

ALCOHOLIC FERMENTATION AND ITS PRODUCTS IN ANCIENT INDIA

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The description of alcoholic fermentation in Kauṭilya's Arthaśāstra as interpreted by Shama Sastry and Kangle is scrutinised. The presence of spices in the ferment contributed both enzymes and flavour. Sweetners, astringents like nuts and barks, and spices, often the same ones as those employed at the start, were used as liquor additives, being mandatory in distilled liquors to please Indian palettes. The nature of the drinks prasannā, medhaka, maireya, āsava and those made from certain fruits is deduced.

South India manufactured toddy, and liquors from rice and paddy, which were occasionally matured underground in bamboo tubes. Richer people used *dhātaki* flowers as a flavourant. Honey was fermented in the mountainous areas where it was available.

INTRODUCTION

Even the Harappans two thousand years ago appear to have known not only the process of alcoholic fermentation, but even of distillation. Mahdi Hassan¹ has assembled a total distillation assembly from clay items routinely found in Indus Valley excavations. This included a small perforated basin for which no satisfactory use had been assigned earlier. This was postulated to be the unit through the pores of which distilled alcohol passed, to be condensed higher up on a cold surface. Numerous alcoholic liquors are mentioned in subsequent literature. The *Rāmāyaṇa* has four, Kauṭilya names twelve, and Caraka lists no less than 84 kinds. In these long lists of names, the actual sources of the liquor, its flavouring, and whether it was a wine or a distilled liquor is usually taken for granted and hardly ever made explicit.

MATERIALS EMPLOYED

Nine sources containing sugar were employed for fermentation, according to Caraka. These were sugar-cane juice, guḍa (jaggery), molasses, honey, coconut water, sweet palmyra sap and *mahua* flowers. In addition there were sweet fruits like the grape, date, mango, woodapple (kapittha), date palm, ber (*Ziziphus* species), banana, apricot, jackfruit, rose-apple (jāmbu, *Syzygium jambos*), jamoon (*Syzygium cumini*), pomegranate, *kadamba* (*Anthocephalus cadamba*), *bilva* (*Aegle marmelos*), *rājadāna* (chironji, *Buchanania lanzan*) and *mādanaphala* (*Mimusops*

elengi). Starch-rich grains like rice and barley, in the form of flours or gruels, were also commonly used.

Indians relished liquor to which flavouring materials had been added. Those employed included fragrant flowers like the *kadamba*, *pātala* (*Stereospermum suaveolens*), *jāthi* (jasmine) and *dhātaki* (*woodfordia fruticosa*) and spices such as *haridrā* (turmeric), *ela* (cardamom), and round and long peppers. Astringency, always an attraction in liquor, was achieved through use of *pūgaphala* (the areca nut, *Areca catechu*) and of barks of trees such as the *kapittha*, *kadamba* and *meṣaśṛṅgī* (*Gymnema sylvestre*).

METHOD OF PRODUCTION

While alcoholic liquors are mentioned from the *R̥gveda* onwards in Sanskrit literature, only in the *Arthasāstra* of Kauṭilya are methods outlined for their preparation. These descriptions are extremely terse, and each translator, such as Shama Sastry², Sten Konow³ and Kangle⁴, has his own rendering, aiming at as accurate a translation as possible rather than with a feasible technical interpretation. Some key passages will now be quoted starting with the original translation of Shama Sastry², but using current botanical terminology and modern equivalents of quantity.

Different liquors

“*Medhaka* is manufactured with one *droṇa* (say about 10 kg) of water, half an *ādḥaka* (say 1.2 kg) of rice and three *prasthas* (say 1.6 kg) of ferment”².

“Twelve *ādḥakas* (say 27 kg) of flour, 5 *prasthas* together with the bark and fruits of *putraka* (an unidentified plant species), constitute *prasannā*.”² To this interpretation, Kangle⁴ adds after the wood ferment the phrase “or a mixture of its class”. Sten Konow³ has “5 *prasthas* of ferment, or a collection of spices combined with the rind and fruit of the *putraka* tree”.

