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Towards an Understanding of *Rongorongo*

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Abstract. – This article discusses in some detail the hypothesis proposed by Michael Dietrich concerning our understanding of *rongorongo*. Dietrich argues that *rongorongo* is not a script but a graphic system that contains the celestial knowledge of the prehistoric Oceanic peoples, developed and used for navigation. Dietrich's methodology and conclusions are then compared with those proposed by Thomas Barthel and Steven Fischer as well as with the results of recent research. The implications of Dietrich's hypothesis for Easter Island and Pacific studies and for scientific inquiry in general are discussed, with the purpose of inviting the scientific community to critically review our current knowledge on *rongorongo*. *[Polynesia, Easter Island, rongorongo, Polynesian astronomy, navigation]*

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Introduction

The missionary Eyraud (1866) discovered wooden objects on Easter Island with standardized engravings in 1864. Today, about two dozen of such objects (Fig. 1), which the old Easter Islanders had called *rongorongo*, are known. They are stored in various museums and private collections around the world.[1] Eyraud identified the engravings as probably constituting a script. He and other early visitors to Easter Island unsuccessfully tried to elicit the meaning of the script from an impoverished people, living in a tragically dysfunctional society.

Over the course of almost 150 years the study of *rongorongo* has fascinated many laymen and scholars, undoubtedly due to the fact of its unlikely occurrence in a neolithic tribal culture on one of the most isolated inhabited islands in the world. In the scientific community a controversy ensued over the question of whether or not *rongorongo* is indeed a script. Those denying *rongorongo* the status of a script were in the minority, albeit among these were such eminent authorities as Padre Sebastian Englert and Alfred Métraux. Most scholars, however, especially those who dominated the discussion over the last six decades,[2] have steadfastly studied *rongorongo* in terms of a script. This holds true also for most of the more recent studies, many of which are emphasizing statistical methods.[3] But even though these scholars have published widely, the ultimate consensus of the global scientific community is still outstanding. Thus, the controversy persists.

Fischer's Methodology and Findings

Recently, the scientific community has paid most attention to the findings of Fischer (1995a, 1995b, 1997). Years of research resulted in 1997 in a for-

1 Barthel (1958); Esen-Baur (1989); Fischer (1997); Heyerdahl (1975).

2 Barthel (1974, 1993); Fedorova (1990); Fischer (1993); Guy (1990, 1998, 2006); Knorozov and Butinov (1957); Krupa (1971); Rjabchikov (1987).

3 Sproat (2003); Pozdniakov (1996); Melka (2008, 2009a, 2009b).

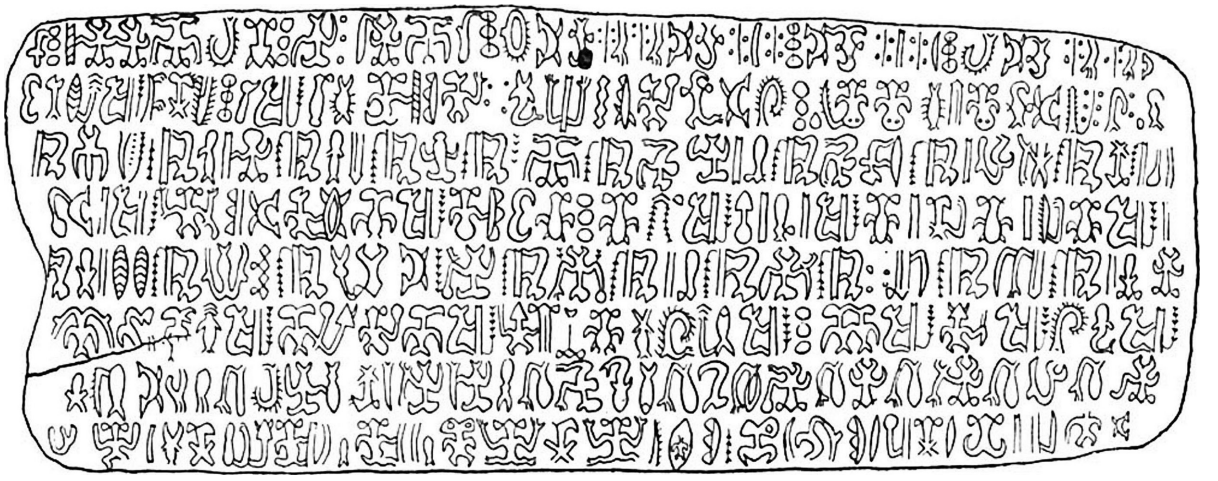


Fig. 1: Small Santiago tablet. According to Barthel (1958: 22) the dimensions are approximately 32 × 12 × 2 cm. This side shows eight rows of glyphs. There are about 720 glyphs on both sides. The glyphs on alternate rows are carved upside down, in inverse boustrophedon order.

midable monograph on the subject. And for a little while the news surfaced that the code had at last been broken.

In the 1997 volume Fischer focused primarily on the script's research history, its material manifestations, and its ethnographic dimensions. Less emphasis was given to the actual decipherment, resulting in one relatively short and tentative reading of *rongorongo* (Fig. 3). Yet, Fischer (1995b: 315 f.) parallels the impact of his decipherment with Alice Krober's identification (1943–1950) of inflection in Linear B and with Yuri Knorozov's discovery in the early 1950s that the Mayan script is logographic.

Michael Coe (1998) not only questions Fischer's dating of the script but also his alleged decipherment, suggesting that it is based on methodological error. Jacques Guy (1996) attests Fischer a fundamental flaw in reasoning. But both authors, as others (Guiart 1990), are pessimistic regarding the success of ever deciphering *rongorongo*.

In his attempt at decipherment Fischer focused primarily on the Santiago Staff (the longest of the surviving *rongorongo* texts) which is engraved with nearly 2,300 glyphs. The staff is not only famous for the quantity and quality of its engravings but also for the textual markers thereupon. The staff features 97 irregularly spaced thin vertical lines. With one exception (Ta4), lines like these are not to be found on any of the other *rongorongo* artifacts.

Fischer proceeded, therefore, at first structurally. He found that each glyph following such a textual division is suffixed by a phallus-like glyph. He also

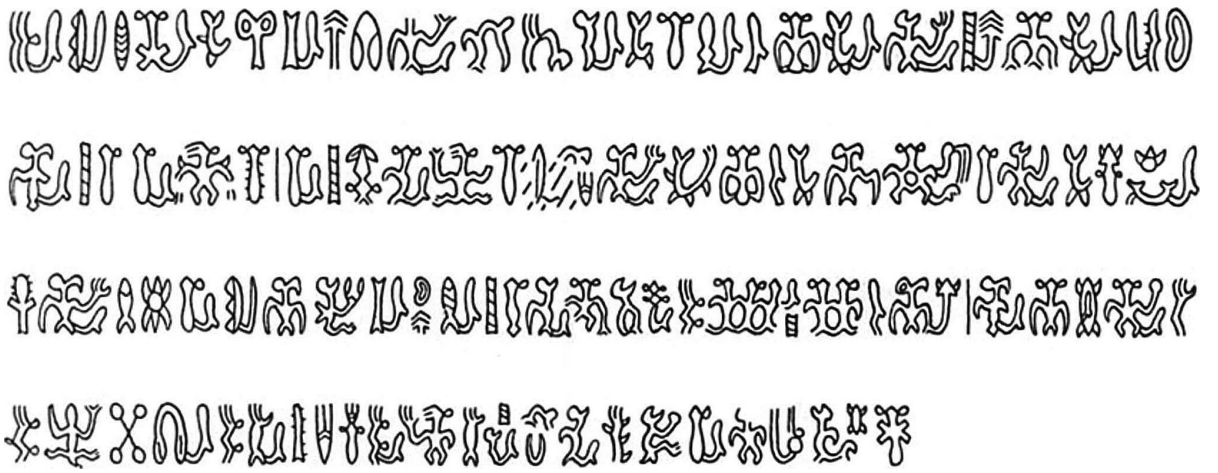


Fig. 2: Excerpt of the Santiago Staff according to Barthel (1958). The glyphs are not transcribed in the original inverse boustrophedon order.

discerned statistically relevant repetitions of phallus-like glyphs. From these observations Fischer derived a triad structure, which he then identified as the minimal textual statement in *rongorongo*. Fischer went on to express the triad structure in terms of a formula: X^1 Y Zn.

– X-designates the glyph to which the phallus is suffixed.
– Y-represents a statistically more frequent glyph that follows X. Z-is a statistically less frequent glyph that follows Y.
– The "n" in the formula is the constant, here denoting unspecified repetition of the triad structure.
– The superlinear "1" in the formula refers to the circumstance that the phallus-like glyph is interpreted semasiographically.

Fischer based his reading to a large extent on the face value of the glyphs, i.e., a fish is a fish, a bird is a bird, etc. In addition, Fischer, being a linguist, read the glyphs, of course, also against the Easter Island and other Polynesian idioms and in terms of homoiphones, homophones, and rebus, a method which had already been used extensively by Barthel (1958). In addition, as indicated above, he read them also in terms of semasiography.

Having identified this triad structure Fischer proceeded to look for external corroboration in the ethnological record from Easter Island. He claimed to have found such triad structures in creation chants – *atua mata riri* – which had been collected on Easter Island in the year 1886 from the Easter Islander Ure Va'e Iko by the American paymaster Thomson (1891). These contain a total of 41 copulations. However, Fischer found no matches between the content of the triads encountered on the Santiago Staff (see Fig. 2) and the content of the Easter Island creation chants nor did he find such matches in the ethnological literature from other Pacific islands.

Since the issue (Z) of his triad formula is not subject of each subsequent triad, Fischer dismissed the idea that the triads reflect genealogies. Instead, Fischer argued that the triad structure contains cosmogonical information. Fischer argued that the cosmogonical content of the *rongorongo* script is further substantiated by the fact that the Easter Islanders had pointed to the heavens, when they were questioned about the content of the *rongorongo* staff.

As to the age and provenience of *rongorongo*, Fischer stated that the Easter Island script was developed on Easter Island after the contact with the Spaniards in 1770, arguing that the Spaniards had asked the Easter Islanders to sign an annexation document. Thus, the Easter Islanders were confronted by a script, which prompted them to develop their own. Emory (1972) had already suggested this explanation. Fischer concluded that *rongorongo* is a mixed script, one that is both logographic and semasiographic and presented this tentative reading.

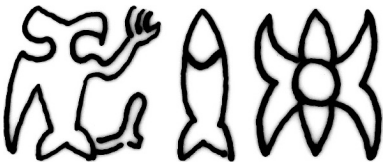


Fig. 3: Reading of above triad submitted by Fischer (1995a: 102): All the birds copulated with fish: there issued forth the sun: *te-manu mau ki'ai ki te ika: ka pu te ra'a*.

This triad can be found in Fig. 2, line 3: 2nd, 3rd and 4th glyphs. The triad does not appear immediately after one of the textual markers.

