1 Introduction

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> *"The richest merchandise of all, and the most soveraigne commoditie throughout the whole world, are these pearls."*
>
> *- PLINY, Historia naturalis. Lib. IX, c.35*[1]
>
> *"Small is the pearl but queen among the jewels"*
>
> *– St. Gregory*[2]

The pearl fishery coast in the Gulf of Mannar was one of the richest in the world. Monopoly of the ruling kingdom over this region allowed them to harvest the pearl oysters for centuries. The fact that pearl fishing has been practised for so long is proved by its being mentioned in Tamil *caṅkam* classics (300 BCE – 300 CE)[3], foreign notices (Megasthenes, Ptolemy, The Periplus of the Erythraen sea, Pliny, Marco Polo[4]) and in stone and copper plate inscriptions (Chola[5], Pandiya[6], Nayaka[7], and Sethupathi kingdoms[8]). The officials of the Government of Ceylon, and British India – James Steuart (1843), G. Vane (paper presented in a conference in 1886 and published in 1888), Edgar Thurston (1889, 1894), W.A. Herdman (1903), James Hornell (1905, 1924) – published extensive reports on pearl fisheries in the Gulf of Mannar; as did S. Sivalingam (1958) who was an official of the post-independent Indian Government.

1. George Frederick Kunz and Charles Hugh Stevenson, The Book of the Pearl : He History, Art, Science, and Industry of the Queen of Gems (New York: The century co., 1908), 3.
2. S Arunachalam, The History of the Pearl Fishery of the Tamil Coast, Annamalai University Historical Series 8 (Annamalai University, Annamalai Nagar, 1952), 1.
3. U.Vē Cāmināṭaiyar, *Eṭṭuttokaiyuḷeṭṭāvatākiya puṟanāṉūṟu mūlamum uraiyum*, Mūṉṟām patippu (Chennai: lā jarṇal accukkūṭam, ceṉṉai, 1935) 24:4; Na.Mu. Vēṅkaṭacāmi Nāṭṭār and Rā. Vēṅkaṭācalam Piḷḷai, *Eṭṭuttokaiyuḷoṉṟākiya Akanāṉūṟu: Kaḷiṟṟiyāṉainirai*, Mutal patippu (Tirunelveli & Chennai: pākaṉēri taṉa vaiciyar iḷaiñarcaṅka veḷiyīṭu, 1943) 10:10; 70:1; James Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar" (Madras: Government press, 1905), 2.
4. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 2.
5. South Indian Inscriptions (SII) vol. 2, 1891, No. 3, p. 21; vol. 2 (II), 1892, No. 46, p. 178.
6. K. A. Nilakanta Sastri, *The Pandya Kingdom – from the Earliest Times to the Sixteenth Century*, Reprint (Madras: Swathi publications, 1972), 31.
7. James Steuart, *An Account of the Pearl Fisheries of Ceylon* (Ceylon: Cotta – Church mission press, 1843), 102; Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 3–11.
8. Es. Em. Kamāl, *Cētupati Maṉṉar Ceppēṭukaḷ* (Ariyalūr: Tiruvaḷḷuvar Patippakam, 2017).

These reports detail the social and economic histories of pearl fisheries and provide us with a wealth of information on the nature of pearl fisheries in this region. Apart from the foreign notices and reports, S. Arunachalam's 'The history of the pearl fishery of the Tamil coast' (1952) is a pioneering work on the subject. Dr. S. Deckla who concentrated on pearl fishing by the Portuguese in Thoothukkudi (2004) wrote a thesis published as a book in 2013. There are also a few articles written by eminent scholars published in various journals that help us to understand the historical background and practices associated with pearl fisheries, and to understand the context for a text such as the *Muttukkaṇakku,* which is presented to the reader in this edition. However, despite the social historical importance of pearl fisheries, not enough has been written on this subject, and even fewer works have been actually published.[9] *Muttukkaṇakku* is one such unpublished manuscript that is taken into consideration here.

Historically the people involved in this pearl fishing were the Paravar community[10] of Thoothukkudi, a coastal Port town in Southern Tamil Nadu. According to some sources this community was involved in pearl fishing since as early as 600 BCE[11]. Tamil classics such as *paṭṭiṉappālai*[12](lines 184 – 193) describe the bazaar where merchants sell glorious expensive stones such as pearls, diamonds, etc. The Paravar community, because of their control over this precious resource, received special privileges from the Pandiya kingdom. Describing the power possessed by this community James Hornell says,

> *"When the Pandyan kingdom was powerful the Parawas had grants of certain rights from the monarchy, paying tribute from the produce of the fisheries and receiving protection and immunity from taxation in return. The fishery in these early days appears to have been extremely prosperous – thus in A.D. 1330 Frair Jordanus, who visited India at this time, tells us that as many as 8,000 boats were employed in the pearl fisheries of Tinnevelly and Ceylon"*[13].

9. For an elaborate historical study of pearl fishery at the Gulf of Mannar please refer to Arunachalam, *The History of the Pearl Fishery of the Tamil Coast*.
10. Cāmināṭaiyar, *Eṭṭuttokaiyuḷeṭṭāvatākiya puṟanāṉūṟu mūlamum uraiyum*; Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 2; Sastri, *The Pandya Kingdom – from the Earliest Times to the Sixteenth Century.*
11. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 3.
12. R Ragavaiyangar, *Paṭṭiṉappālai ārāycciyum uraiyum*, Annamalai University Tamil Series (Madurai: Annamalai University, Annamalai Nagar, 1951), 7.
13. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 3.

Since pearl fisheries were controlled by one community for a long period, they must have been the only ones who knew how to weigh and value pearls. The Arabs[14], the Portuguese and the Dutch, with special permission from the local ruler also eventually became involved in the fisheries[15]. *Muttukkaṇakku* was probably written at a time when many diverse communities required a common method and tables for measuring and valuing pearls.

1.1 Brief history of labor in the pearl fisheries of Gulf of Mannar[16]

Pearl banks or *paars* of the Gulf of Mannar, both on the East coast of Tamil Nadu and North-west coast of Sri Lanka, are numbered at around 70 (Tamil Nadu – 54[17], Sri Lanka – 19[18]). Usually for pearl fishing, the monsoons and the local weather conditions of the concerned region would need to be considered. A formal inspection and reconnaissance would be conducted before the start of the season to check the wealth of the pearl oysters in certain *paars*. The collected sample oysters would be examined under the supervision of a committee of officers. Oysters would be cleaned and "the Pearls will be collected... sorted, classed and valued by an assembly of five or six native pearl dealers"[19]. Moormens or Lebbais were the pearl dealers involved in classifying and sorting the pearls. Based on the report submitted by the committee, the government would then decide to embark on fishing, based on the quantity, quality and value of the pearl samples[20]. On the Sri Lankan shore, 'a Harpenaar, the head of the Moors, an assistant Pattangatyn, and a couple of European superintendents would be involved in inspecting the pearl banks'[21]. The pearl banks under inspections would be pointed out by the Harpenaar and the head of the Moors.

If the government officials were convinced by the samples, they would flag the commencement of the day and the timings of cultivating pearl oysters. The planned days of pearl fishing would be advertised publicly. Thousands of people, pearl merchants, buyers, traders, beggars, divers, boatmen, boat-owners, coolies, and visitors[22], would gather at the shore to participate and play their role in the fisheries, the gathering taking the form of a festival during these days, often spanning over a week or more.

