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A bird's eye view of plants used as toothbrush in India: past and present

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Abstract

Plants have been used for centuries to improve dental health and to promote oral hygiene and this practice persists in several communities throughout the world since the times of ancient civilizations. India has been rich in cultural diversity since antiquity and plants play a significant role in religion and faith. In India, plants have been used as natural tooth brush since time immemorial. In ancient literature such as Indian and in different texts of Ayurveda many of them were described with their medicinal properties and uses for overall oral dental care. Besides, over 72% population of the country residing in rural areas utilize a wide variety of plant species as tooth brush. An attempt has been made to document all the information available in ancient and present literature and collected during ethnobotanical survey in different tribal and rural areas of the country.

Key words: Dental care, Indian dental health, Oral hygeine, Plants as toothbrush

1. Introduction

Oral hygiene practices have been practiced by different populations in different ways. Plants have been used for centuries to improve dental health and to promote oral hygiene and this practice persists in several communities throughout the world. In some countries where brushing with toothbrushes is uncommon, brushing with chewing sticks have been followed (Asadi and Asadi, 1997). It is an affordable oral hygiene device and additional benefits are derived from its functional aspect of chewing as jaw exerciser as well as reflex induction of saliva which is beneficial to the oral hygiene. Studies have also shown that the use of chewing sticks have a high efficacy compared to the conventional toothbrushes without toothpaste (Wu, 2001). There are around 173 different types of plant species, which can be used as chewing sticks, belonging to the families Fabaceae, Combretaceae, Icacinaceae and Rhamnaceae (Dogan *et al*, 2005). It has also been suggested that antimicrobial substances that naturally protect plants against various invading microorganisms or other parasites may leach out into the oral cavity and that these compounds may benefit the users by protection against carcinogenic and periodontopathic bacteria. The various benefits of using natural toothbrushes are that they act as an antibacterial agent, as astringent and detergent. Furthermore, it has anti-inflammatory qualities, abrasive qualities, significantly plaque inhibiting properties. It also enhances salivation, fight caries and provides nutrients for bone and tooth development, a natural way to whiten stains, remove stains, prevent plaque and cavities (Ahmad *et al*, 2011).

In India, plants have been used as natural tooth brush since very long time. In Ayurveda many of

them are described with their medicinal properties and uses for overall oral care. Chew sticks are twigs or roots of certain plants that are chewed until one end is frayed. This end is used to brush against the teeth, while the other end can be used as a toothpick. Most commonly plants are used that have a high content of tannins (astringent and antibacterial) or other compounds that benefit the health of gums and teeth. The earliest chew sticks have been dated to Babylonia in 3500 BC and an Egyptian tomb from 3000 BC; they are mentioned in Chinese records dating from 1600 BC and in the Tipitaka the Buddhist Canon, purported to be giving account of events which took place in the north-western India around the 5th century BC. In Islam, *Salvadora persica* L. tree is traditionally used to create a chew stick called *miswak*, as frequently advocated for in the *hadith* (written traditions relating to the life of Muhammad) (Ahmad *et al.,* 2011). Traditional Sikhs still use plant twigs as toothbrush (*datum*) even today as it is written in their scriptures: 'Dear/beloved, natural twig brush everyday and pains you shall never get. (23)'- Guru Gobind Singh*, Tankhah Naama,* as written down by Bhai Nand Lal.

Teeth cleaning twigs can be obtained from a variety of tree species. Although many trees are used in the production of teeth cleaning twigs, some trees are better suited to clean and protect the teeth, due to the chemical composition of the plant parts.

When compared to toothbrushes, teeth cleaning twigs have several advantages like more ecological in its life-cycle, fresh and easily available in all seasons, no cost involved, no need for additional toothpaste, independence from external supplier if made at home from privately owned trees, low maintenance, with some twigs need moistening with water if they become dry, to ensure the end is soft. The end may be cut afresh to ensure hygiene and should not be stored near a sink. The twig is replaced every few weeks to maintain proper hygiene. On the other hand, different species of trees have various levels of hardness just as synthetic toothbrushes would, so careful selection of the right hardness is required before use. Excessive scrubbing too can also bring the risk of gum damage.