A more detailed discussion of Fischer's methodology and findings is not deemed necessary in the context of this paper, as these have been widely published.

Dietrich's Methodology and Findings

Shortly after Fischer's research had been published a new hypothesis of interpreting *rongorongo* was put forth, not by a cultural scientist but rather by an artist who had also worked many years as a graphic designer (Dietrich 1998, 1999a, 1999b, 2000, 2001). Dietrich did not develop his hypothesis with the rigor expected in scientific circles and he was not familiar with the scientific jargon generally used. Thus, his articles were at times interspersed with long unnecessary digressions, at other times with a rather flowering language. Stylistically the presentations were oftentimes haphazard and even for German readers difficult to follow. Still, Krupa, editor-in-chief of the *Journal of Asian and African Studies*, being an insider to the subject of *rongorongo*, did publish his articles. Krupa saw beyond these shortcomings and discerned an approach worthwile pursuing, a stance quite in line with the noble tradition of academic tolerance.

Analysis of Structure

Dietrich approached *rongorongo* by focussing on the glyph catalogue (Formentafeln) and the subsequent transcription of the inscriptions as compiled by Barthel in his 1958 volume. In the glyph catalogue Barthel had listed 790 positions, of which 603 positions were actually filled. The glyphs were

grouped according to eight external criteria, that is, by criteria which had made sense to Barthel. These eight criteria were: 1. geometrical forms, 2. rare geometrical forms and personifications, 3. anthropomorphic figures with head in en face position, 4. anthropomorphic figures with heads in profile position, 5. figures in en face position having different body forms, 6. special head forms, 7. bird figures, and 8. other animal figures. Barthel's glyph catalogue did not reflect glyph classes such as single glyphs or combined glyphs even though he mentioned such glyphs classes sporadically.

After a thorough analysis of Barthel's glyph catalogue, Dietrich was convinced that the external criteria by which Barthel had classified the glyphs did not reflect the internal criteria adhered to by the unknown graphic artists, who had originally devised the *rongorongo* system. In fact, Dietrich held that Barthel's glyph catalogue obfuscates rather than reveals the underlying systematic. His experience as a graphic artist led him to believe that this graphic system, as is the case in all other graphic systems, had evolved from single glyph to combined glyph. In order to be able to understand such a system, it would, therefore, be necessary to first identify the single glyphs in *rongorongo*. The next step would then be to learn the rules by which combined glyphs were created.

Even though Dietrich doubted the appropriateness of Barthels's external criteria, he, nevertheless, commended his attempt of assigning numbers to the *rongorongo* glyphs. Such numbering made possible statistical analyses which gave the study of *rongorongo* a more objective standing, which, in the eyes of many scholars, had been lacking so far. Such analyses – and Barthel presented ample evidence for it – yielded quantitative relationships of *rongorongo* glyphs, be they single or combined glyphs. For instance, Barthel (1958: 165) was now in the position to identify the twenty most frequent *rongorongo* glyphs, expressing their hierarchy in terms of exact percentages. Such analyses also offered insights into the distribution of glyphs on any individual artifact as well as on all extant artifacts. Thus, Barthel had indeed devised a smart tool with which to obtain interesting statistical data in terms of distribution, repetition, and even parallel passages. Such information would turn out to be of enormous importance when moving from the level of structural analysis to the analysis of content.

Fischer (1997: 218) had also criticized Barthel's glyph catalogue, pleading for a revised and improved version. The new version should distinguish between main glyphs, affixes (prefixes, suffixes, infixes), fusions (suprafusion, subfusion), and alloglyphs. But Fischer did not construct such a new glyph catalogue.

Other scientists have criticized Barthel's glyph catalogue. The Pozdniakovs (2007), for example, reduced the inventory of glyphs to just 52 (see Fig. 4), claiming that they account for 99,7% of the corpus. Another extreme is proposed by Everson (2009), who fits the glyphs into a "universal character set," comprising hundreds of glyphs.

Dietrich revised Barthel's glyph catalogue in terms of three glyph-classes: a class of single glyphs, another of combined glyphs, and a third class featuring those glyphs which are never encountered alone, as they are always attached to glyphs of the first two classes. Work on this revised glyph catalogue is in progress. Dietrich contends that these three glyph classes reflect the criteria which are intrinsic to the system. In collaboration with Dietrich a list of 70 single glyphs is presented in Fig. 5. This list is constantly growing by ongoing research. It is expected that this list will eventually comprise more than 100 glyphs and numbers will then be assigned to each single glyph.

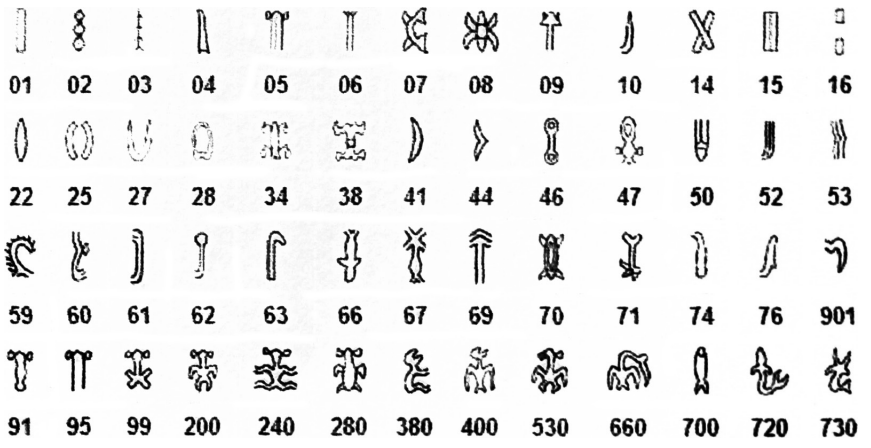


Fig. 4: Glyph catalogue as provided by the Pozdniakovs (2007).

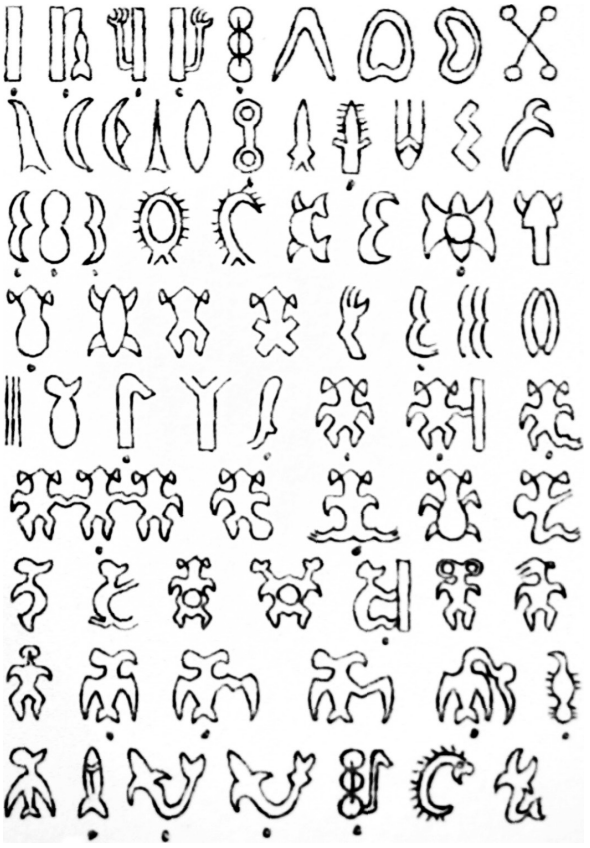


Fig. 5: List of single glyphs, as provided by Dietrich (personal communication 2010). Those glyphs identified with a dot underneath are discussed in this article.

Given the celestial hypothesis, one may ask why those glyphs in Fig. 5, which have been identified as moon glyphs by Barthel and others, are not discussed in this article. Such a discussion will necessarily be quite extensive and calls for a separate article, which is in preparation.

Comparing Fig. 4 and Fig. 5 we note that they share quite a number of glyphs but differ in quantity. The quantity is expected to increase. Their greatest difference, however, is to be seen in the way these lists are put to use in the effort of explaining *rongorongo*.

The Pozdniakovs used their list of 52 glyphs to determine their statistical frequencies in the corpus. These frequencies were then tested against linguistic frequencies in Rapanui. From these results they deduced that *rongorongo* is compatible with Rapanui, making *rongorongo* a phonetic script. Their analysis stayed short of assigning phonetic values to each glyph, but they stated that *rongorongo* is essentially a syllabary. Their research must be seen as giving support to the script hypothesis. The response of the scientific community has not been very enthusiastic (Sproat 2003).

Dietrich's list, on the other hand, is tested against the specific body of Polynesian literature, ethnographica, and language pertaining to the celestial sphere and navigation. His single glyphs are not assigned phonetic values but are understood to be names and concepts pertaining to the celestial sphere and navigation. Dietrich's list does not give support to the script hypothesis, in fact, it rejects it.

Dietrich's second glyph class, consisting of combined glyphs, is the largest of the three glyph classes. A perusal of the corpus shows that it consists mostly of combined glyphs. Even though many of these combined glyphs occur frequently, others occur only once. In future it might be helpful to also assign to this glyph class numbers, which should be derived from those numbers that will be assigned to the single glyphs.

Various researchers (e.g., Métraux 1941: 401; Guy 1982) have suggested that combining glyphs may not have had any significance, since similar or identical glyph groups are encountered in the corpus, which are at times joined and at other times not connected. The Pozdniakovs' glyph catalogue (see Fig. 4) is obviously built on this assumption. Dietrich's analysis does not support such a far-reaching interpretation, there being too much evidence to the contrary. More importantly, he holds that the graphic artists, who had devised the system, had consciously incorporated the concept of combining and had understood it to be a vehicle by which (special) meaning could be transported.

Many of the combined glyphs consist of two, three, or four glyphs. But there are also those which consist of up to ten glyphs. It goes without saying that this part of the glyph catalogue, because of its sheer size, is not presented here, even though much work has already been put into it. But a number of examples of combined glyphs will be discussed below, particularly in reference to the rules established for combining glyphs and in terms of the mastery achieved therein by the *rongorongo* artists.

The third glyph class will probably be quite short. Presently it consists of 11 glyphs (see Fig. 6).

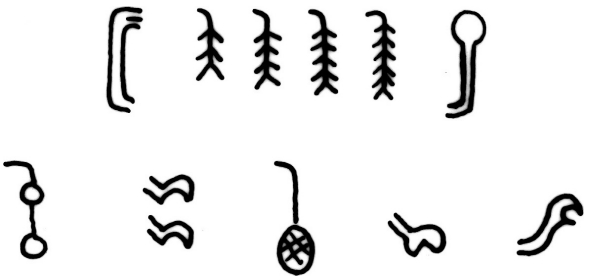


Fig. 6: List of single glyphs, which never stand alone, as provided by Dietrich (personal communication 2010).