14. Hornell, 10; S Deckla, "Maritime History of the Pearl Fishery Coast with Special Reference to Thoothukkudi, Tirunelveli" (Tirunelveli, Manonmaniam Sundaranar University, 2004), 42.
15. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 10–13.
16. Arunachalam, *The History of the Pearl Fishery of the Tamil Coast*.
17. Arunachalam, 25–27.
18. G Vane, "The Pearl Fisheries of Ceylon," *Colombo : G. J. A. Skeen, Goverment Printer Ceylon*, Journal of the Ceylon Branch of the Royal Asiatic Society, X, no. 34 (1887): 16.
19. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 5.
20. Steuart, *An Account of the Pearl Fisheries of Ceylon*, 11.
21. Steuart, 41.
22. Vane, "The Pearl Fisheries of Ceylon," 23.3

Each boat would contain 24 members:

- 10 Divers, who work five at a time
- 10 Munducks or rowers who also assist the divers while fishing
- 1 Toda or boat keeper to bale out the water
- 1 Tindal or the Master
- 1 Sammanotty or owner of the boat
- 1 Peon, representative of the Government

If the owner of the boat could not accompany the crew on a fishing trip, he would depend on the Tindal for his share. The shares of the pearl oyster yield were as follows:

- Three-fourths of the total yield would be taken by the Government
- The remaining one-fourth of the yield would be shared between the Sammanotty, the Tindal, the Toda, the Munduck and the Divers almost equally.
- The Divers would then have to pay a tribute to the temple priests, out of their own shares. The divers' salaries were typically not paid in cash. We find only a few instances where they were paid in money[23]. It seems that the effort put in by the Divers – the labor, working time, periods of breathlessness and suffocation, often heightened under bad weather and current conditions, the toll on the body – were not taken into account for their payment.

The divers involved in pearl fishing were Paravars, Mutharaiyars, Mukkuvars[24], Kadaiyars, Moormen or Lebbais, Arabs, and Malayali fishermen[25]. The number of Malayali fishermen involved in pearl fishing were relatively fewer.

Before the colonial period, at the time of the advent of the Portuguese in 1524 and of the Dutch in 1658, the proportions of share were calculated in terms of the number of stones. 'Stone' refers to an actual stone that was used to tie the rope used by the diver and his assistant while fishing. Each stone thus represented such a couple. According to Hornell,

> *"[in] 1691, at which there were 385½ stones admitted free, viz.: - 96½ stones for the Nayak of Madura. 59 for the Setupati of Ramnad and the remainder for the headmen of the divers..."*[26].

23. Steuart, *An Account of the Pearl Fisheries of Ceylon*; Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 13–15.
24. Ā Civacuppiramaṇiyaṉ, *Kirustuvamum tamiḻc cūḻalum*, Mutal patippu (vamci, n.d.).
25. Steuart, *An Account of the Pearl Fisheries of Ceylon*, 95; Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 85; Kunz and Stevenson, *The Book of the Pearl: The History, Art, Science, and Industry of the Queen of Gems*, 113,114.
26. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 12.

This indicates that the privilege and shares in pearl fishing were decided according to the mutual understanding between the trading companies and the kings. Some temples also had the authority to send in their boats and stones to the pearl fishery, as a privilege awarded by the kings over the centuries.

The fishery of 1708 gives more details regarding the (tax-)free stones: List of free stones according to ancient customs:

- 96½ to the Naick of Madura – 4 Christian, 92½ Moorish
- 60 to Theuver – 60 Moorish
- 10 to Head Moorman of Cailpatnam – 5 Christian, 5 Moorish
- 185 to the Pattangatyns of this coast – all Christian stones
- 30 to those of Mannar
- 13 to those of Jaffnapatam
- 3½ lost by 4 Moors who died in the fishery"[27].

According to this Sri Lankan report the divers affiliated with the Portuguese and later with the Dutch are Paravars (Christians) and those with the Nayak of Madura and the Setupati are Lebbais (Muslims). The conflict which arose with the advent of the Lebbais in the East coastal region with the Paravars, who had until then enjoyed a monopoly over the pearl fisheries for centuries, clearly shows up amongst the phenomenon of tax-free stones and boats in this region. While the Nayak of Madura extended protection to the Lebbais, Paravars became friendly with the Portuguese in an attempt to defend their monopoly of the fisheries. In order to keep good relations with the Portuguese, Paravars agreed to the demand of mass conversion to Christianity.

Following this, by the 16th century most of the community had converted to Christianity. As a result, the monopoly over the region went to the Portuguese. Albeit, in order to keep up their cloth trade and also for protection, the Portuguese allowed quite a number of free stones to the Nayak of Madura (96½ stones which is equal to 193 divers) and the Setupati (60 stones which is equal to 120 divers)[28].

This agreement between the company and the local kings continued until the advent of the British (1796) in this region. The Nayak of Madura and Setupati in turn granted free stones and divers to the local temples and to headmen of communities. In 1609, the Setupati granted 7 stones to Rameswaram temple, and 3 more (i.e., totally 10) in 1714[29].

When the fishery ceased for the day, the boats would return to their respective *koṭṭu*. The collected pearl oysters were accumulated within the enclosure and divided

27. Hornell, 14.
28. Steuart, *An Account of the Pearl Fisheries of Ceylon*, 102,103.
29. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 11.

into four heaps. The Government officer or the Renter would select three of the heaps, and the remaining heap would be shared as equally as possible between the individuals. James Steuart in his report has provided a supposed amount of the oysters and how the shares were made.

Suppose a boat came to the shore with the following quantity of oysters viz:

People's share	Oysters	Govt. share	Boat
Stone No. 1	2000	1500	500
Stone No. 2	3000	2250	750
Stone No. 3	2000	1500	500
Stone No. 4	3000	2250	750
Stone No. 5	4000	3000	1000
Toda, Tindal and Sammanotty	600	450	150

Let us take the yield from stone 1[30].

Stone No. 1	2000 oysters	
Deduct ¾ for Government share	1500	500
Government officer's privilege	75	425
Charity oysters taken for the temples	23	402
Divide into 3 individual shares (Assuming One diver and two mundu cks for the stone)		134[31]

From this final individual share of 134 of the divers and mundu cks, another round of deductions would then be made as privilege for several others involved in the activity[32] (Notably these 'privilege oysters' deduction is exempted for Tindal, Sammanotty and Toda):

The Commandant	2 Oysters from each Stone
The Master Attendant	2 Oysters from each Stone
The interpreter	2 Oysters from each stone
The Cutwall	2 Oysters from each stone
The clerks in the Cutcherry	2 Oysters from each stone

30. Steuart, *An Account of the Pearl Fisheries of Ceylon*, 42,43.
31. Steuart, *An Account of the Pearl Fisheries of Ceylon*, 42,43.
32. Steuart, 42.

The Shark Charmer	2 Oysters from each stone
The Buoy Boats	2 Oysters from each stone
The Number Man	1 Oyster from each stone.