Plants used as toothbrush found throughout India. It is used by the native peoples as a chew stick for cleaning their teeth. When the end of the wood is chewed, it becomes frayed and can be used as a natural brush that delivers therapeutic minerals and chemicals, present in the wood fiber to the teeth and gingiva. The use of this wood for oral care could be a great benefit to people in industrialized nations.

The use of natural tooth brushes is environment friendly and cheap tool for dental care and oral hygiene. Natural toothbrushes reported dental protection similar to modern toothbrushes. They are more ecological in its life-cycle, lower cost (0-16% of the cost of a toothbrush). They require no tooth paste, maintenance and can combat bad breath.

2. Materials and methods

Indian ancient literature written mainly in Sanskrit language is a store house of traditional indigenous knowledge including health and hygiene, agriculture, scientific, social, cultural, religious, economical aspects. The health is an important and integral part of human beings since antiquity. Ayurveda considered as a 5th *Veda* is totally based on human health covering curative and preventive measure.

Beauty of your smiling face is depending solely on your teeth. Apparently, teeth are very important when eating. The teeth would grind the food that we eat to make them smaller and easier to shallow. It helps the food to be easily digested before it reaches down to the stomach. Aside from eating, our teeth help us look good. Based on a research, teeth are among our growing glory. It's one of the main features that can make us attractive. Having a healthy set of teeth is not only for sustenance, but it is also for better social allure and interaction. It is very important that we keep them healthy to avoid serious problems in the future.

Therefore, our ancient sages and hermits gave the proper direction to cleaning teeth every morning with the help of plant based toothbrush. Since then the people have been using twigs of different plants found in their vicinity. After the review of ancient literature, it is found that the plants proposed for toothbrush are mentioned in *Brahma Vaivarta Purana, Koorma Purana* and Ayurvedic literature such as *Bhavaprakasha*

Nighantu, Astanghridayam and *Charak Samhita.* Besides, research papers published by various authors like Punjani (1998), Pradeep Kumar (2014) and Sagar (2015) and my personal fieldwork carried out in different parts of the country.

3. Results and discussion

3.1. Enumeration of plants

The plants are enumerated in tabular form by local name followed by botanical name, family, parts used and references.

3.1.1. Plants used as tooth brush in Ayurveda

The Indian *Puranas* are regarded as store house of knowledge. There are 18 numbers of *Puranas* but plants used as toothbrushes are mentioned in *Brahma Vaivarta* and *Koorma Puranas* only (Table 1).

Table 1. Plants used as tooth brush in India (Sensarma, 1989)

Sl. No.	Local Name	Botanical Name	Family	Part used	Name of Puranas
1	*Khadira*	*Senegalia catechu* (L.f.) P. J. H. Hurter & Mabb.	Fabaceae	Twigs	*Brahma Vaivarta Purana*
2	*Babool*	*Vachellia nilotica* (L.) P. J. H. Hurter & Mabb. ssp. *indica* (Benth.) Kyal. & Boatwr.	Fabaceae	Twigs	*Brahma Vaivarta Purana*
3	*Apamarg*	*Achyranthes aspera* L.	Amaranthaceae	Stem	*Brahma Vaivarta Purana, Koorma Purana*
4	*Bilva*	*Aegle marmelos* (L.) Correa (Plate 1a)	Rutaceae	Twigs	*Koorma Purana*
5	*Sirisa*	*Albizia lebbeck* (L.) Benth. (Plate 1b)	Fabaceae	Twigs	*Brahma Vaivarta Purana*
6	*Palash*	*Butea monosperma* (Lam.) Kuntze. (Plate 1c)	Fabaceae	Twigs	*Brahma Vaivarta Purana*
7	*Punnag*	*Calophyllum inophyllum* L.	Calophyllaceae	Twigs	*Brahma Vaivarta Purana*
8	*Udumbar*	*Ficus racemosa* L.	Moraceae	Twigs	*Brahma Vaivarta Purana*
9	*Vat*	*Ficus benghalensis* L.	Moraceae	Roots	*Koorma Purana*
10	*Malti, Jati*	*Jasminum grandiflorum* L.	Oleaceae	Twigs	*Koorma Purana, Brahma Vaivarta Purana*
11	*Am*	*Mangifera indica* L.	Anacardiaceae	Twigs	*Brahma Vaivarta Purana*
12	*Vakul*	*Mimusops elengi* L.	Sapotaceae	Twig	-
13	*Kadamb*	*Neolamackia cadamba* (Roxb.) Bosser	Rubiaceae	Twigs	*Brahma Vaivarta Purana*
14	*Karvir, Karavi*	*Nerium oleander* L.	Apocynaceae	Twigs	*Koorma Purana, Brahma Vaivarta Purana*
15	*Amra*	*Phyllanthus emblica* L. (Plate 1d)	Phyllanthaceae	Twig	*Brahma Vaivarta Purana, Koorma Purana*
16	*Champak*	*Plumeria rubra* L.	Apocynaceae	Twigs	*Koorma Purana*
17	*Ashok*	*Saraca asoca* (Roxb.) J. J. de Wilde	Fabaceae	Twigs	*Brahma Vaivarta Purana*
18	*Sal*	*Shorea robusta* C.F. Gaertn.	Dipterocarpaceae	Twigs	*Brahma Vaivarta Purana*
19	*Arjun*	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	Twigs	*Brahma Vaivarta Purana*
20	*Sindhuvar*	*Vitex negundo* L. (Plate 1e)	Lamiaceae	Twigs	*Brahma Vaivarta Purana*
21	*Ksheer vriksh*	*Ficus* spp.	Moraceae	Twigs	*Brahma Vaivarta Purana*