In Barthel's glyph catalogue Dietrich's three glyph classes are haphazardly mixed. Having approached the corpus of *rongorongo* glyphs with the above mentioned eight external criteria of this own choosing, Barthel was "blind" to other more fundamental glyph classes, such as the ones perceived by Dietrich.

Method of Combining Single Glyphs

Since the class of combined glyphs is by far the largest class, their construction presented the *rongorongo* artists with great challenges. They had to develop rules to be adhered to and which could be taught. Most importantly, these rules had to make sense graphically. Simply combining single glyphs might easily result in a monstrosity, disturbing the aesthetic flux of the system which the *rongorongo* artists certainly wanted to attain and maintain. In addition, such juxtapositions, since they would be made up of unaltered glyphs, would use up scarce space (graphic economy). Such a simple procedure was, therefore, discarded. Instead, the procedure followed by the *rongorongo* artists – among others to be described below – was one of partial elimination. Dietrich's studies showed that combined glyphs were fashioned by eliminating superfluous element(s) of the original single glyphs to be connected. And this had to be accomplished in such a way that the message that one wanted to get across with the combined glyph, would not get lost. Thus, the required element of a single glyph one needed to hang on to would have to be what graphic artists identify as its dramatic highlight.

The first example (Fig. 7) shows a combined glyph constructed out of two single glyphs: one is a bird with a long neck, the other is a (broken) leg. The dramatic highlight of the bird figure is obviously its long neck. For the purpose of combination the body of the bird is dropped, it is the superfluous element. As to the (broken) leg nothing can nor need be dropped of this glyph. The two glyphs are elegantly joined, creating an aesthetically convincing glyph. The combined glyph used up little space and most likely gets the message across. The next four examples are combined glyphs, each consisting of three single glyphs.

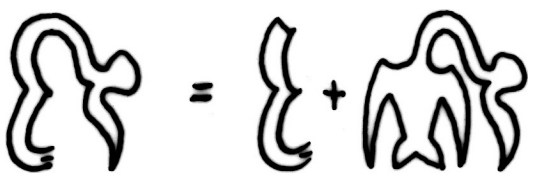


Fig. 7: An example of a combined glyph which consists of two single glyphs.

Fig. 8: An example of a combined glyph which consists of three single glyphs.

Figure 8 consists of 1) a bird: Its body is crafted in en-face position, its head in profile position. The dramatic highlight of this glyph is the broken wing. 2) A pillar: Crowned with what looks like a helmet. It is crafted in en-face position. Its dramatic highlight is that helmet. 3) A "birdman" (human head and legs but wings instead of arms): It is entirely fashioned in en-face position. Its dramatic highlight consists obviously of the wings and the legs, not so much of the head. The three individual glyphs were stripped of everything but their dramatic highlight and the rest was elegantly joined together, using up little space, making a definite statement.

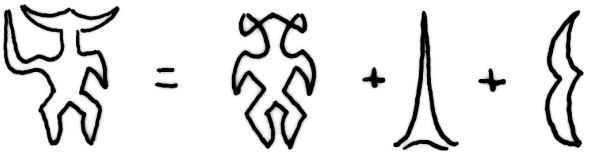


Fig. 9: An example of a combined glyph which consists of three single glyphs.

Figure 9 is composed similarly. Note, that the dramatic highlight of the "birdman" is his body with wings and legs. His head is superfluous. To the truncated body of the "birdman" the two other glyphs are attached. In one case, the original glyph was reduced to half of its original size and, in the other case, the glyph was rotated some 90 degrees so that it fits like a head onto the truncated body of the "birdman." Again, the new glyph has handled space economically, it is aesthetically convincing and very likely contains all information required.

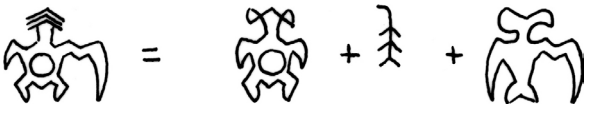


Fig. 10: An example of a combined glyph which consists of three single glyphs.

Figure 10 is also a composition of three single glyphs, combined along the rules discussed above. The broken wing and the three wedges hanging on a line, but not the line itself, are added to the body of a "birdman," whose dramatic highlight is the round hole on his belly.

Fig. 11: An example of a combined glyph which consists of three single glyphs.

Figure 11 features a "birdman" making the split, which definitely is its dramatic highlight. The pillar and the adze are glyphs that do not have any superfluous element(s). They were, however, reduced in size, in order to be added in a natural manner to the body of the "birdman."

Figure 12 features the longest combined glyph to be found in the corpus of *rongorongo* glyphs. To the unschooled observer four or five glyphs seem to be combined here. But by controlled graphic analysis this first impression must be revised. This combined glyph is in fact composed of ten individual glyphs, achieved by applying all the rules discussed above.

These examples show that the old *rongorongo* artists were indeed masters of connecting glyphs while maintaining information. The new entity was the outcome of a masterly performance in graphic design. Surely, they had the beauty of the graphic system in mind, their creative ingenuity, however, was foremost directed at the function of the system.

Macri (1996: 186) provided five examples of combined glyphs which she broke down into their constituent elements, maintaining, however, that each element may correlate with a syllable of the Rapanui language, thus providing support to the script hypothesis.

Analysis of Content

Having established these structural insights into the *rongorongo* system, Dietrich's next step was the attempt to assign meaning to the single and to the combined glyphs and to the system as a whole.

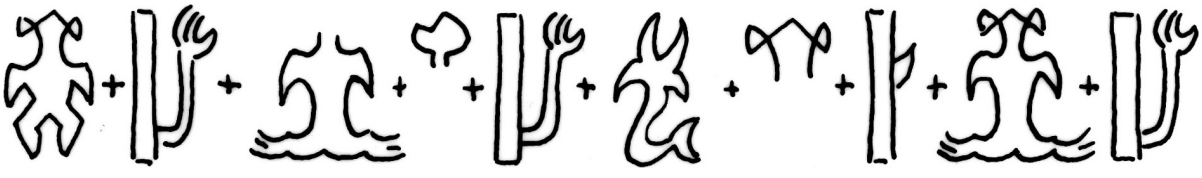
Barthel had attempted to decipher *rongorongo* by a mixture of methods. He had used information gleaned by the translation efforts of the Easter Islander Metoro, who in 1873 was interviewed by Bishop Jaussen on Tahiti. Barthel had also consulted traditions from other islands of the Pacific, especially those which concerned themselves with mythological motifs pertaining to the sun, the moon, the Milky Way, the gods, etc. He had applied various linguistic methods such as rebus, homophonic, and homoiphonic readings. Barthel (1963) also included "decipherments" of several *rongorongo* glyphs said to have been obtained by his field assistant, Leonardo Pakarati, in 1957! See also the relevant discussion in the chap. "Conclusion."

Fischer, in his attempt at deciphering, as mentioned above, relied heavily on the chants collected in 1886 from the Easter Islander Ure Va'e Iko. He also applied the linguistic methods Barthel had already subscribed to and added semasiographic explanations.

Barthel and Fischer addressed the question of age and origin of *rongorongo*, since answers to these questions have consequences for the analysis of content. The answers to these questions given by Barthel and Fischer differ substantially.

Barthel maintained throughout his professional life – see, e.g., his publications in 1958, 1963, 1989, and 1990 as well as private discussions up until his death in 1997 – that *rongorongo* was not invented

Fig. 12: Longest combined glyph in the corpus of *rongorongo*. Location according to Barthel (1958: Pv 5).



on Easter Island. Barthel was convinced that it had originated in Eastern Polynesia sometime around the 14th century, during the time of the Golden Age of Polynesian culture. It had reached Easter Island shortly thereafter with a large group of (second) settlers, led by the culture hero Hotu Matua. In support of this hypothesis Barthel cites genealogies, legends, historical and linguistic developments also of Eastern Polynesian cultures. He refers in particular to a legend which purports that Hotu Matua had brought with him 67 *rongorongo* tablets.

Fischer (1997), on the other hand, argues that *rongorongo* is a late local development, stimulated by the Spaniards, who had visited Easter Island in 1770. In an earlier (1994), highly speculative article, Fischer had argued that Hotu Matua was a late (Missionary times) Mangarevan import, who had replaced the "original" founding father of the Easter Islanders. He suggests that the "original" founding father had arrived around 1500 years before the European discovery (1722) and was derived from the Polynesian god Tu. Fischer gives no credence to the theory of a Pre-European import of *rongorongo* tablets as he supports the hypothesis of a single settlement.

My own research does not confirm the hypothesis of a single settlement nor the hypothesis that *rongorongo* has been a late local development. The obviously spectacular cultural achievements of the Easter Islanders, which have baffled so many scientists – the production of the classical *moai* and *rongorongo* – are seen as developments belonging to the Middle Period of cultural development on Easter Island and correspond nicely with Barthel's hypothesis and chronology of a second settlement. My detailed analysis of the petroglyphs of Orongo and their relationship to the *rongorongo* glyphs likewise give evidence for a much greater time depth of the latter than suggested by Fischer (for a detailed discussion see Esen-Baur 1983).

Dietrich, who approached these questions from an entirely different vantage point, also cannot confirm a late indigenous invention of *rongorongo*. The celestial knowledge found in *rongorongo* is not limited to those phenomena which can be observed from Easter Island. He has collected overwhelming evidence for star names and celestial concepts that reflect Tahitian, Hawaiian, Maori, etc. concepts, which could not have been known to Easter Islanders if they had experienced only one early pre-European settlement. *Rongorongo* contains knowledge gathered by Polynesians and their forefathers, who had travelled both the northern and southern hemisphere.

Even though Barthel and Fischer differ regarding the origin and time depth of *rongorongo* they do not differ in terms of their basic explanatory model. Both tried to decipher *rongorongo* linguistically. Since many of the glyphs depict easily identifiable natural phenomena, such as birds, fish, the sun, the moon, a pectoral, etc., these were in a first step directly translated into Polynesian: *manu*, *ika*, *ra'a*, *hina* (*marama*), *rei miro*, etc. Individual syllables gleaned from these translations were then amended and played with according to the above mentioned linguistic methods and connected with the ethnographic, ethnological, and linguistic literature of Polynesia and beyond. This is a totally acceptable strategy, yet the inroads made into the decipherment of *rongorongo* in the course of almost six decades are rather meagre, as anyone who has travailed through the heaps of this specific literature will readily admit.

As a consequence of his in-depth structural analysis of the *rongorongo* system, Dietrich dropped the script hypothesis. He had encountered too many single glyphs for the system to be an alphabet or a syllabary. He argued instead for some kind of a notation system. The question to be answered was: What information or knowledge the Polynesians may have had found worth recording with these *rongorongo* glyphs?