If the Government appointed a peon in a boat, then the privileged share for him would be 1 oyster from each stone. So, the total number of deductions from each stone would be 16. Besides these deductions, following the custom, the divers are also forced to give a sum of 'charity oysters', mostly from 12 to 48, for the temples on the coast which further reduces the number of oysters for the divers into tens. According to Hornell, if the diver could contrive to open an oyster and find a pearl in it while he is in the waters, it is to be considered his own. The pearl workers would be under constant vigilance by armed men who would accompany the expeditions, and provide them with protection from sharks[33].

According to historians of the Indian Ocean trades, Fahad Bishara and Hollian Wint, "at the core of the *bazaar* economy of the Indian Ocean were the bonds of debt and credit – of obligation, more generally – that bound economic actors together, from Basra all the way down to Zanzibar." The pearl fishing boats in particular were sites where such debt relations of bondage played out.

> *"In the pearl dive that took place annually around the Persian Gulf in the summer months, divers took a series of loans (a pre-season advance, and two loans in the off-seasons) from their captain (called a nakhoda) to see them through the year; in return, they pledged to dive for that nakhoda and no-one else, effectively binding themselves to the nakhoda's firm. For his part, the nakhoda was bound to a merchant from whom he borrowed the capital; whatever pearls his divers fished that season were to be delivered to the merchant at a discounted rate. A similar system of advances bound mariners to nakhodas of trading dhows [vessels] in the Persian Gulf and East Africa, the principal difference between trading and pearling being the high uncertainty that characterized profit-making in the latter (to say nothing of the physical harshness of the activity)."*[34]

We can glimpse the uncertainty of such an enterprise when we consider the factors on which the yield depended:

33. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 8.
34. Fahad Bishara and Hollian Wint, "Into the Bazaar: Indian Ocean Vernaculars in the Age of Global Capitalism," Journal of global history, 16, no. 1 (2021): 44–64.

- Depth of the sea. According to some studies, pearl oysters will grow well between 6 – 8 fathoms depth of the sea.
- Oceanic currents, monsoons, variable heat of water and the amount of influx of fresh water. Oysters would be typically eradicated from drastic variations of these oceanic factors.
- Age of the oysters. Pearls in the pearl oysters are well grown with luster and glory mainly between six to seven years of age. After eight years of age the pearl oysters die. (For instance, according to a report on the *Karai Karuwal paar,* the size of pearl oysters in the consecutive years were: 1897 – 1¾ to 5/8 inch; 1898 – 2 inches; 1899 – 2¾ inches[35]. This gives a clear picture of the growth and age of oysters).
- Surface of the ocean. Rocky surface of the Gulf is a perfect place for pearl oysters to live and to generate pearls. Pearl oysters grow as patches of clusters stuck to the rocky surface.

Pearl fishing would be conducted based on the above mentioned circumstances. Between 1658 and 1904 (246 years), the total number of fisheries that took place on the Tamil Nadu and Sri Lankan coasts were 24 and 58 respectively[36].

Once brought to the shore, the oysters were usually washed in vallams (boats). After the oysters were put into the ballam, sea water was poured in, until it was about three fourths filled; and every pearl oyster was carefully washed and examined by men on each side. The ballam was cleaned again and again with sea water until the unwanted substances were removed and only small pearls and sand remained. The oysters were then spread on a cloth or mat and left to dry for days. Once completely dried, they were carefully sifted by women and the pearls were carefully collected. This occupation usually happened under strict vigilance. From the commencement of this work every pearl that was found, was put into a box by the Superintendents. After the pearls were collected, they were classed, weighed and valued.

The method of classifying pearls was by passing them through a succession of brass colanders which were usually called baskets (*muttuppeṭṭi* in Tamil). The number of the colanders varied from ten to twelve, according to some sources. These colanders[37] were marked with a number, such as 20, 30, 50, 80, 100, 200, 400, 600, 800, 1000[38]. It is not clear what the rationale was for naming them in this way. The collected pearls were carefully put into the top sieve, which had the largest holes. The large pearls were kept in it and the rest passed down and then then passed through the second sieve, and so on. After being thus classified using colanders, the pearls were weighed and valued

35. Bishara and Wint, 65.
36. Bishara and Wint, 23.
37. Visit https://universes.art/en/art-destinations/sharjah/museums/sharjaj-maritime-museum/20 for ancient colanders
38. Steuart, *An Account of the Pearl Fisheries of Ceylon*, 18.

according to their respective sizes. As we shall see below, this was a way to assess the quality of the pearls.

Image 1: Pearl Sieves, for Sorting and Grading of Pearls. Image courtesy *Muthu V. Prakash*

It is at this stage of valuation of the pearls that a text like the *Muttukkaṇakku* comes in. It is important to note that *Muttukkaṇakku* - a mathematical text created mainly for the purposes of the traders and accountants in the business - is solely concerned with the valuation of pearls and says nothing about the labor, compensation and hazards involved in the fishing. Instead, we find romantic eulogies throughout the text about the mystic of the pearls themselves, while silence is maintained on the social and economic history of labour in all of this.

1.2 Valuing pearls

According to the Sri Lankan reports, these operations were carried out by sets of four professionals, mostly Lebbais. Each of the four had his specific vocation: one sifts, another classes, the third weighs and the fourth finally accounts the value of the pearls[39]. After the pearls are classified, they need to be valued. Generally, sieves numbered 20 to 80 (and at times 100) may each have the qualified kind of pearls that are highly valued, such as *Āṇi*, *Aṉātāri* and *Kaḷippu*[40]. According to Vane, high-quality pearls – *Āṇi*, *Aṉātāri*, *Samatayam*, *Kaiyēṟal*, *Vaṭivu* and sometimes *Machchakai* (*Makkakai*) – are valued in terms of a specific measure called *Cevvu*. The inferior quality ones that are also small in size, such as *Kuṟuval*, *Kalippu*, *Pīcal*, *Kuṟaḷ*, *Tūḷ*, *Māsu-tūḷ*, *Oṭṭumuttu*, *Maṭaṅku,* are valued according to their weight in *kaḻañcu* or *Mañcāṭi*. (units of weight) The high quality pearls are first weighed in terms of *kaḻañcu* or *Mañcāṭi* and

39. Vane, "The Pearl Fisheries of Ceylon," 20.
40. Vane, 21.

then valued using the distinctive measure *cevvu*. However, according to our reading of *Muttukkaṇakku,* the *cevvu* calculation applies not just to the highest quality pearls but to all pearls that pass through the colander system.

The four distinct steps in classifying and valuing pearls can be summarized as follows:

- - Sizing or arranging all the given pearls into ten different sizes, from the largest to the smallest.
- - Classing or subdividing according to shape and luster of each pearl.
- - Weighing the pearls in each of these classes separately.
- - Assigning the monetary value to such pearls, each in its class, by weight and the market price per weight at the time of the valuation[41]

For assigning the market price of the qualified pearls (per *cevvu*), several factors might have been taken into consideration: the tax amount of boats, number of free stones given as a privilege and share, number of years when fishing was halted, the loss met in the previous year fisheries, luster, size and colour of the pearl. Interestingly no two valuers classed a given set of pearls alike, and one person did not class twice in the same manner[42]. So, the price may have varied if the same pearl was examined twice by different valuers.