3.1.2. Plant twigs used as tooth brush in Ayurveda

In *Bhavaprakasha Nighantu*, it is stated that the different plants have different properties and different tastes. The plants have the best taste are listed in Table 2.

In *Bhavaprakasha Nighantu*, it is also stated that tooth brush made from parts of different plants give varied experiences. The performance of parts of different plants used as tooth brush mentioned in *Sloka* (Couplets 30-33, *Purva Khand* - 9) in given in Table 3. In *Astanghridayam* and *Charak Samhita* the following plant twigs are used as tooth brush (Table 4).

Table 2. Taste of stem twig useful as toothbrush in (Anonymous, 1997)

Sl.No.	Local name	Botanical name	Family	Best in taste
1	*Mahua*	*Madhuca longifolia* (J. Koenig ex L.) J. F. Macbr. (Plate 1f)	Sapotaceae	Sweet
2	*Karanj*	*Pongamia pinnata* (L.) Pierre (Plate 1g)	Fabaceae	Pungent
3	*Neem*	*Azadirachta indica* A. Juss.	Meliaceae	Bitter
4	*Khair*	*Senegalia catechu* (L.f.) P. J. H. Hurter & Mabb.	Fabaceae	Astringent

Table 3. Plants used as toothbrush in (Anonymous, 1997)

Sl. No.	Local name	Botanical name	Family	Result given by the plants
1	*Aak, Madar*	*Calotropis procera* (Aiton) W. T. Aiton (Plate 1h)	Apocynaceae	Energy (power)
2	*Vat*	*Ficus benghalensis* L.	Moraceae	Brightness
3	*Karanj*	*Pongamia pinnata* (L.) Pierre	Fabaceae	Victory
4	*Pakar*	*Ficus lacor* Buch. Ham.	Moraceae	Wealth
5	*Ber*	*Ziziphus mauritiana* Lam.	Rhamnaceae	Sweet voice
6	*Khair*	*Senegalia catechu* (L.f.) P. J. H. Hurter & Mabb.	Fabaceae	Fragrance in mouth
7	*Bel*	*Aegle marmelos* (L.) Correa	Rutaceae	Much money
8	*Gular*	*Ficus racemosa* L.	Moraceae	Varacious
9	*Am*	*Mangifera indica* L.	Anacardiaceae	Good health
10	*Kadamb*	*Neolamackia cadamba* (Roxb.) Bosser	Rubiaceae	Patience and memory
11	*Champa*	*Plumeria rubra* L.	Apocynaceae	Steady
12	*Siris*	*Albizia lebbeck* (L.) Benth.	Fabaceae	Glory, prosperity, age and healthy
13	*Chirchita*	*Achyranthes aspera* L.	Amaranthaceae	Patience and memory
14	*Vijaysar*	*Pterocarpus marsupium* Roxb. (Plate 2a)	Fabaceae	Patience, memory and wisdom
15	*Anar*	*Punica granatum* L.	Punicaceae	Handsome or beautiful form
16	*Arjun*	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	Handsome or beautiful form
17	*Kutaj*	*Holarrhena pubescens* Wall. ex G. Don	Apocynaceae	Handsome or beautiful form
18	*Chameli*	*Jasminum multiflorum* (Burm.f.) Andrews	Oleaceae	Destroy bad dream
19	*Tagar*	*Tabernaemontana divaricata* (L.) R. Br. ex Roem. & Schult.	Apocynaceae	Destroy bad dream
20	*Mandar*	*Erythrina variegata* L.	Fabaceae	Destroy bad dream