The idea that this notation system may have something to do with celestial bodies came up quite readily. Barthel and others had already identified certain glyphs as heavenly bodies. And a look at the ancient lore of the Polynesians, their myths, and legends, but also their religious beliefs, reflect an enormous interest in and knowledge of the celestial sphere. From time immemorial, the Polynesians, just like all mankind, had studied the rising and the setting of the sun, the waxing and the waning of the moon, the appearance and the disappearance of individual stars and constellations. In time they had become aware of correlations between the movements of these celestial bodies and planting and harvesting seasons. The periods of abundance and scarcity seemed also to correlate with changes in temperature and winds and currents. All these phenomena structured daily life and were in time enhanced with ritual. The celestial sphere permeated all of life and religion. The Polynesians believed that their gods had created their many tiered cosmos. They believed that their revered ancestors reappeared after death either as individual stars on the heavens or that they inhabited, together with many lesser souls, the more nebulous heavenly places, such as the Milky Way. Inherent in such explanations is the belief that the nightly sky is populated by human-like individuals, also by certain animals, natural objects, and symbols encoun-

tered and used in daily life (Cain 1990; Makemson 1941).

Since the old Polynesians were a seafaring people, they had yet another very special need for celestial knowledge. One of their greatest achievements was populating the many hitherto uninhabited islands, sputtered over the vast expanse of the Pacific. Buck (1938), therefore, spoke of the Polynesians in terms of "vikings of the sunrise." The Polynesians excelled in navigation and in pre-European time they were able to build great seaworthy ships with which they navigated safely by the stars. Åkerblom (1968: 23) writes: "Polynesian astronomy, … was … adequate as a basis on which to evolve a navigational method, without which ocean voyages would have been impossible."

Thus, there was a good case to be made for Polynesians to have developed a notation system that would reflect their celestial and perhaps also their navigational knowledge. Dietrich decided to explore Oceanic and Polynesian literature from the vantage point of such a hypothesis. He went systematically through the body of Polynesian and Oceanic myths and legends and the various compendia of star names. He checked descriptions of ethnographica. Most useful at this stage were the writings of Makemson (1941), Johnson and Mahelona (1975), Best (1922), Åkerblom (1968), Gill (1876), and the many other authors named in the bibliographies to his various publications. Oftentimes he found more than one name for a certain star or constellation. This is not deemed unusual, considering that this knowledge had been collected over a long period of time and by various island cultures. When we look at our Western cosmos to which many different cultures – Persian, Egyptian, Greek, Roman, North European, etc. – have contributed over time, we, too, encounter often more than one name for a particular star. These various names are witnesses to the historical circumstances upon which our Western cosmos has been built. The Polynesians obviously gave different names to the stars and they connected various stars differently from Western traditions, thereby creating their very own sidereal system, demonstrating extraordinary creativity, as will be shown below. Dietrich, the graphic artist, decided to focus on those names which lend themselves to be transposed graphically into glyphs.

It is obvious that the old Polynesians would concern themselves only with those stars which they could make out with the naked eye. At best, there are about a few thousand individual visible stars. Kyselka and Lanterman (1976: 37) give the following count: "Six thousand stars of 6th magnitude or brighter are visible to the unaided eye. Since only half the celestial sphere can be seen at any time, this number is down to 3,000. Many stars are near the horizon, and are hard to see in the thickness of the atmosphere, reducing the number to perhaps 2,500." Makemson (1941) collected the names of less than a thousand stars and there are about two hundred stars that are particularly bright. Dietrich has been able to identify dozens of stars, planets, and constellations among the *rongorongo* glyphs by the above mentioned method. In this article I shall present some 30 identifications, which will suffice to get the discussion started.

Identification of Stars, Planets and Constellations

The constellation Orion and some of its bright neighboring stars are visible with the naked eye. The constellation is close to the Milky Way and can be seen from most parts of the world. The old Polynesians knew many of these stars and had given them names which astutely characterize their perceived idiosyncracies. Much of this knowledge is embedded in the ethnographic literature on Oceania.

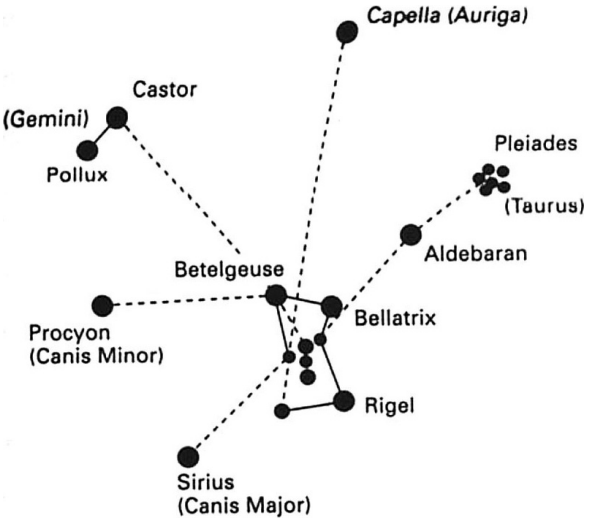


Fig. 13: Orion and bright neighboring stars (Daintith and Gould 2006: 315).

The star Betelgeuse is the second brightest star in the constellation Orion. Makemson (1941: 199) reports that the Polynesians named this star Ana-varu (Tahitian) and that it was given the description "the pillar to sit by." Dietrich suggests that the glyph depicted in Fig. 14 may designate this star.

Fig. 14: The star Betelgeuse (Ana-varu).

The star Sirius is not only the brightest star in the constellation Canis Major, but it is also the brightest star after the Sun and is one of the nearest stars in the sky. In star navigation Sirius is known as "the sun of the night." Johnson and Mahelona (1975: 1) and Makemson (1941: 198) report two names for this star. One is A'a (Hawaiian), which is translated with "burning bright," the other is Ipu-o-Lono (Hawaiian), which is translated with "gourd" (Johnson and Mahelona 1975: ix). Dietrich offers the following two glyphs as signifying this bright star:

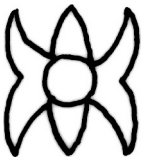


Fig. 15 (left): The star Sirius (A'a).
Fig. 16 (right): The star Sirius (Ipu-o-Lono).

Another bright star is Aldebaran, located halfway between Orion and the Pleiades (Fig. 13). It is the brightest star in the constellation Taurus. Johnson and Mahelona (1975: 119) collected the name Ul (Lamotrek) for this star, which is translated with "the virile member." The above authors provide interesting additional information (61): "Wuun is Aldebaran in Taurus. It refers to a worm or 'viril member' (penis) which is the Micronesian configuration in the constellation Taurus. The phallic rock on Moloka'i, Ka-ule-o-Nanahoa, "Penis of Nanahoa" (Fig. 18), is probably associated with Aldebaran, since ule in Hawaiian is a cognate of Uun, Ul, or Wuun (Aldebaran) in Micronesia." Dietrich assigns the glyph (Fig. 17) to the star Aldebaran:

Fig. 17: The star Aldebaran (Ul).

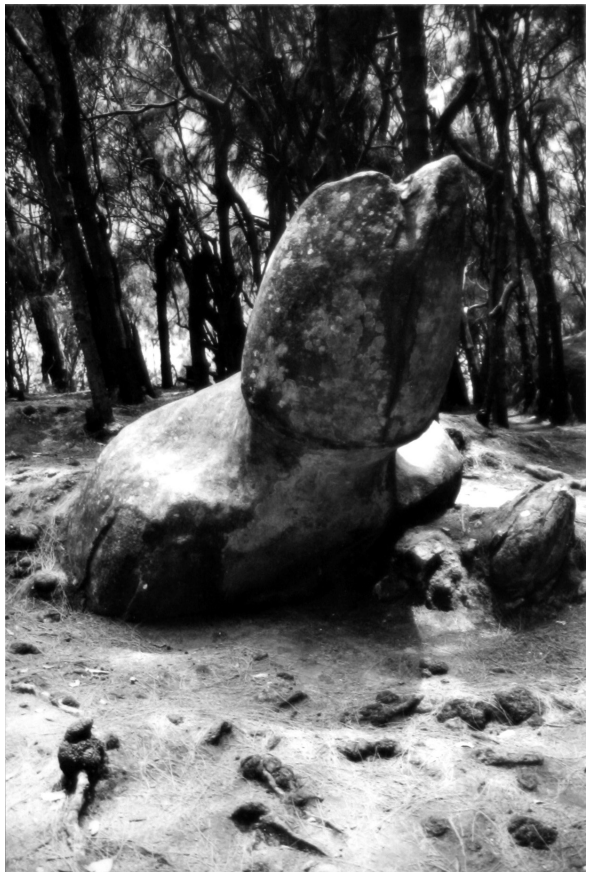


Fig. 18: Phallic rock on Moloka'i: Ka-ule-o-Nanahoa. Photo: Esen-Baur, 1994.

The brightest star in the constellation Orion is Rigel. Makemson (1941: 247) reports for this star the name Puanga (Maori), which she translates with "blossom cluster." The glyph best matching this description is deemed by Dietrich the representation shown in Fig. 19.

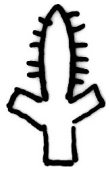


Fig. 19: The star Rigel (Puanga).

It is interesting to note that Best (1922: 39) was also given the above name for Rigel, but he adds that Rigel is also known as a variety of shark. Dietrich offers the glyph shown in Fig. 20 for Rigel:

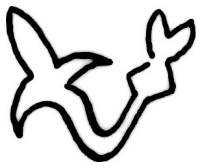


Fig. 20: The star Rigel (Mango ?).

The galaxy Milky Way, home to us earthlings, is a huge cluster of stars stretching across the nightly sky. According to Makemson (1941: 229) the Polynesians referred to the Milky Way as Mangoroa (Maori), which translates as "long shark." Dietrich identifies the glyph Fig. 21 as standing for this galaxy:

Fig. 21: The Milky Way (Mango-roa).

Another, yet often recurring name for the Milky Way, is Ia (Hawaiian), meaning "fish," as reported by Makemson (1941: 213). Dietrich's choice is:

Fig. 22: The Milky Way (Ia).

It is interesting to note that one of the glyphs for Rigel (Fig. 20) and the glyph for the Milky Way (Fig. 21) are quite similar. The only difference is a slight protuberation just below the tail end. Dietrich suggests that this slight alteration in the design of the shark glyph was necessary, as it would otherwise confuse the "reader" of *rongorongo*. Thus, the unaltered glyph would mean the Milky Way, the slightly altered glyph would be used when the star Rigel was meant.

The Pleiades, a star cluster in the constellation Taurus, consists of several hundred stars, of which at least six stars are visible with the naked eye. Johnson and Mahelona (1975: 16) report that the Polynesians referred to them as Matariki (Hawaiian), translated as "small eyes" (Fig. 23).

Fig. 23: Pleiades (Matariki).

Most of the *rongogongo* glyphs are carved in the vertical position, at times contrary to its natural horizontal position. This graphic convention (rotation), of course, helped to save scarce space (graphic economy), but primarily it was employed as a stylistic means, which enables the artist to secure the overall aesthetic flow of the *rongorongo* system. Thus, the glyph above can easily be identified as (small) eyes.

