoding Rongorongo Inscriptions. *Polynesian Research*, 4(2), pp. 8-13.
Rjabchikov, S.V., 2014a. *On the Observations of the Sun in Polynesia*. arXiv:1407.5957 [physics.hist-ph].
Rjabchikov, S.V., 2014b. The God Tinerau in the Polynesian Art. *Anthropos*, 109(1), pp. 161-176.
Rjabchikov, S.V., 2014c. The Sea Route from the Marquesas to Mangareva and Then to Easter Island: New Data. *Polynesia Newsletter*, 3, pp. 2-14.
Rjabchikov, S.V., 2014d. The Sea Route from the Society Islands to Easter Island. Early Mangarevan-Marquesan Records on Easter Island: New Data. *Polynesia Newsletter*, 4, pp. 2-12.
Rjabchikov, S.V., 2015. *Easter Island: the Tongariki and Mataveri Solar Observatories Used a Common Methodology*. arXiv:1508.07100 [physics.hist-ph].
Rjabchikov, S.V., 2016a. *The Ancient Astronomy of Easter Island: Venus and Aldebaran*. arXiv:1604.03037 [physics.hist-ph].
Rjabchikov, S.V., 2016b. *Tama-nui-te-ra, Tangaroa, Tane, Whiro*: Remarks on the Maori Pantheon. *Polynesia Newsletter*, 6, pp. 2-4.
Rjabchikov, S.V., 2016c. *The Rongorongo Script Has Been Deciphered*. *Polynesia Newsletter*, 6, p. 5.
Rjabchikov, S.V., 2016d. The Ancient Astronomy of Easter Island: Kirch’s Comet. arXiv:1607.08638 [physics.hist-ph].
Routledge, K., 1914-1915. Katherine Routledge Papers. Royal Geographical Society, London, Archives. Copies Held in Libraries and Research Centres.
Routledge, K., 1998. *The Mystery of Easter Island*. Kempton: Adventures Unlimited Press.
Scheffrahn, W., 1965. *Tangaroa: Ein Beitrag zur polynesischen Religionsgeschichte*. Tübingen: Fotodruck Präzis.
Te Rangi Hiroa (Buck, P.), 1949. *The Coming of the Maori*. Wellington: Maori Purposes Fund Board.
Thomson, W.J., 1891. *Te Pito te Henua, or Easter Island*. Report of the United States National Museum for the Year Ending June 30, 1889. *Annual Reports of the Smithsonian Institution for 1889*. Washington: Smithsonian Institution, pp. 447-552.
Tregear, E., 1891. *The Maori-Polynesian Comparative Dictionary*. Wellington: Lyon and Blair.
Van Tilburg, J.A., 1986. Red Scoria on Easter Island: Sculpture, Artifacts, and Architecture. *Journal of New World Archaeology*, 1(7), pp. 1-27.
Wallin, P. and H. Martinsson-Wallin, 1997. Archaeological Excavations at the Ahu Hekii Complex, La Pérouse, Easter Island, October–November 1996. *Kon-Tiki Field Report Series*. Vol. 1. Oslo: The Kon-Tiki Museum.
White, J., 1887. *The Ancient History of the Maori, His Mythology and Traditions*. Vol. 1. *Horo-Uta or Taki-Tumu Migration*. Wellington: George Didsbury, Government Printer.
I visited the General Archives of the Congregation of the Sacred Hearts of Jesus and Mary in 2015. I was tracing the *rongorongo* glyphs of the Tahua tablet.