Each quality pearl, *āṇi*, *aṉātāri*, *camatāyam*, *kaiyēṟal*, *vaṭivu* and sometimes *macakkai,* would usually be weighed in terms of *kaḻañcu* and *mañcāṭi*. For instance, if a large *āṇi* pearl weighs 5 *mañcāṭi,* the *mañcāṭi*weight would be squared; and three-fourths of the result will be considered as the *cevvu* measure. The *cevvu* measure would then be multiplied with the current market price to determine the market value of the *āṇi* pearl on that day.

Square of 5 *mañcāṭi*, 5 * 5 = 25

Three-fourths of this = 18.75 (probably be rounded as 19)

This 19 is the *cevvu* value for the *mañcāṭi* weight of 5. Suppose the market price is Rs 15 (per *cevvu*), then the value of the pearl is 19 x 15 = Rs 285.

In actual practice, as reported by Vane, since the weights would often be in fractions of a *mañcāṭi,* in the interest of clubbing together similar qualities of pearls and calculating the total price at once, the fractions would be converted to fractions with denominators of 320 – or *muntiri,* the smallest fraction in the Tamil number system[43].

41. Vane, 32.
42. Vane, 21.
43. Vane, 37.

According to Vane, actually squaring the weights and scaling them by ¾ would be rare in day to day practice. The final values would just be read off from pre-calculated tables. "To facilitate their own operations they have certain tables, constructed once for all; and besides these, something like a multiplication table to 320 times, which one may sometimes hear them repeating to themselves"[44]. It seems that a kind of multiplication table, common to all pearl merchants, would be used by the pearl dealers at the time of the trade. In fact, we do find such tables in the *Muttukkaṇakku.*

1.3 Kinds of Pearls

In the history of the pearl industry, there would have been many kinds of pearls that would have specific names given their size, luster, colour and form. From the beginnings of the Chola rule we have a number of details of pearls with their names through inscriptions[45]. However, we do not have any data relating to the reasoning behind such names given to pearls. Vane's report gives some details about certain pearls that indicate that each pearl was named according to its credibility:

- *Āṇi (ஆணி): perfect in sphericity and luster.*
- *Aṉātāri* (*அனாதாரி*): failing relatively in one aspect, either sphericity or luster.
- *Samatayam* (*சமதயம்*): failing in both aspect, but not very much.
- *Kaiyēṟal* (*கையேறல்*): failing still more in both points.
- *Makkakai* (*மக்கசை*): an appropriate name.
- *Vadivu* (*வடிவு*): beauty.
- *Madaṅku* (*மடங்கு*): folded or bent pearls.
- *Kuṟuval* (*குருவல்*): double pearl, sometimes double Āṇi.
- *Kalippu* (*கலிப்பு*): abundance
- *Pīsal* (*பீசல்*): mis-shaped
- *Kuṟaḷ* (*குறள்*): quite mis-shaped and small.
- *Tūḷ* (*தூள்*): small as powder.
- *Māsu-tūḷ* (*மாசுதூள்*): small, like powder, and generally discoloured – a class which usually contains those pearls that may have passed through the tenth sieve, constituting, as it were, an 'eleventh size'.

- *Oddumuttu* (*ஒட்டுமுத்து*): shell pearls. Those that have adhered to, or seem like excrescences on the shells, and are generally not subjected to the process of sifting. They constitute a 'class' by themselves, independent of their 'sizes'.[46]

44. Vane, "The Pearl Fisheries of Ceylon."
45. SII, vol. 2, No. 3, pp. 21 - 42. For more details see Appendix
46. Vane, "The Pearl Fisheries of Ceylon," 33,34.

The first 7 kinds (*Āṇi* to *Madaṅku*) in the above list have been entitled *cevvu* and the following 5 kinds (*Kuṟuval* to *Tūḷ*) entitled *kaḻañcu* in Vane's article. This is in keeping with his claim that the top quality pearls were valued in terms of *cevvu*, while the rest were valued directly in terms of their collective weight. These 12 kinds of pearls could be classed using the sieves. The rest two (powdered) kinds - *Māsu-tūḷ* and *Oddumuttu* - were not to be classified and valued through sieves.

In the following table (Table 1), we compare the categories of pearls as obtained from the various reports and *Muttukkaṇakku* manuscripts.

As we see from Table 1, we have around 28 kinds of pearls found during the last 600 years: *āṇi, aṉātāri, camatayam, cappanti, ceṉṉīr, kaiyēṟal, kaḷippu, kaṟaṭu, karucul, karunīr, karuppu, koṭai, kuruval, makkakai, macaku, maṭaṅkal, mulainīr, mācutūḷ, moci, nāyappal, nimiḷai, nīr, pīcal, podikalippu, oṭṭumuttu, tūḷ,* and *vaṭivu*. But the number may increase further with more sources of pearls[47].

47. Refer Appendix 5 for more details.

Table 1: Categories of pearls obtained from various reports and *Muttukkaṇakku* manuscripts.

S.No.	IFP mss	ORI mss	James Steuart (1828 report)	Edgar Thurston	G. Vane	James Hornell
1	āṇi	āṇi	āṇi	āṇi	āṇi	āṇi
2	---	aṉutāri	aṉātāri	---	aṉātāri	aṉātāri
3	camatāy	camatāyam	camatāyam	---	camatayam	---
4	cappanti	---	---	---	---	---
5	ceṉṉīr	ceṉṉīr	---	---	---	---
6	kaiyēṟal	---	kaiyēṟal	---	kaiyēṟal	---
7	kaḷippu	kaḷippu	kaḷippu	kaḷippu	kalippu	kalippu
8	kaṟaṭu	---	---	---	---	---
9	karucul	---	---	---	---	---
10	karunīr	karunīr	---	---	---	---
11	---	karuppu	---	---	---	---
12	---	koṭai	---	koṭai	---	---
13	---	---	kural	---	kuṟaḷ	---
14	kurukal	kuruval	---	kuruval	kuṟuval	Kuruval

S.No.	IFP mss	ORI mss	James Steuart (1828 report)	Edgar Thurston	G. Vane	James Hornell
15	---	---	---	makkakai	makkakai	---
16	---	macavu	macaku	---	---	---
17	maṭaṅkal	---	---	---	maṭaṅku	---
18	---	mulainīr	---	---	---	---
19	---	---	---	mācutūḷ	mācutūḷ	mācitūl
20	---	---	---	moci	---	---
21	nāyappallu	nāyappal	---	---	---	---
22	nimiḷai	nimiḻai	---	---	---	---
23	nīr	nīr	---	---	---	---
24	pīcal	pīcal	pīcal	pīcal	pīcal	pīcal
25	---	---	---	---	---	podikalippu
26	---	---	---	shell pearl	oṭṭumuttu (shell pearls)	shell pearls
27	---	---	tūḷ	tūḷ	tūḷ	tūḷ
28	vaṭivu	vaṭivu	vaṭivu	vaṭivu	vaṭivu	vaṭivu

1.4 Manuscripts and sources

There are two manuscripts available on pearl mathematics: one in the French Institute of Pondicherry (IFP) (Mss.No. RE 33705) and another in Oriental manuscript library (ORI), GOML, Thiruvananthapuram (Mss.No. 8086). The manuscript available at IFP is complete and comparatively later than the manuscript found at ORI which is incomplete. This text is difficult to understand because there are no commentaries available. Nor can we ask anyone since the practice of pearl fishing ended in the 1960s. No one who was involved in pearl fishery is alive today and hence discovering details regarding the text is indeed difficult. Kudavatti Mohammad Lebbai's stupendous work on pearl measurement, '*Muttuc cevu kaṇakku*' which was published in 1881 allows us to understand the *Muttukkaṇakku* to a great extent.