Having found the drawing shown in Fig. 24 in Gill's most interesting book on "Myths and Songs from the South Pacific" (1876: 125), Dietrich suggests that the Pleiades may have also been represented by the *rongorongo* glyphs in Fig. 25.

The *rongorongo* artists produced this glyph in four variant forms: the first one is designed as to

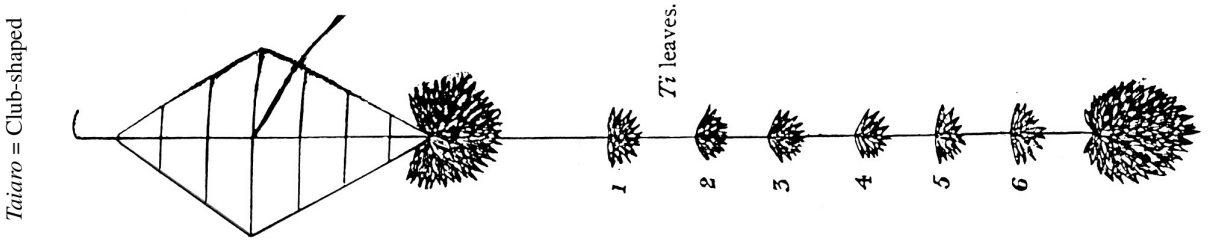


Fig. 24: The representation of a kite from Mangaia. The six inner bundles of the tail are reported by Gill (1876: 125) to signify the Pleiades.

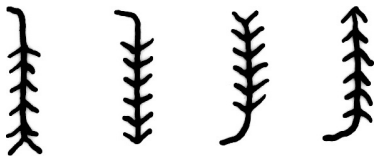


Fig. 25: Pleiades.

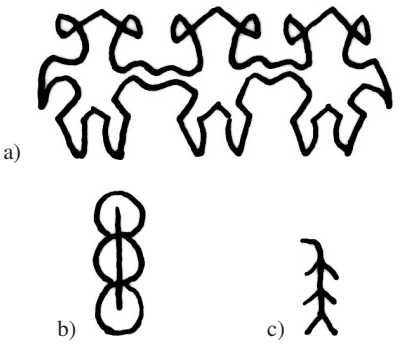


Fig. 26: Orion's belt (Alo-tolu): a), b), and c).

be attached from the top and the individual wedges point upwards; the second one is likewise designed, but the six wedges point downwards; the third one is designed as to be attached from the bottom and the six wedges point downwards; and the fourth one is again likewise designed, but the six wedges point upwards. Dietrich is convinced that these ever so slight changes were purposefully fashioned and that they are not purely arbitrary. He does not yet know their very special meaning. They are, however, without doubt, referring to the Pleiades.

The highly visible three stars that make up the belt of Orion were well-known to the Polynesians. Gill (1876: 125) and Makemson (1941: 198) report that the Polynesians named them Alo-tolu (Tongan), meaning "three in a row." Kyselka and Lanterman (1976: 39) mention: "The stars in Orion's belt are the Three Canoe Paddlers in Polynesia; here is the only place in the sky where three evenly bright stars lie in a row." Dietrich suggests that the three glyphs in Fig. 26 may be depictions of the belt of Orion.

As already mentioned above, Gill (1876: 126) had received information on Mangaia about the construction of the tails of kites. The tail of a kite showing three inner bundles was described to him as signifying the three bright stars forming Orion's belt, see Fig. 27.

It is well-known that Polynesians connected various stars differently from Western tradition and the resulting constellations were given names out of their own repertoire of phenomena. The following discussion in connection with Figs. 28–31 provides a wonderful example.

Looking at what we call the constellation of Orion, the Polynesians saw therein not the mythological hunter but rather an adze. Best (1922: 38) describes this Polynesian constellation: "The Belt of Orion seems to be known by two names. That of Tau toru includes the three bright stars of the Belt, while that of Te kakau (the Handle) includes the same three stars and another row extending out from that at an angle that suggest the name Te Kakau to the Maori. These rows of stars are thought to resemble in form of the handle of an adze – the form

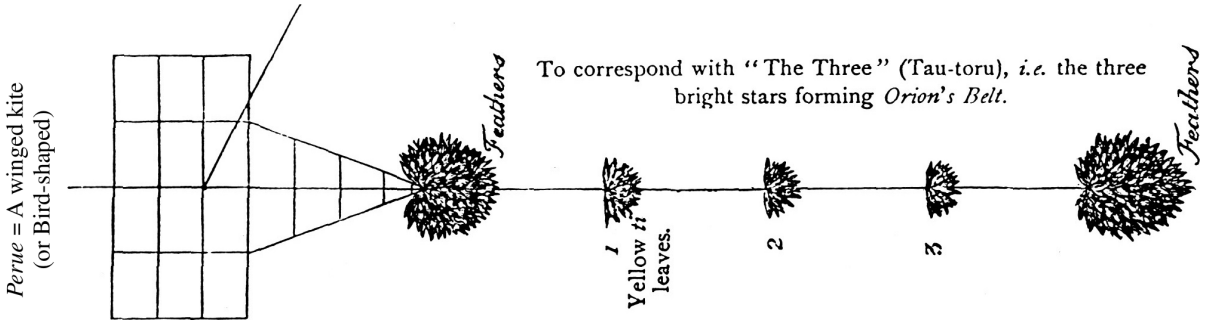


Fig. 27: The representation of a kite from Mangaia. The three inner bundles of the tail are reported by Gill (1876) to signify the three bright stars forming Orion's belt.

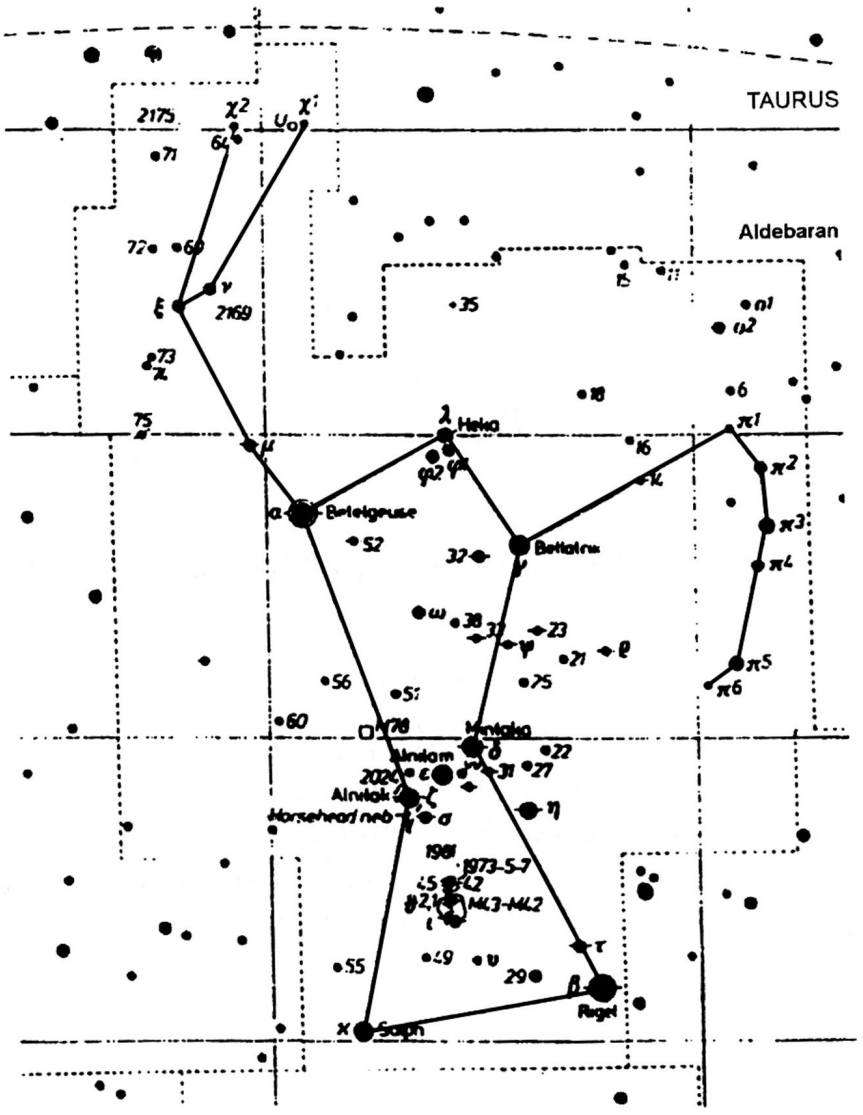
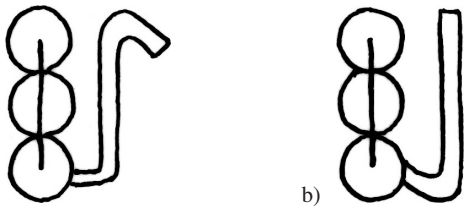


Fig. 28: Star map of Orion, showing the mythological hunter.

of handle used for the old stone adze. This group is sometimes called the Huihui-o-te- Kakau (the assembly of the Te Kakau)."



a) b)

Fig. 29: The Polynesian constellation "Adze" (Hui-hui-o-te-kakau): a) and b)

The fact that the Polynesian constellation "Adze" appears to be standing upright, when seen from the northern hemisphere, and appears to be standing on its head, when seen from the southern hemisphere, might explain quite simply, why the *rongorongo* glyphs were arranged by their creators in inverse boustrophedon order. The Polynesian navigators who travelled both the northern and southern hemispheres encountered constellations regularly in such differing positions. It was, therefore, not only logical but ingenious that the expert graphic artists had decided, already upon devising the fundamental structure of the celestial notation system, to construct it in inverse boustrophedon order. This order best reflected the reality the navigators encountered. If the *rongorongo* system had been devised for a script, there would have been no intrinsic need for an inverse boustrophedon order. And it is not surprising that we do not find among all the known scripts of mankind one that has been arranged in

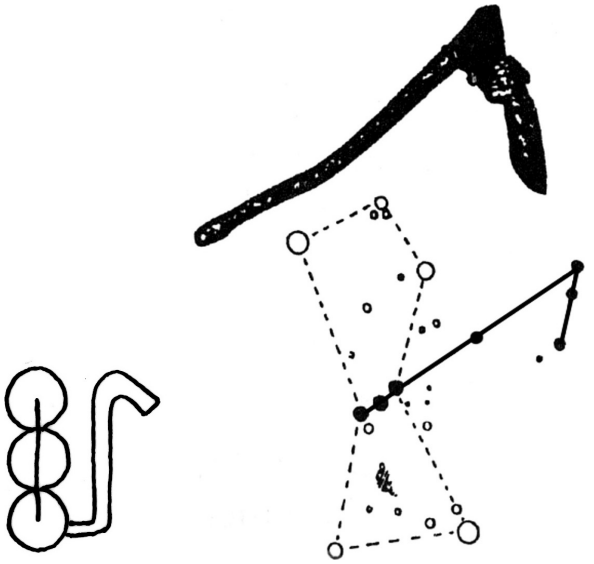


Fig. 30: The Polynesian constellation "Adze" (Hui-hui-o-te-ka-kau), as seen from the southern hemisphere.