Table 4. Plant twigs used as toothbrush in *Astanghridayam* and *Charak Samhita* (Lalchandra, 2008; Anonymous, 1984)

Sl. No.	Local name	Botanical name	Family	Part used	Name of Ayurveda text
1	*Ak*	*Calotropis procera* (Aiton) W.T. Aiton	Apocynaceae	Twig	*Astanghridayam, Charak Samhita*
2	*Vat*	*Ficus benghalensis* L.	Moraceae	Twig	*Astanghridayam*
3	*Khadira*	*Senegalia catechu* (L.f.) P. J. H. Hurter & Mabb.	Fabaceae	Twigs	*Astanghridayam*
4	*Karanj*	*Pongamia pinnata* (L.) Pierre	Fabaceae	Twig	*Astanghridayam, Charak Samhita*
5	*Arjun*	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	Twig	*Astanghridayam, Charak Samhita*
6	*Kaner*	*Nerium oleander* L.	Apocynaceae	Twig	*Charak Samhita*
7	*Malti*	*Jasminum multiflorum* (Burm.f.) Andrews	Oleaceae	Twig	*Charak Samhita*
8	*Vijaysar*	*Pterocarpus marsupium* Roxb.	Fabaceae	Twig	*Charak Samhita*

3.1.3. Plants used as tooth brush by rural/ tribal people in different parts of India

India is the second largest country of the world in respect of population. Majority of the population i.e., about 72% reside in rural areas in different States of the country. Apart from the rural population, 8.4 million population constituted by over 705 types of different tribal communities and ethnic groups, which utilize over 10,000 plant species for fulfillment of their various kind of requirements such as food, fodder, fiber, medicine, dye, gum, religion, worship, thatching, making traditional homes and agricultural implements, etc. They still use twigs of several plant species as tooth brushes which are easily available in their surroundings (Table 5).

Table 5. Plants used as tooth brush by rural/tribal people in different parts of India (Punjani, 1998; Pradeep Kumar, 2014; Sagar, 2015)

Sl. No.	Local name	Botanical name	Family	Part used	Region
1	*Haldu*	*Adina cordifolia* (Roxb.) Brandis	Rubiaceae	Young branch	Maharashtra
2	*Apamarg, Chirchira*	*Achyranthes aspera* L.	Amaranthaceae	Root/Stem	Throughout India
3	*Bili*	*Aegle marmelos* (L.) Correa	Rutaceae	Stem twig	Gujarat
4	*Ankol*	*Alangium salvifolium* (L.f.) Wangerin (Plate 2b)	Cornaceae	Stem twig	Gujarat
5	*Shiris, Sarasdo*	*Albizia lebbeck* (L.) Benth.	Fabaceae	Stem twig	Gujarat
6	*Neem,Limdo*	*Azadirachta indica* A. Juss.	Meliaceae	Tender twig	Throughout India
7	*Kachnar*	*Bauhinia variegata* L. (Plate 2c)	Fabaceae	Twig	South India
8	*Saledi*	*Boswellia serrata* Roxb.	Burseraceae	Stem twig	Gujarat
9	*Kamboj*	*Breynia retusa* (Dennst.) Alston	Phyllanthaceae	Stem twig	Gujarat