1.5 Text

Muttukkaṇakku was most likely written by one Subramanian. The second poem in this text mentions the name of the author as *Paccaimuttucutaṉ Cuppiramaṇiyaṉ*. Subbiramaniyan, son of Paccaimuttu, who belonged to the town *Mantira Nakar,* wrote this *kaṇakku* text. *Mantira Nakar* was the name given to the town Thoothukkudi[48].

The manuscript bundle under this title *Muttukkaṇakku* preserved at the French Institute of Pondicherry (IFP) manuscript library comprises four distinctive texts, probably written by the same author. In 23 songs, the first one (of the four), *Muttukkaṇakku,* has 8 sections. Mainly, this text focuses on three major topics viz., kinds of pearl colander and calculating the number of holes in each colander (in other words, volume of the colander); unit of measuring pearls; and valuing a pearl with a distinct measure called *cevvu*. Following this text, the author gives the list of the kinds of pearls, under the title *Muttukku Vakaiyum Kuṇamum Aṟivatu*, before entering the comprehensive reading of the table valuing pearls. Interestingly, the title given to the second part, which lists the entire table of calculations is rather ironic – *Muttukkaṇakkalla*, that literally translates to 'not pearl calculations' – although this is the vital crux of this entire bundle. This portion of the text scrupulously lists the details of the relations between the weight measures (in *kaḻañcu* and *mañcāṭi*) and the respective *cevvu* values. The following two portions of the text, *Kaṇṇakumatumēl Muttu Akaval* and *Poṉṉuraiyāṇikkalla - āṇi vakai akaval,* summarize what was explained in the previous portion along with some more details.

48. A town, manthiri pattinam, north of Thoothukudi dates back to the beginning of the historic period sound similar to this name mantira nakar where the author Subramanian lived. Despite its similarity, more evidence needed to ascertain this.

Three meters used by the author in *Muttukkaṇakku* are *veṇpā*, *viruttam* and *akaval*. The first three invocatory verses dedicated to Lord Ganesh, which mentions the author's name as well, a verse on pearl colander and a verse on the measurement in *mañcāṭi* are written in the *veṇpā* meter. The last verse of the first part which provides details on the kinds of pearls, and the verses in *Muttukkaṇakkalla*, *Poṉṉuraiyāṇikkalla - āṇi vakai akaval*, *Kaṇṇakumatumēl Muttu Akaval* are written in *akaval* meter. The rest of the verses are written in various kinds of *viruttam* meter.

The invocatory poems praise Lord Subramanian while the other poems praise deities such as Lord Siva, Lord Brahma, Lord Ganesh, the deity of the sky people (*viṇṇōrk kiṟaivaṉ*), Lord Kumarakuruparan, Kumara Nayakan, Goddess Saraswati, and petition for the favour of being able to complete this text without any hindrance. At the end of each theme the scribe praises the deity as a guiding spirit, for example,

> *šrīramajayam, kumarakuruparaṉ pātāra vintamē tuṇai, and cuppiramṇiya cāmi pātāra vintamē tuṇai.*

The voice of the author apparently imparts the pearl measurement to a recipient. Verbs such as *ceppē*, *viḷampē*, *kēḷmō*, *col*, *collakkēḷāy* are some examples indicating that the voice is talking to someone to describe pearl measuring.

The author uses the third person singular and plural verbal endings in some places, for example *arivittārē* (they announced), *uraittaṉarē* (they narrated) to detail the tradition. The author also uses the simple vocative and the vocative when addressing women in the poem, a tradition that has been followed from medieval times in Tamil. Interestingly, the author used a typical style of addressing males as well.

Kārikaiyē	– hey, damsel
aṉṉanaṭaimātē	– swan-like walking young lady
tōkaiyarē	– hey, beauty like peacock
cīmāṉēnīkēḷu	– hey, wealthy, listen to me
mōkaṉaṉē	– hey, beautiful man

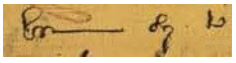
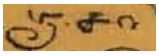
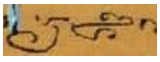
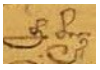
The scribe has an artistic style of writing. He uses a number of conjoined consonants from the very beginning of the text. The letters are clearly visible. Although the leaves have been damaged by insects there is no difficulty in reading and analyzing the text. Wherever the leaves are damaged we tried to fill those portions with the flow of the poem. These portions are bracketed to show that they have been filled up by us. The

short and lengthened vowels and consonants are mentioned with their specific identity. The consonants not identified with dots and r and r̲ are identified with their specifications. Some examples of letters and conjoined symbols:

Letters

No.	Letters/Symbols	Meaning
2		சீ (cī)
3		டி (ṭi)
4		நீ (nī)

Conjoined letters and symbols

No.	Letters/Symbols	Meaning
5		விருத்தம் (viruttam)
6		ராசா (rācā)
7		ராஜா (rājā)
8		துணை (tuṇai)

Symbols

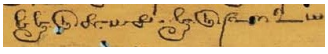
No.	Letters/Symbols	Meaning
9		மஞ்சாடி (mañcāṭi)
10		காணி முந்திரிக்கு 64முந்திரிக்கு 320 (kāṇimuntirikku 64 Muntirikku 320)

Image 2 - 10: Letters and Symbols from manuscript. Image Courtesy *Muthu. V. Prakash*

1.6 Date of Muttukkaṇakku

Chola inscriptions are the earliest available evidence of pearl measurements and valuing of pearls. Rajaraja I in 1006 CE while granting gems to the Thanjavur Rajarajesvara temple commonly known as 'the big temple' provides information on pearls. The phrase goes thus: *muttu pavaḻamum niṟai nāṟkaḻañce yeṭṭu mañcāṭiyum nāṉku māvukku vilai kācu* 11[49]; Rajendra I, successor of his father Rajaraja I, also granted pearls to the same temple in 1015 CE. The phrase of the inscription goes thus: *vayiram muttu pavaḻam niṟai 77 kaḻañce 4 mañcāṭiyuṅ kuṉṟikku vilai kācu* 500[50]. These two inscriptions followed the units of *kaḻañcu* and *mañcāṭi* for measuring the mass of the gems.

We do not find any mention of the *cevvu* values of those pearls in these inscriptions. Later we do find 'an agreement given by 'Padineṇvishayathar' (corporation) of four townships, undertaking to contribute half a *panam* on every hundred pearls sold at Kilakkarai to meet the requirements of worship and repairs in the local temple in a 16th century inscription. This shows that in the 16th century there were stores established in Kilakkarai to sell pearls[51]. Steuart, Vane and Hornell in their reports do mention *cevvu* as one of the units for valuing pearls when it comes to commercial transactions.