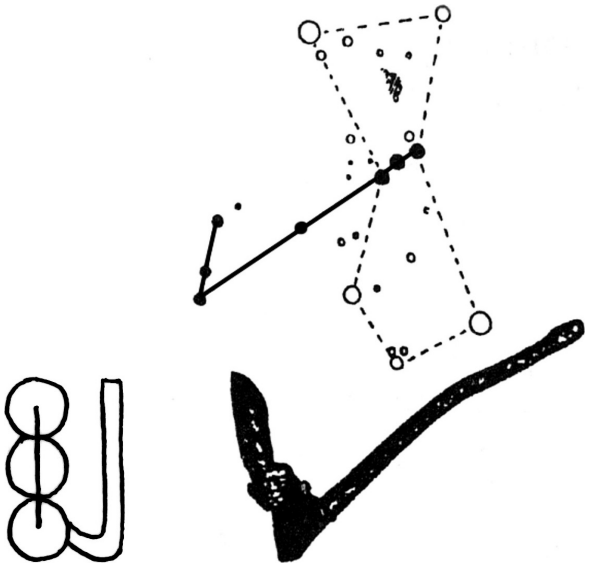


Fig. 31: The Polynesian constellation "Adze" (Hui-hui-o-te-ka-kau), as seen from the northern hemisphere.

inverse boustrophedon order. All prior speculations concerning this aspect of *rongorongo* should, therefore, be dismissed. Inverse boustrophedon makes sense only in terms of a celestial notation system. It is astonishing with what high professionalism the old *rongorongo* artists went to work. Having arrived at such insight, one is forced to challenge Fischer's characterization of the *rongorongo* system as "being sloppy and contradictory" (1997: 555).

Both Emory (1965: 342) and Johnson and Mahelona (1975: 88) report that the Polynesians called the star Vega "Kau-toki," which they translated with "adze-handle." Dietrich suggests that the glyph in Fig. 32 depicts the star Vega:

Fig. 32: The star Vega (Kau-toki).

The star Algol was known in Polynesia as Ma tohi (Maori), meaning "split" as reported by Makemson (1941: 233 f.), see Fig. 33. Algol is the second-brightest star in the constellation Perseus. In Western culture the star is also known by such descriptive names as Demon Star or Winking Demon. Such names were given this star because of its perceived variations in brightness, which early astronomers had already noticed. Daintith and Gould (2006: 8) explain that Algol reaches a maximum brightness for a period of 68.82 hours on a regular basis, vacillating thereby in brightness between 2.1 and 3.5 in apparent magnitude (see Fig. 34). This phenomenon was recognized also by the early Polynesians and their descriptive name Ma tohi quite astutely translates the regularly occurring change in brightness.

Fig. 33: The star Algol (Ma tohi).

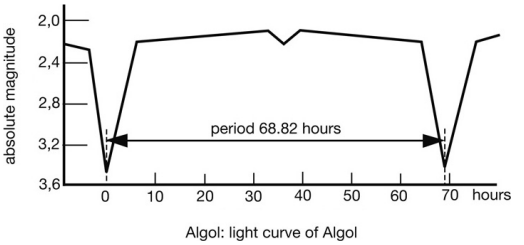


Fig. 34: The light curve of Algol (after Daintith and Gould 2006: 8).

The star Antares is the brightest star in the constellation Scorpius and was known in Polynesia as Rehua (Maori), described to Makemson (1941: 249) as the bird with two wings, one wing is broken. Dietrich suggests that the glyph in Fig. 35 was devised for this star:

Fig. 35: The star Antares (Rehua).

In *rongorongo* this glyph has variant forms: at times it is depicted with its right wing broken, at other times its left wing is broken and the bird is also depicted with both wings broken. This called for an explanation, because Dietrich considered it highly unlikely that these variant forms were arbitrary. In collaboration with Friedrich Witte from the Carl Zeiss Planetarium in Stuttgart, Germany, Dietrich hypothesizes that the wandering of stars across the sky may have been depicted by means of a slight change in the glyph. He, therefore, proposes that Antares in its culmination point would be depicted with two broken wings. The bird glyph with only one broken wing depicts the star either when it starts or finishes its course across the nightly sky, see Fig. 36.

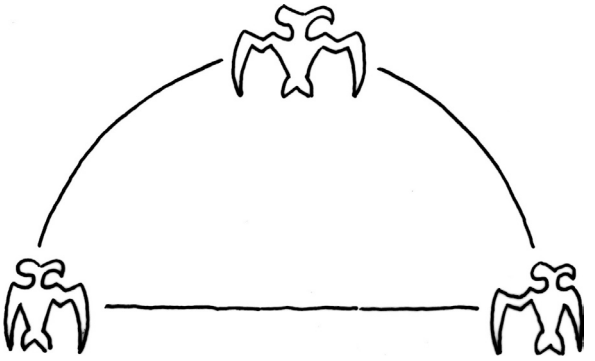


Fig. 36: The course of the star Antares as it rises, culminates, and sets.

Doubling or iteration is often encountered in *rongorongo* and may depict in some instances a culmination. But this needs to be investigated further. This kind of graphic solution – if proven true – is quite ingenious.

The constellation Ursa Major, an extensive and very conspicuous constellation in the northern hemisphere, was known to the Polynesians by the name of Manu-kaki-oa (Marquesan), meaning "the bird with the long neck" (Makemson 1941: 229). Dietrich assigns the glyph in Fig. 37 to this constellation.

Fig. 37: The constellation Ursa Major (Manu-kaki-oa).

The star Canopus in the constellation Carina is the third-brightest star in the sky after the Sun and Sirius. Makemson (1941: 201 f.) collected three names for this star: Atu-tahi, Ao-tahi, and Au-tahi (Maori), which she translated with "one who stands alone." Dietrich's choice is the glyph shown in Fig. 38:

Fig. 38: The star Canopus (Ahu-tahi, Ao-tahi, Au-tahi).

The star Arcturus is the brightest star in the constellation Boötes and the second-brightest star in the northern sky (after the Sun). Makemson (1941: 199) was given the following name for the star Arcturus: Ana-tahua-taata-metua-te-tupu-mavae (Tahitian) and it was described to her as "the pillar to stand by." Kyselka and Lanterman (1976: 63) report: "Arcturus … was a beacon in the sky for the Polynesians, marking the end of the journey in their voyages from Tahiti to Hawaii." Dietrich's choice Fig. 39:

Fig. 39: The star Arcturus (Ana-tahua-taata-metua-te-tupu-mavae).

In Hawai'i Makemson (1941: 209) encountered the term Hoku-iwa, translated as "stars-of-the-frigate-bird." It was identified as "a Hawaiian constellation which guided Hawaii-loa back to Hawaii after a voyage to the south Pacific and must therefore be situated in the northern sky. The Tuamotuan equivalent Te Kiva is said to be Arcturus; hence Hoku-iwa is probably the constellation Bootes which passes overhead in the latitude of Hawaii." Dietrich suggests that the glyph of the frigate bird (Fig. 40) may identify the star Arcturus:

Fig. 40: The star Arcturus (Hoku-iwa).

The star Polaris, also known as the North Star, is the brightest star in the constellation Ursa Minor. It lies very close to the north celestial pole. According to Makemson (1941: 199) the Polynesians named this bright star Ana-nia (Tahitian), and it was described to her as "pillar to fish by." Dietrich encountered this glyph (Fig. 41) in its complete form only once in the corpus, but it is part of many combined glyphs.

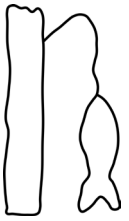


Fig. 41: The star Polaris (Ana-nia).

The star Polaris was known in Hawai'i as Hokupaa, meaning "immovable star," as Makemson (1941: 210) reports. And Johnson and Mahelona (1975: 85) report the name Fyy-se-mekyt (Lamotrek), which means "star not moving." The glyph shown in Fig. 42, lacking wings (arms) and legs, best fits this description:

Fig. 42: The star Polaris (Hoku-paa).

It is quite remarkable that a number of very bright stars were described with reference to a pillar: Betelgeuse (pillar to sit by), Arcturus (pillar to stand by), and Polaris (pillar to fish by). When discussing the concept of the cardinal points, we shall see that the pillar is also an important feature: south, i.e., the pillar of the left hand; north, i.e., the pillar of the right hand; east, i.e., the pillar of the sunrise; and west, i.e., the pillar of the sunset.

The concept that the sky, which had originally rested firmly upon the earth and was later raised above the earth, henceforth resting upon pillars, is a widely held concept in Oceania. In Tahiti, as reported by Makemson (1941: 199), the sky was conceived of as resting on ten star pillars, which seemed to her unique and "was doutless connected with their cosmos of ten heavens." Makemson goes on to say: "they named those stars Ana, meaning splendor" and gives the following list of the ten star pillars:

1. Ana-mua for Antares, described as "entrance pillar of the sky dome"
2. Ana-muri for Aldebaran, described as "rear pillar at the foot of which was the place for tattooing"
3. Ana-roto for Spica, described as "middle pillar"
4. Ana-tipu for Dubbhe, described as "upper-side pillar on the northern boundary of the sky where the guards stood"
5. Ana-heuheu-po for Alphard in Hydra, described as "pillar by which debates were held"
6. Ana-tahu-taata-metua-te-tupa-mavae for Arcturus, described as "pillar to stand by"
7. Ana-tahua-vahine-o-toa-te-manava for Procyon in Canis Minor, described as "pillar for elocution"
8. Ana-varu for Betelgeuse, described as "pillar to sit by"
9. Ana-iva for Phaet in Columba, described as "pillar of exit"
10. Ana-nia for North Star, described as "pillar to fish by"

As will be noted, some of these descriptive names can easily be transposed into glyphs. Others defy such a transposition. In those cases other possibilities were sought by the *rongorongo* artists and were evidently also found for the star Aldebaran (Fig. 17) and the star Antares (Fig. 35). It is expected that ongoing research will reveal the other pillar stars which have not yet been identified.

According to Best (1922: 41) the planet Venus was known to the Polynesians by many names. Among these names was also the name Mere-mere. Best writes: "Tamarau, of Tuhoe, tells us that Venus has three names – Kopu, Tawera, and Meremere. As an evening star in summer it is called Meremere-tu-ahiahi; in the winter, as a morning star, it is Kopu. In other districts Venus as a morning star, is called Tawera; as an evening star, Meremere and Meremere-tu-ahiahi."

At first glance these names did not lend themselves for transposition into a glyph. But when Dietrich by chance came across a publication containing an illustration of various South Sea artifacts (Christmann and Oberländer 1873: 5) he had found the key for locating the glyph for Venus in *rongorongo*. These authors report that the name of a violin-shaped Maori war club, which we nowadays usually refer to as *kotiate*, was Mere-Mere.