10	*Achar*	*Buchanania cochinchinensis* (Lour.) M.R. Almeida (Plate 2d)	Anacardiaceae	Twig	Madhya Pradesh, Chhattisgarh
11	*Khakhro, Kesudo*	*Butea monosperma* (Lam.) Kuntze	Fabaceae	Stem twig	Gujarat
12	*Arhar*	*Cajanus cajan* (L.) Huth	Fabaceae	Green stem	Chhattisgarh, Madhya Pradesh
13	*Ak*	*Calotropis procera* (Aiton) W. T. Aiton	Apocynaceae	Root	Maharashtra
14	*Karra*	*Cleistanthus collinus* (Roxb.) Benth. ex Hook.f.	Phyllanthaceae	Twig	Chhattisgarh
15	*Takoli*	*Dalbergia lanceolaria* L.f.	Fabaceae	Twig	Chhattisgarh, Madhya Pradesh, Odisha
16	*Sandesro*	*Delonix elata* (L.) Gamble	Fabaceae	Stem twig	Gujarat
17	*Cholohaerna charo*	*Dicoma tomentosa* Cass.	Asteraceae	Root & Branch	Rajasthan
18	*Chamrol*	*Ehratia aspera* Willd.	Boraginaceae	Young branch	Maharashtra
19	*Vat, Bargad, Vad*	*Ficus benghalensis* L.	Moraceae	Aerial root	Gujarat
20	*Umro*	*Ficus racemosa* L.	Moraceae	Stem twig	Gujarat
21	*Peepal, Piplo*	*Ficus religiosa* L.	Moraceae	Twig	Maharashtra, Gujarat
22	*Mulaithi*	*Glycyrrhiza glabra* L.	Fabaceae	Root	
23	*Antedi*	*Helicteres isora* L. (Plate 2e)	Malvaceae	Stem twig	Gujarat
24	*Kutaj, Kuda*	*Holarrhena pubescens* Wall. ex G. Don	Apocynaceae	Twig	Madhya Pradesh, Chhattisgarh, Odisha
25	*Chirol*	*Holoptelea integrifolia* Planch.	Ulmaceae	Twig	Madhya Pradesh, Chhattisgarh, Odisha
26	*Jangli Arandi*	*Jatropha curcas* L. (Plate 2f)	Euphorbiaceae	Stem twig	Madhya Pradesh
27	*Mahua, Mahudo*	*Madhuca longifolia* (J. Koenig ex L.) J. F. Macbr.	Sapotaceae	Twig	Madhya Pradesh, Chhattisgarh, Odisha, Maharashtra, Gujarat
28	*Seb*	*Malus domestica* (Suckow) Borkh.	Rosaceae	Twig	Jammu & Kashmir, Himachal Pradesh, Uttrakhand
29	*Am*	*Mangifera indica* L.	Anacardiaceae	Small stem	Throughout India
30	*Kasi*	*Mimosa hamata* Willd.	Fabaceae	Stem twig	Gujarat
31	*Kadamb*	*Mitragyna parvifolia* (Roxb.) Korth.	Rubiaceae	Stem twig	Gujarat

32	*Parijatak, Tarbat*	*Nyctanthes arbor-tristis* L. (Plate 2g)	Oleaceae	Stem twig	Gujarat
33	*Chhind*	*Phoenix acaulis* Roxb.	Arecaceae	Petiole	Chhattisgarh, Madhya Pradesh
34	*Aonla*	*Phyllanthus emblica* L.	Phyllanthaceae	Twig	Chhattisgarh
35	*Karanj*	*Pongamia pinnata* (L.) Pierre	Fabaceae	Twig	Throughout India
36	*Peelu, Piludi*	*Salvadora persica* L.	Salvadoraceae	Twig	Rajasthan, Gujarat
37	*Khair*	*Senegalia catechu* (L.f.) P. J. H. Hurter & Mabb.	Fabaceae	Stem twig	Gujarat
38	*Aaval*	*Senna auriculata* (L.) Roxb.	Fabaceae	Stem	Gujarat
39	*Kasundro*	*Senna occidentalis* (L.) Link	Fabaceae	Stem	Gujarat
40	*Sal*	*Shorea robusta* C. F. Gaertn.	Dipterocarpaceae	Stem of small plant	Madhya Pradesh, Chhattisgarh
41	*Ram Daton*	*Smilax zeylanica* L.	Smilacaceae	Branch	Madhya Pradesh, Chhattisgarh, Odisha, Rajastahn
42	*Jamun*	*Syzygium cumini* (L.) Skeels	Myrtaceae	Twig	-
43	*Dhav*	*Terminalia anogeissiana* Gere & Boatwr.	Combretaceae	Stem twig	Gujarat
44	*Runjdo*	*Vachellia leucophloea* (Roxb.) Maslin, Seigler & Ebinger	Fabaceae	Stem twig	Gujarat
45	*Babool, Baval*	*Vachellia nilotica* (L.) P. J. H. Hurter & Mabb. ssp. *indica* (Benth.) Kyal. & Boatwr.	Fabaceae	Twig	Throughout India
46	*Nagod*	*Vitex negundo* L.	Lamiaceae	Stem twig	Gujarat
47	*Dhuni*	*Vitex trifolia* L.	Lamiaceae	Stem twig	Gujarat
48	*Ber*	*Ziziphus mauritiana* Lam. (Plate 2h)	Rhamnaceae	Twig	-
49	*Bordi*	*Ziziphus nummularia* (Burm.f.) Wight & Arn.	Rhamnaceae	Stem	Gujarat