Lines 5 and 10 of *Kaṇṇakumatumēl Muttu Akaval* mentions the names of a father and a son – Acanēyiṉāṉ and Mahammatu Levvai. In previous research, we found the mention of one Acanā Nayiṉā from a 16th century tomb inscription from Kayalpattinam; this was the only historical reference we had for this name. The inscription describes the death of Abdul Gaffar alias Immidi Shenbagarama Mudaliyar, and in that context lists his genealogy going back 8 generations. The first name in that genealogical list is that of Acanā Nayiṉā. Following this, given the dearth of any direct evidence, we hypothesized that this text might be dated anywhere between 14 and 15 CE. But in subsequent research we found a reference to one Muhammad from 19th century, whose grandfather Kaṇṇakumatu most likely lived in the 18th century. This name is striking because of its relation to the name of the text *Kaṇṇakumatumēl Muttu Akaval*. However, we do not find any mention of Mahammatu Lebbai in this genealogy. On the other hand, we do have a published text entitled *Muttu cevvu kaṇakku* by one Kudavatti Mohammad Lebbai dated 1881. However, the orthography of the *Muttukkaṇakku* manuscript suggests that it must be older than this 1881 text. So, it is unlikely that this Mohammad Lebbai is the same person as mentioned in the manuscript.

49. SII, 2 (I), no.6
50. SII, 2 (I), no.8
51. SII, 23, no.396

We do find the mention of the place called Mantira Nakar in the *Muttukkaṇakku* text, which is a Puranic name for the present town of Thoothukudi. While we cannot date the text based on this, the last known mention of this name (as far as we have checked) can be found in a 19th century text, *Tirumakkā Paḷḷu,* which simultaneously mentions both the names – Mantira Nakar and Thoothukudi. Given this, all we can really say with some certainty is that the *Muttukkaṇakku* manuscript copies are from 19th century at the latest; the text itself may have originated earlier than that.

1.7 Descriptions of Muttukkaṇakku

The aim of the text is to create a table for *cevvu* values corresponding to the weight measures in *kaḷañcu* and *mañcāṭi* and thus provide the merchants and pearl dealers with a ready tool for the computations. To begin with, the text introduces pearl colanders (*muttuppeṭṭi*). There are in total 10 different kinds of colanders with different sized holes. The size of the hole decreases from top to bottom. The names of the colanders are in numbers: 20, 30, 50, 80, 100, 200, 400, 600, 800, and 1000. The topmost colander is numbered 20 and has the biggest holes. According to the text there are 91 holes (*tamar*) in this colander. The pearls settled in the top colander are the most expensive, big in size and of good quality.

The subsequent colanders with progressively decreasing size and an increasing number of holes are used to classify the pearls according to corresponding sizes. Anie Montigny, an anthropologist working at the National Museum of Natural History in Paris, describes how "The same system exists in the Gulf. Pearls are first grouped according to size, then divided in 10 grades by passing them successfully through ten brass sieves; each sieve having holes of different size for graduating. Some merchants had different measures with one set of sieves for selling, another for buying!"[52]

We did not find any pearl colanders from the Tamil Nadu coastal region from recent times. Museum with no Frontiers has preserved some colanders used in the Middle East. The following statement from Hornell helps us understand how *muttuppeṭṭi* pearl colanders were used by the pearl merchants.

> *"The pearls having been extracted from the shells, and carefully washed, were placed in a metal receptacle containing some five or six colanders of graduated sizes, which were fitted one into another so as to leave a space between the bottoms of every two and were pierced with holes of varying sizes, that which had the largest holes being the topmost colander and*

52. Anie Montigny, "Weights & Measures Related to the Oriental Pearl Trade: The Orıgın of the chau ," Diving Memories In Qatar Forum of Qatar National Day, 2010, 42–51.

> *that which had the smallest being the undermost. When dropped into colander No. 1, all but the very finest pearls fell through into No. 2, and most of them passed into Nos. 3, 4, and 5; whilst the smallest of all, the seeds were strained off into the receptacle at the bottom. When all had stayed in their proper colanders, they were classified and valued accordingly"*[53].

It seems that the number of holes in the pearl colanders differed according to the merchant. The verses from 2 to 4 of *Muttukkaṇakku,* tell us how to calculate the number of holes in a colander. For this purpose, the colander is assumed to be a regular hexagon:

> *"Aṟukōṇat torukōṇat tatilē nērē, yaṉpākat tamartaṉai eṇṇik koṇṭu".*

This verse asks one to calculate the number of holes along one such 'corner' or angle. Next, this number is to be multiplied by itself (square it):

> *"Caṟukāmal kaṇṭataṟkup patilē vaittut, Tayavāka iruvakaiyum perukkic cērttu".*

The result thus obtained needs to be scaled ('reduced') by a factor of ¾.

> *"Ciṟukavē mukkālil kaḻittu"*

The result then needs to be increased to the nearest whole number by adding a ¼ . This is supposed to give us the total number of holes in a given colander. Verses 3 and 4 list the number of holes in one corner and verses 5 and 6 list the corresponding number of holes for the whole colander. This helps the pearl dealers to calculate the holes and how many pearls there can be in a colander at a time.

53. Hornell, "Report to the Government of Madras on the Indian Pearl Fisheries in the Gulf of Mannar," 14; Aruṇāccalam Es, *Tamiḻakak Kaṭalōrattil Muttuk Kuḻittal Varalāṟu, Tamiḻākkam: Cā. Jeyarāj,* (tamiḻākkam, 2011), 124.

The number of holes in one corner of a colander according to *Muttukkaṇakku* are as follows:

Pearl colander	Number of holes in a corner
20	11
30	13
50	15
80	17
100	21
200	25
400	29
600	33
800	39
1000	41

And the total number of the holes in each colander are given below.

Pearl Colander	Total No. of holes
20	91
30	127
50	169
80	217
100	331
200	469
400	631
600	817
800	1141
1000	1261

These colanders were termed at times as Nos. 1 to 5, and at other times as mentioned above, using numbers from 20 to 1000; we don't know why the local merchants number-named these colanders the way they did. We do not find any obvious correspondence between the number-name of the colander and the number of its holes. However, according to some reports the number-name of the colander was the same as the number of holes in it[54].

The number of pearl colanders used in the market seems to have varied. There are 10 pearl colanders listed in the available *Muttukkaṇakku* manuscript and the government reports. But according to the *Muttu cevu kaṇakku* text, published in 1881, the number of pearl colanders in use were 12[55]. Sieves with numbers 1500 and 2000 are the two extra colanders mentioned in that text. The holes in these colanders should be relatively small in size. Later, in the *Muttukkaṇakku* text itself while providing the details of *mañcāṭi* value calculation for each colander, the author mentions the number 1500 colander but we don't know whether the last two colanders were in continuous use.

Vane's report gives some more interesting details on the classification of pearl colanders into three kinds: *cevvuppeṭṭi* (செவ்வுப்பெட்டி), *vadivuppeṭṭi* (வடிவுப்பெட்டி), and *tūḷpeṭṭi* (தூள்பெட்டி)[56]. The first four sieves – the 20, 30, 50 and 80 – are called *cevvuppeṭṭi*. These four baskets chiefly contain the best pearls both in size and class and are therefore of high value. The following three sieves – the 100, 200, and 400 – are called *vadivuppeṭṭi*. Pearls which fall into these baskets are beautiful and of good quality, but not as good as those from the previous sieves.