The shape of the Mere-mere was quite amenable for graphic transposition and thus the following three glyphs (Fig. 44) are tentatively identified as glyphs denoting the planet Venus:

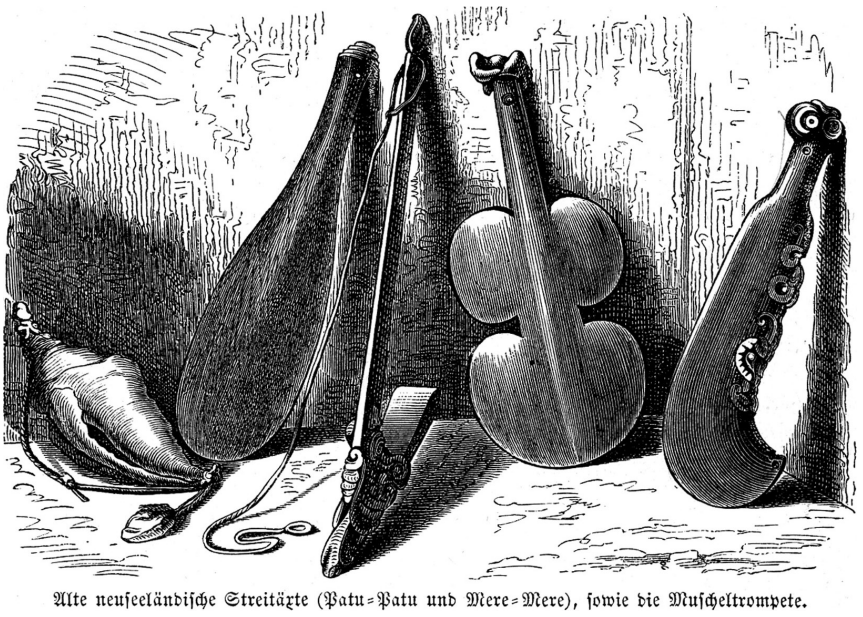

Alte neuſeeländiſche Streitäxte (Patu=Patu und Mere=Mere), ſowie die Muſcheltrompete.

Fig. 43: Ethnographica depicted in Christmann and Oberländer (1873). Old Maori war clubs (Patu-Patu and Mere-Mere) as well as a conch shell horn.

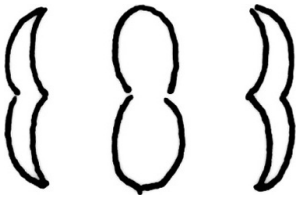

a) b) c)

Fig. 44: Three choices to denote the planet Venus.

As has been shown above, the rules by which single glyphs were combined included a reduction. This rule is well exemplified by the first (a) and third (c) glyph in Fig. 44. Dietrich went through the corpus of *rongorongo* artifacts and found some 70 glyphs that make some kind of statement concerning the planet Venus.

Makemson (1941: 193) reports the name Naholoholo (Hawaiian) for Venus, for which she also offers a descriptive name, "the swift running one." This descriptive name refers to the fact that Venus crosses the sky rather quickly in comparison to other celestial bodies. She is even faster than the Moon. Venus, as well as the other planets, have been known as celestial wanderers, which is due to the fact that they move noticeably fast across the sky against the background of the apparently fixed stars. Dietrich suggests that the glyph shown in Fig. 45 may also refer to Venus.

Fig. 45: The planet Venus (Naholoholo).

Interestingly, Kyselka and Lanterman (1976: 101) attribute the Polynesian name Na-holo-holo, which they translate with "running to and fro," not to the planet Venus but to the planet Mercury. They do not name their sources and, therefore, the problem cannot be resolved at this time. Still, it is worthwhile noting that they, too, refer to a planet and not to one of the other bright stars or to a constellation.

Identification of Other Phenomena Required for Navigation

Dietrich realized that if his hypothesis that *rongorongo* is connected to navigation and contains names of stars, planets, constellations, etc. were to bear out, consequently he would have to find glyphs denoting the four cardinal points: north, south, east, and west. These cardinal points are known in Polynesia under the following names: Kukulu (pillar) or Toko (pillar) as transmitted by several authors.[4] Also Åkerblom (1968: 45) reports on the cardinal points: "The word [pillar] refers to the pillars which, according to Hawaiian cosmology, supported the dome of heaven at the four cardinal points." The names collected for the cardinal points were: for

4 Malo (1951: 9f.); Beckwith (1932: 78); and Best (1922: 65f.).

north, Kukulu akau, meaning "the pillar of the right hand," for south, Kukulu hema, meaning "the pillar of the left hand," for east, Kukulu hikina, meaning "the pillar of the sunrise," and for west, Kukulu komohana, meaning "the pillar of the sunset." Figs. 46 to 49 show Dietrich's identifications:

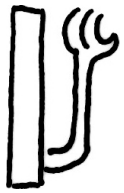


Fig. 46 (left): Cardinal point north (Kukulu akau).
Fig. 47 (right): Cardinal point south (Kukulu hema).

Fig. 48 (left): Cardinal point east (Kukulu hikina).
Fig. 49 (right): Cardinal point west (Kukulu komohana).

Whereas three of the four cardinal points were easily found among the *rongorongo* glyphs, it was rather difficult to find the glyph for the cardinal point "west." Not until Dietrich came upon a curious Hawaiian tale, was he able to offer the tentative reading of the glyph in Fig. 49 above, arguing that west in Polynesian is *hina*, also referring to the Moon Goddess. Makemson (1941: 168) relates a Hawaiian tale, depicting the plight of this goddess: "Hina, who was the wife of Makalii (Pleiades) or, as some say, of Aikanaka (Man-Easter), fell in love with the Moon and decided to go to it. Just as she was about to ascend beyond reach her husband seized her leg and twisted it so violently that he broke it. Hina, however, reached the Moon and immediately changed her name to Lono-moko, Crippled Lono (Rongo)." Dietrich pondered the question, which element of this tale a *rongorongo* artist would have chosen in order to develop the sign for west. He picked the element of the twisted, the broken leg. Such a glyph was subsequently found in *rongorongo*. Thus, the pillar of the sunset is not a pillar but the depiction of a broken leg.

Another concept of importance for navigation is the concept of a guiding star. A guiding star would direct the navigator along his voyage. Sirius, for example, is known to have been an important guiding star for voyages between Hawai'i and Tahiti. The same holds true for the star Arcturus, which passes over Hawai'i. Johnson and Mahelona (1975: 81) were told by their Polynesian informants that the concept of guiding star was expressed with Na hoku ai'aina, which they translated as "stars which ate, ruled the land" (Fig. 50). Åkerblom (1968: 30) writes that "one steered towards a star which rose (or set) over the island one wished to reach." This glyph never stands alone and it belongs to Dietrich's glyph class three (see Fig. 6).

Fig. 50: The concept of guiding star (Na hoku ai'aina).

The next two combined glyphs show Sirius (Fig. 51) and Betelgeuse (Fig. 52) as guiding stars:

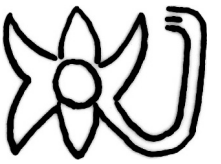


Fig. 51: Sirius as guiding star.

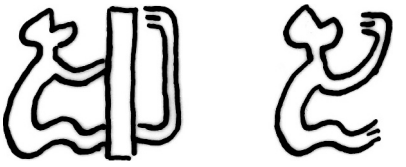


Fig. 52: Betelgeuse as guiding star. Left: "full" version, i.e., Betelgeuse plus guiding star; right: "stripped" version.

It should be noted that the qualifier "guiding star" has not been simply attached to the full glyph that defines Betelgeuse (Fig. 14). Instead, the *rongorongo* artists stripped the glyph of its superfluous element, in this case it is the pillar, in order to elegantly and anatomically correct attach the arm with the hand to the seated man. And the result is such that the message was not lost by the elimination of this element of the original glyph.

The glyph 76 (Barthel's numbering), identified as penis, has played an important role in Fischer's decipherment effort (see Fig. 3). Dietrich has offered his "reading" of the glyph in Fig. 17. This glyph is also included in the glyph catalogue presented by the Pozdniakovs (see Fig. 4).

Dietrich noticed a great graphic variability for this glyph, far greater than one would expect in the *rongorongo* system, keeping in mind that variations in size and rotation have been identified as rules of the system. At times the glyph is quite small, and as

such often attached to another glyph, while leaning away from it (Fig. 53). At other times it stands erect and fills up all available space (Fig. 54).

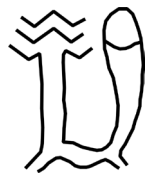


Fig. 53 (left): Small glyph, leaning sideways, attached to another glyph.
Fig. 54 (right): Large, vertical glyph, attached to another glyph.

Dietrich suggests that these are not "variations" of glyph 76 according to the rules of the system, but rather two different glyphs, carrying different messages. The larger, vertical glyph, is the one, which identifies the star Aldebaran, Ul, (see Fig. 17) and the smaller glyph, generally encountered as an appendix attached to a larger glyph, is understood to be a qualifying glyph, in this case probably carrying the meaning of *ihu-ku* (Hawaiian), i.e., "standing above the bow." Johnson and Mahelona (1975: 7) and Makemson (1941: 213) report that the term *ihu-ku* may "probably [be] a general term for any guiding star standing (*ku*) above the bow (*ihu*) of a canoe. Dietrich suggests, that when the appendix sign is attached to a star name, then the steersman knew, how to steer.

The appendix glyph in Fig. 53 should not be confused with the glyph in Fig. 50. The latter refers to a specific guiding star, such as Arcturus, the star for landfall in Hawai'i, as it governs its latitude. Or it may refer to Sirius, the guiding star for landfall in Tahiti. The former, on the other hand, refers to any guiding star standing above the bow. Based on this interpretation, an alternate "reading" for the decipherment given by Fischer in Fig. 3 is possible, having added two more glyphs to the example (Fig. 55).

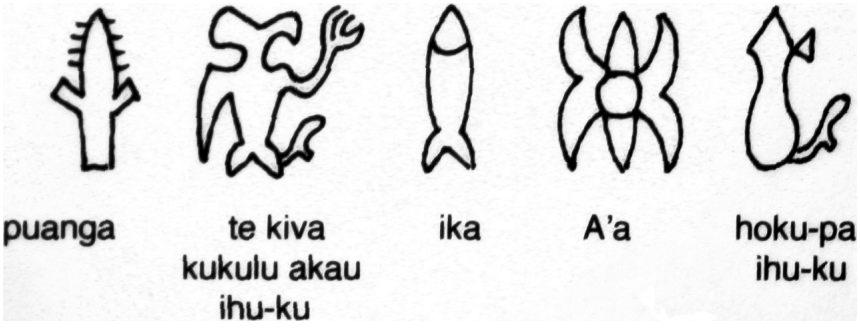
Dietrich ran a check for this glyph formation in the Stuttgart Planetarium. He found that three of the four stars (Rigel, Arcturus, and Sirius) can only be seen together in the month of March, looking from the South toward the North. In April, Rigel will have disappeared and in February, Arcturus is not yet visible. In March, the Milky Way stands in the North (and to the right) of Arcturus in an almost upright position.