3.2. Discussion

The twigs or branchlets of trees, shrubs, climbers and herbs are being used by people since ancient times and their teeth did not fall for over 100 years as mentioned in ancient scriptures. During ancient times, there were no toothpastes and brushes and people used twigs of plants growing around them as tooth brushes and kept teeth clean and healthy. The trend of synthetic toothpastes and brushes started since 4-5 decades. Now, many companies are making herbal toothpastes like Neem, Babool, Miswak, Aloe vera gel, Vicco Vajradanti, Ved shakti, Dantkanti, Dant rakshak, etc. Ingredients are added in toothpaste in the name of herbals and claimed as antibacterial, helps in control of plague and tarter buildup, thereby making the gum and teeth healthy and strong, reduces the incidence of cavity and tooth decay, regular use of the product will ensure complete oral hygiene, etc. But their claims may not be true. The rural people practicing traditional method of teeth cleaning using plant twigs are

Plate 1. a. *Aegle marmelos* (L.) Correa; b. *Albizia lebbeck* (L.) Benth.; c. *Butea monosperma* (Lam.) Kuntze; d. *Phyllanthus emblica* L.; e. *Vitex negundo* L.; f. *Madhuca longifolia* (J. Koenig ex L.) J. F. Macbr.; g. *Pongamia pinnata* (L.) Pierre; h. *Calotropis procera* (Aiton) W. T. Aiton

Plate 2. a. *Pterocarpus marsupium* Roxb.; b. *Alangium salvifolium* (L.f.) Wangerin; c. *Bauhinia variegata* L.; d. *Buchanania cochinchinensis* (Lour.) M. R. Almeida; e. *Helicteres isora* L.; f. *Jatropha curcas* L.; g. *Nyctanthes arbor-tristis* L.; h. *Ziziphus nummularia* (Burm.f.) Wight & Arn.

safer than people using modern toothpastes in urban areas. Because, plant contains several natural chemical constituents which could be responsible for cure of diseases in human beings, while conventional toothpastes are synthetic. Therefore, the phytochemists, pharmacologists, ethno-pharmacologists and dentists may carry out further detailed scientific studies of indigenous plants used as toothbrush since ancient times and find out the active chemical constitutes which are responsible for curing dental disorders. The comparative study among different plants should also be conducted to find out best plant species responsible for complete oral health.

4. Conclusion

This review is informative and gives a clear idea on brushing teeth with natural toothbrush as it has more advantages when compared with conventional toothbrushes. When compared to modern toothbrushes, teeth cleaning twigs have several advantages such as dental protection, is ecologically safe, cost effective and become self-reliant. Some twigs may need moistening with water if they become dry to ensure the end part is soft. The end part may be cut afresh to ensure hygiene, since twigs are replaces every few weeks to maintain proper hygiene. Disadvantage is that excessive scrubbing could damage the gums.

Though we have shifted to these modern brushing techniques, there are still many people using these natural toothbrushes in many countries. It is healthy and has lot of advantages. It will be better, if natural toothbrushes are used, as they are more beneficial for oral hygiene and health.

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