These pearls are also mostly valued by *cevvu*. The last three sieves – the 600, 800, and 1000 – are called *tūḷpeṭṭi*. The pearls collected in these baskets are of less value and poor in quality, size and form. This classification might have helped the valuers to class pearls easily according to their quality. Mohammad Lebbai in his text classifies the colanders similarly, and further notes the relation between the weight (in *kaḻañcu*) and *cevvu* values for the first two classes of sieves. The last class of pearls from the *tūḷpeṭṭi*, he says, would be calculated and sold simply according to the weight in *kaḻañcu*.[57]

54. Steuart, *An Account of the Pearl Fisheries of Ceylon*; Vane, "The Pearl Fisheries of Ceylon," 39.
55. Kutavatti Muhammatu Leppai, *Muttuc cevuk kaṇakku* (Palayamkottai: ṭārliṅ piras acchu, 1881), 13.
56. Vane, "The Pearl Fisheries of Ceylon," 38,39.
57. Leppai, *Muttuc cevuk kaṇakku*, 13,14.

1.8 About the Colanders (muttuppaṭi laṭcaṇam)

In the history of pearl valuing the colanders played a crucial role. Pearl valuers would have been concerned with the geometry of the colanders and their relation to the weights of the pearls. This particular verse, we think, indicates some relation between the colanders and the weight of the pearls. However, we can't tell what exactly the relation is, since this verse, that occurs both in the *Muttukkaṇakku* mss. and the *Muttu cevu kaṇakku,* lists only a series of numbers without enough explanation.

Mohammad Lebbai's *Muttu cevu kaṇakku* defines 19 *paṭi* for a set of pearls – *oru kūṭṭa muttu paṭiyākiṟatu atāvatu 19*. In the list, a cluster of something – possibly pearls – are mentioned as *kottu*. Lebbai's list ends with the reminder that 'one who is involved in pearl trade and measurements, needs to understand these 19 entries [of the list] clearly'. It is particularly difficult, too, to hypothesize a relation because such practice of calculations has been discontinued over time.

Here is one entry from Lebbai's list of 19 entries:

> *"iraṇṭāvatu aintu kaḷañcu paṭikku kottu aintu", which translates roughly to "second, for 5 kaḷañcupaṭi, the cluster is 5".*

The rest of the entries are likewise. The first 8 refer to weights in *kaḷañcu*, the rest to weights in mañcāṭi. The mañcāṭi entries from Lebbai's list correspond more or less exactly to the entries from the *Muttukkaṇakku* mss (with a few exceptions). Below we simply list the series of numbers as mentioned in both texts, to be read in the above sense. We are not sure what the word *paṭi* refers to, neither is it clear what the cluster is (*kottu*) that is referred to. We think this particular verse deserves further study.

From Muttukkaṇakku	From Muttu cevu kaṇakku	
For *mañcāṭi*	For *kaḷañcu*	For *mañcāṭi*

(The numbers mentioned on the left are weight measurements and on the right are number of *paṭis*)

For 2¼ mañcāṭi paṭi, 2	For 10 kaḻañcu paṭi, kottu is 1	For 2¼ mañcāṭi paṭi, kottu is 2
[2¼; 2]	[10;1]	[2¼; 2]
[2; 4]	[5;5]	[2; 4]
[1¾; 1]	[3;3]	[1¾; 1]
[1½; 3]	[2;2]	[1½; 3]
[1; 2]	[1;1]	[1¼; no kottu]
[¾; 4]	[½; 1]	[1; 2]
[½; 1]	[¼;1]	[¾; 3]
[¼;1]	[⅛;1]	[½;1]
[¼;1]	[⅛;1]	[1/16; no kottu]

1.9 Unit of measurement

kaḻañcu and *mañcāṭi* are the two units used to measure gems from the ancient period to the recent. 8th century inscriptions from the Pallava kingdom[58] are the earliest available historical data on these two units of weight measurement. As mentioned earlier, *kaḻañcu* and *mañcāṭi* were used by merchants to measure pearls.

Following that tradition *Muttukkaṇakku* also describes the method of measuring pearls using these two units. For example, one Chola inscription from 11th CE measured 37 pearls as 8 *mañcāṭi*[59]. *kaḻañcu* was usually measured as 72 grain (4.6656 g app.) whereas *mañcāṭi* equals to 3.6 grain (0.23328 g app.). Fabricius in his Tamil to English dictionary recorded the value of *mañcāṭi* as 4 grains[60]. In general, 20 *mañcāṭi* equals 1 *kaḻañcu.* The exact measuring value of both *kaḻañcu* and *mañcāṭi* varied during the colonial times. While James Steuart gives 7¾ grains to *mañcāṭi*, Vane gives 3⅓ or more precisely (3) x (35/100). Thus, Vane equates 1 *kaḻañcu* to 67 grains. The aim of *Muttukkaṇakku* is to provide the '*cevvu* table' corresponding to the weight measure of pearls. Based on this, the price of pearls would be decided according to the market price of the day. Verses 8 and 9 list the (average) number of pearls needed to total a weight of 1 *mañcāṭi* for each colander.

58. SII, 4, no, 131
59. SII, 2 (II), no.43
60. J. P. Fabricius, "Tamil and English Dictionary" (Tranquebar: Evangelical Lutheran Mission Publishing House, 1972), 289, https://dsal.uchicago.edu/dictionaries/fabricius/.

Colander size	Number of pearls needed for 1 mañcāṭi
20	1
30	1½
50	2½
80	5¼
100	8½
200	15
400	24
600	40
800	60
1000	120
1500	240

Similarly, verses 10 and 11 list the (average) number of pearls totaling a weight of 1 *ka̲lañcu* for each colander.

Pearl Colander	Number of pearls needed for 1 ka̲lañcu
20	20
30	30
50	50
80	105
100	170
200	300
400	480
600	800
800	1200
1000	2400
1500	4800

1.10 Cevvu: a distinct unit

Cevvu has been used by the trading community for a long period; however, we do not find any references to it from the inscriptions. The reason might be due to the basic nature of the inscriptions[61]. Most of the inscriptions, as we see, are the records of the donor, like the king, a chieftain, etc. This unit was particularly used by the trading community dealing in pearl trade. There might be no reason to be get it recorded in the inscriptions. The first occurrence, as of now, of this unit is from a Tamil literature of the medieval period, *makaraneṭuṅkuḷaikkātar piḷḷaittamiḻ*. The 46th verse in it goes as follows:

> மழைமுத்த முந்துளி படும்போது செவ்வுக்கு
> வாராத வடிவு தரும்
> *(maḻaimutta muntuḷi paṭumpōtu cevvukku*
> *vārāta vaṭivu tarum)*

This can be translated as 'when a drop of rain falls, it renders a quality pearl that cannot be measured even by *cevvu*'. There is another interpretation that considers *cevvu* as a form of the pearl. But since cevvu has been defined as a unit in this text, we can go with the previous reading until we get a better reading of these lines. This text dates back to mid-16th century hence the age of this unit or index dates back to the same period.