Note that no qualifiers are attached to Rigel and Sirius, which probably means that their function in this formation is calendrical. Qualifiers are attached to Arcturus and Polaris. This makes sense, because coming from the South Arcturus would be seen first: the steersman is told to steer towards this star. While proceeding northward, Polaris appears on the horizon: the steersman is told to direct his boat towards Polaris. The interpretation of the data shows that both calendrical as well as astronomical data were put down in *rongorongo*.

In navigation natural phenomena, such as winds and currents, play an important role. Given Dietrich's hypothesis, one would expect that such information was also laid down in *rongorongo*. Up for discussion is the following family of glyphs (see Fig. 56), to which Dietrich tentatively assigns wind qualities.

The concept of wind is difficult to transpose graphically into glyphs, not so its qualities. To be able to "read" the glyphs in Fig. 56 it will be necessary to consult with meteorologists, who are familiar with the specific situation in the Pacific, as well as with historians, who are familiar with the winds the Polynesians knew, named, and dealt with in pre-European times.

Fig. 55: Proposed "reading," as presented by Dietrich (personal communication 2010).



Rigel	Arcturus, North standing above the bow	Milky Way	Sirius	Polaris standing above the bow

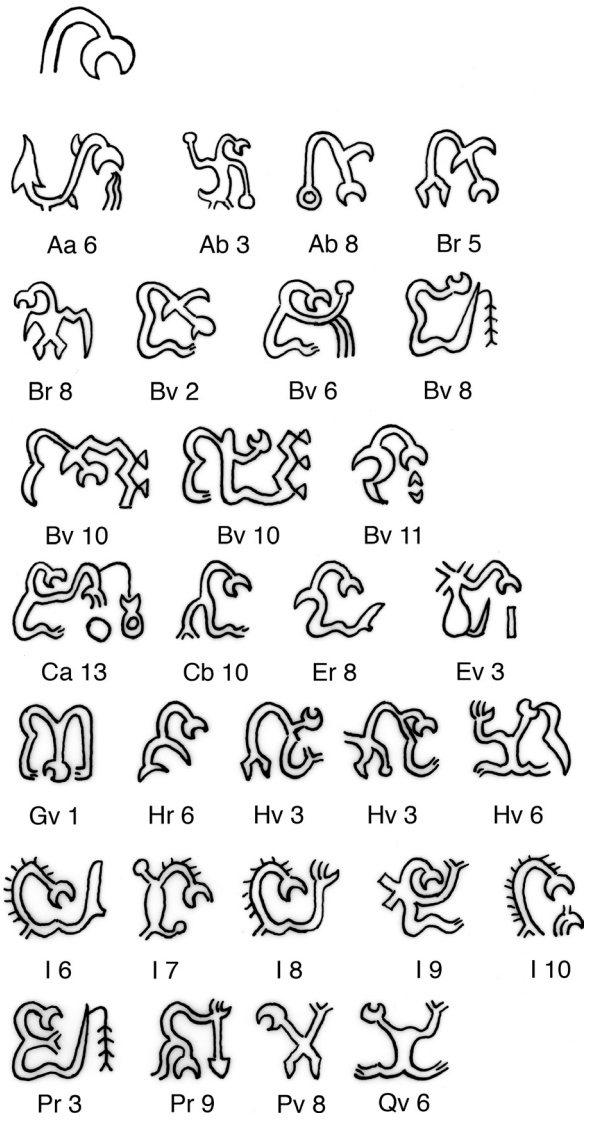


Fig. 56: The family of glyphs pertaining to winds. Letters and numbers reflect Barthel's transcription.

Finney (2007: 162 f.) has made available various wind compasses, one from Tahiti, which Handy (1932: 67) had obtained and another one obtained by Gill (1876: 320) from the Cook Islanders. These may be a starting point for further investigation into this specific subject.

So far not even tentative identifications of glyphs which might make a statement as to currents can be made. Many accounts give evidence that the pre-European Polynesians were familiar with the main currents in the Pacific as well as with minor currents, which rebound around islands. They knew, for example, that currents at time reverse their course (e.g., El Niño and La Niña), that the trades may cease to blow for a while out of their normal direction or decrease in strength, that the doldrums around the equator may persist longer than usual or move North or South. They used this knowledge when planning their voyages. Finney (2003: 13), while criticizing Heyerdahl's theory that Polynesia was settled from the Americas, writes: "the flaw in Heyerdahl's theory is that the trades are not permanent. They seasonally weaken and are displaced by spells of westerlies …. Heyerdahl also did not know that Polynesians and other Pacific sailors were well-aware of these wind shifts and used them to sail to the east." It is expected that *rongorongo* artists had addressed this aspect, too, since it plays such an important part in the life of a seafaring people.

Conclusion

I have presented here but a fraction of the "decipherments" Dietrich has already achieved. Emphasis is laid on the hypothesis on which the decipherments are based. Dietrich delivered a highly professional analysis of the graphic structure of the *rongorongo* system. He could show that this system is governed by a set of rules, which he identified: superfluous element(s), dramatic highlight, partial elimination, graphic economy, rotation, reduction, doubling, iteration, inverse boustrophedon, aesthetic flux. Additional rules may be encountered by ongoing research.

Differences in the approach to other researchers, especially to Barthel and Fischer, both on the level of structural analysis and on the level of analysis of content, have been identified and explained. It has been argued that both Barthel and Fischer are ethnologists and linguists and thus paid too little attention to the graphic structure of *rongorongo*. Their analysis of the content was shown to have run astray. One such example presented by Fischer has been discussed above (see Figs. 53–55). Another example, attributed to Barthel, is provided below (see Figures 57 and 58).

In 1963, Barthel presented an article, devoted to the decipherment of a number of *rongorongo* glyphs. Among these are at least two glyphs which Barthel had come to understand with the help of his field assistant, Leonardo Pakarati.

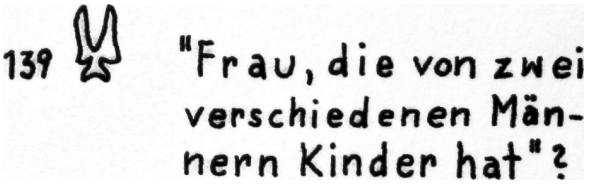


Fig. 57: Glyph 139 according to Barthel (1963: 433) given the meaning "woman who has children from two different men."

Fig. 58: Glyph 711 according to Barthel (1963: 435) given the meaning "bait fish."

The means by which Barthel had obtained these rather preposterous decipherments and the value he placed in them offer a good illustration for the above mentioned inadequacies in his structural analysis and his interpretational framework.

Dietrich's hypothesis, with its great relevance to traditional Polynesian culture, made possible real advancements in understanding *rongorongo* glyphs. He was able to give plausible explanations for many individual glyphs; he was able to explain structural idiosyncracies, among others the use of the inverse boustrophedon alignment of the glyphs, which hitherto had been subject to wild speculations; he was able to show that, embedded in *rongorongo*, there were statements with astronomical, calendrical, navigational, and perhaps also meteorological content. His findings do not support the single settlement theory, but rather make a strong case for abandoning the script hypothesis.

The insights achieved so far have been obtained as a result of years of research on a most difficult subject. Much prior research, especially the systematization of the corpus, established by Barthel in 1958, but also the research of many scientists before and after Barthel, have laid the foundation upon which Dietrich could build. They supplied the divergent theses against which he could test his hypothesis. Yet, the work has only begun. To reconstruct the way the old Polynesians thought about their world and how it had been incorporated into the *rongorongo* system is a difficult undertaking and can only be achieved with contributions from many sides.

Outlook

Rongorongo is a challenge which has not yet been mastered, although many have attempted to solve this puzzle in the course of almost 150 years. Recent research shows that it is a challenge that might be mastered. Most promising is the approach put forth by Michael Dietrich.

There are, however, some basic inadequacies concerning both the subject of research, i.e., the corpus of *rongorongo*, and the research tools. Concerning the corpus of glyphs an up-to-date and reliable transcription of all available artifacts is needed. Presently one relies on transcriptions of glyphs which are inconsistent and contradictory. Dietrich ran a check comparing the transcriptions (Barthel and Fischer) by focussing on one of the more frequently encountered glyphs. He chose the tentatively identified glyph for the star Algol (see Fig. 33). The two transcriptions deviate in the order of more than 30%. It must be deduced from this comparison that deviations to a larger or smaller extent may well be incurred when other glyphs are thus studied. Such a deviation is too large for a reliable research tool. I propose that all original *rongorongo* artifacts be studied by a professional graphic artist, using all available modern techniques with the aim of providing a reliable research tool.

Further desiderata concern the nomenclature in use today. Ever since Fischer's study (1997) *rongorongo* researchers are required to work with two nomenclatures, which make research quite cumbersome. Thus, when referring to the Santiago Staff Barthel's nomenclature is "I," whereas Fischer operates with "RR10." One of the two nomenclatures should be dropped. I propose to adhere to the one presented by Barthel.

Another problem concerns the arrangements of the individual glyphs: Fischer presents a different arrangement than Barthel. If one were to check up, for example, on the whereabouts of the triad in Fig. 3 one would find it in Barthel on "I 12" at the beginning of line 3 and in Fischer it is to be found on "RR 10-1," line 3 in about the center. This is intolerable.

As important as these adjustments may be, it is of far greater importance to rewrite the glyph catalogue along the line of three glyph classes. And they should eventually be numbered, which would enable researchers to make quantifiable and distributional statements. The interpretation of such statements will, however, greatly differ from the ones offered by Barthel. This undertaking is quite arduous and time-consuming but achievable.

Speaking on a more general level, theoretical guidance or exclusivity should no longer be grounded in the epistemological resources of any one field, least in the field of linguistics, which has dominated the *rongorongo* research for so long. A truly interdisciplinary team, consisting of scholars engaged in the various fields of anthropological sciences and of experts in the field of navigation, astronomy, meteorology, and the graphic sciences. Especially helpful should be engaging such experts who have been involved in deciphering ancient scripts, such as Michael Coe, Paul Bouissac, Steve Farmer, Richard Sproat, and Michael Witzel. These colleagues have not only experienced and mastered controversies,

but have also seen advances when research is open to new methods, including those put forth by outsiders.

Rongorongo studies should be put on such a broad footing if we want to solve the puzzle. I am quite optimistic that the celestial hypothesis, as described above, will be of help along the way. But first it is up to the experts to falsify or to validate Dietrich's hypothesis. Science is trial and error and here is a chance to move along the road to success, solving a puzzle, which has endured a 150 years.

This article is the outcome of long discussions with Michael Dietrich, Horst Cain, and Uwe Lemmer. If, in the end, credit is dispensed, it certainly is due to Michael Dietrich.

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