Cevvu as a unit was first introduced by the *Muttukkaṇakku*, a mathematical text. Miron Winslow in his dictionary defines *cevvu* as,

> *'a rule in estimating the number and value of pearls,*
> *முத்துக்களின்நிறையளவு. (R.) 2. (p.) Straightness, correctness, &c.,*
> *செம்மை. பத்துச்செவ்வுமுத்துவாங்கினேன். I bought ten செவ்வு of pearls.*
> *செவ்வுற, inf. to be proper. (p.)*[62]

61. since cevvu is a measurement solely used in pricing qualified pearls for the market; possibly there was no reason to mention this unit in any inscription. Moreover, it seems that the inscriptions mostly refer to second grade pearls, donated to the temples, that are measured in kaḻañcu or mañcāṭi, in contrast to the qualified pearls that don't seem to have been donated to temples. Hence, the absence of cevvu.
62. Miron Winslow, "A Comprehensive Tamil and English Dictionary of High and Low Tamil" (Madras: P.R. Hunt, 1862), 205.

Following this, Tamil lexicon defines *cevvu* as

> *'a unit in counting pearls; முத்துக்களின் அளவுவகை.'*

and reproduces Winslow's example: *பத்துச் செவ்வு முத்து வாங்கினேன்* (W.). Hornell in his report has produced a statement on pearls sold in the 19th century. *Cevvu* was also included as a unit of measurement in his statistical table. While listing the statistics of the 19th century pearl profits, he lists 10 kinds of pearls, their size in basket, number, quantity in 'chevu', weight, value per 'chevu' and per 'kalanji'. The quantity of the pearls was listed in one column and the *cevvu* value in another column. Anie Montigny traces the origin of the word *chau* used in the Persian Gulf fisheries to the Tamil *cevvu*:

> *"Long researches have allowed me through various search channels and old documentations to discover that the origin of the word "chau" comes from the transcription from the Tamil language used in former Ceylon (Sri Lanka) into English of the word "chevvu".*[63]

Even today in southern parts of Tamil Nadu particularly in Marthandam, Thoothukudi and in surrounding areas, the word *cevvu* has been used in spoken to mention the goodness and perfection of a certain work[64] which is close to the term used for quality pearls. However, we need more detail to relate a measuring unit of index with a term used in the spoken language.

Muttukkaṇakku verses recite the cevvu values for 1 *mañcāṭi* of pearls across the various sieves.

Colander size	Cevvu value of 1 mañcāṭi weight of pearls *
20	(¾)
30	(½)
50	(¼ + 1/20)
80	(2 + ¾ + 1/8) ma
100	(1 + ¾) ma

63. Montigny, "Weights & Measures Related to the Oriental Pearl Trade: The Origin of the chau," 11,12 See Appendix 6 for more detail on Chevvu by this author.
64. Thanks to Ms. Rukma, Marthandam, who shared this information.

Colander size	Cevvu value of 1 mañcāṭi weight of pearls *
200	1 ma
400	(½ + 1/8) ma
600	(¼ + 1/8) ma
800	(1/4) ma
1000	(1/8) ma

*** (Here, 1 ma = 1/20)**

The subsequent verses similarly recite the cevvu values for 1 *kaḻañcu* of pearls across the various sieves. The actual word used in the text to refer to cevvu values in *kaḻañcu* units is '*peruñcevvu*' - which literally translates to 'the bigger *cevvu*'.

Colander size	Cevvu value of 1 kaḻañcu weight of pearls *
20	15
30	10
50	6
80	(2 + 3/4 + 1/8)
100	(1+3/4)
200	1
400	*10 vīcam*=10/16
600	*6 vīcam*= 6/16
800	*4 vīcam*= 4/16
1000	*2 vīcam*= 2/16

*** (Here, 1 vīcam= 1/16)**

The primary aim of this text is to list the *cevvu* value of pearls corresponding to their weight measures in *kaḻañcu* and *mañcāṭi*. The pearl valuer's main task is to calculate the *cevvu* value of a qualified pearl. The purpose of the tables is, however, to allow the dealer to read off the *cevvu* values without having to go through the actual, potentially

tedious calculations every time. The list of the *cevvu* tables for *kaḻañcu* and *mañcāṭi* measures are attached as appendix 1 and 2.

In summary, as noted above, the *cevvu* of one pearl is computed by squaring the actual weight of the pearl and multiplying it by a factor of ¾. However, there are some arithmetic variations to these calculations that are described in the text, based on a variety of situations – such as, how to compute the *cevvu* of a bunch of pearls that weigh a certain amount in total.

We may assume that the aim of *Muttukkaṇakku* was to standardize the pearl measurement which was used within the community in the past. Most of the calculations described in the text must have been in common usage because the author leaves the relation between the number of holes in a colander, weighing measures and *cevvu* values unexplained. Pearl and diamond sellers in India today follow the international units to measure and value pearls. They distinguish pearls as cultured and semi cultured and follow *carat* (as a quality measure) and *grams* (as a quantity measure). The ancient measurements such as *cevvu* (for quality measure) and *kaḻañcu* and *mañcāṭi* (for quantity measure) are no longer in use.

1.11 Ponnuraiyāṇikkalla - Āṇi vakai akaval

This is one of the texts found in this bundle that deals with the specific gold kind *āṇi*. The title itself prescribes the distinction of this kind of gold. The aim of this section could be to value the measure of an *āṇi* gold with its degree of fineness. The table of the measurement of *āṇi* gold with its *māttu* value is given as an appendix for further study. It seems that the degree of flaw that seen in the gold should be under control. This verse lists the flaw that can be seen in certain *māttu* of gold. The flaws are measured by scribing a symbol in a gold. The flaws are termed as ve*ṭṭu*, *puḻḻi*, and *cāyppu*. These flaws are also detailed in *Kaṇakkatikāram* texts. Since the authorship of this text is as same as *Muttukkaṇakku*, the copier would have copied it in this manuscript bundle.

The title *āṇi vakai akaval* is perfectly fit to this verse, however the other title given to this verse *ponnuraiyāṇikkalla*, we couldn't understand it and it doesn't make sense as a title.

The textual variations are given in the same page as footnotes and other details related to the verses and words are given at the end of each portion as an endnote. The endnotes are given using symbols whereas footnotes are given with numbers. A few pearl divers who dived in 1950s still live in Therespuram, Thoothukudi[65]. The pearl divers have dived every season until it got stopped in 1962. One of the pearl divers, Mr.

65. The detail of the informants with their photographs was given in the appendix. Please refer to inllustrations 7 for more detail.

Arumugam, 85, worked as a helper (Toda) before he started to dive by himself from 1957. He said, 'we dived for pearls, found them, and the merchants paid for it after valuing it. We do not know how the merchants calculated the value of pearls'. The pearl divers dived for pearls on the day announced by the government, under strict supervision. Pearl diving takes place at least for six months in a year.

During these days, fences are placed around the specified coastal area. It is like a temporary market for pearls. More than 300 stalls are put up during this event. The collected pearl oysters would be divided into three shares. Two shares are taken by the government and the remaining oysters are divided among the diver, toda and sammanoty (boat owner). The diver's share of oysters is cleaned and the pearls are carefully removed by the women of the family. Mukkamma, in her 80s, shared her experience of removing pearls. After the pearls were carefully put in a bottle jar then the pearls are sold to a merchant. While the divers know the quality of pearl by their shape, lustre and approximate weight, they have no idea how it is valued in the market[66].

66. For more details, please refer to the article, 'muthu: Thoothukudiyum muthukulippum muthukkanakkum', in Tamil, written by the authors themselves, published in the Tamil journal Markeni, 62, July 2023.