“One hundred *palas* (say 3.5 kg) of *kapittha*, 500 *palas* (17.5 kg) of *phānita* (translated as sugar, but actually molasses) and one *prastha* (560 g) of honey form *āsava*. With an increase of one quarter of the above ingredients, a superior kind of *āsava* is manufactured; and when the same ingredients are lessened to the extent of one quarter each, it becomes of an inferior quantity”². Kangle⁴ uses *tulā* in place of one hundred *palas* and 5 *tulās* for 500 *palas*. He remarks that the amount of water (not mentioned) is evidently 8 *tulās* (30-40 kg), and that *āsava* is primarily an infusion.

“The preparation of various kinds of *ariṣṭa* for various diseases are to be learnt from physicians.”²

“A sour decoction of the bark of *meṣaśṛṅgī* (a kind of poison) mixed with *guḍa* and with the powder of long pepper and black pepper or (a footnote states that in place of

“or”, and “and” is also possible) with the powder of *tr̥phalā* (*Terminalia chebula*, *Terminalia bellirica* and *Emblica officinalis*) forms *maireya*. To all kinds of liquor mixed with jaggery the powder of *tr̥phalā* is always added”. Kangle⁴ states that *maireya* is distilled from a mixture of *meṣaśrhgī* bark decoction with jaggery, mixed either with long and black peppers, or with a mix of the three fruits: this, he adds in a footnote, is probably *tr̥phalā*, or according to another suggestion, nutmeg, arecanut and clove. or, he says, “there should be a mixture of the three fruits in all liquors mixed with jaggery”. Incidentally, *meṣaśrhgī*, which Shama Sastry² translated as a kind of poison, is identified as the tree *Gymnema sylvestre*.

The ferment or kiṅva

“One *drona* (about 10 kg) of either boiled and unboiled paste of *māsa* (*urad*, *Vigna mungo*), three parts more (13 kg?) of rice, and one *karṣa* (about 10 gm) of *morata* (*Alangium salviifolium*) and the like form the ferment”.² Kangle⁴ has “one-third part more rice grains”, a slight difference, and later “mixed with a part weighing one *karṣa* (each) of *morata* and others”. These others, according to a footnote by Shama Sastry², are the six drugs listed as additions to *medhaka* and *prasannā*, as quoted below.

In the manufacture of *medhaka* and *prasannā*, 5 *karṣas* (about 50 g) of the powder of each of *pāthā* (either *Clypea hermandifolia* or *A. cruentus*), *lodhra* (*Symplocos racemosa*), *tejovatī* (*Piper chaba*), *elāvāluka* (either *Prunus cerasus* or *Limonia acidissima*), honey, grape juice, *pr̥yahgu* (seeds of *Panicum miliaceum*), *dāruharidrā* (*Amomum aromaticum*), black pepper and long pepper are added as *sambhāra*, requisite spices”.²

Additives to liquor

“The decoction of *madhuka* (*Madhuca indica*) mixed with *kataśararkarā* (granulated sugar), when added to *prasannā*, gives a pleasing colour”. Kangle⁴ translates *madhuka* as liquorice, and says *kataśararkarā* may be a plant. “The same ingredients as are added to *prasannā* are also added to *śvetasurā*”, a word which Shama Sastry² translates literally as white liquor, and Kangle⁴ as *medhaka*.

“The requisite quantity of spices to be added to *āsava* is one *karṣa* each of the powders of *coca* (cinnamon bark), *citraka* (*Plumbago zeylanica*), *vilahga* (?), and *gajapippalī* (*Scindaspus officinalis*), and two *karṣas* each of the powder of *kramuka* (*Averrhoa carambola*), *madhuka* (*Mahua indica*: again Kangle prefers liquorice), *muṣṭā* (*Cyperus rotundus*) and *lodhra*”.

“The addition of one-tenth of the above ingredients, viz. *coca*, *kramuka*, etc. is termed *bījabandha*”. On the other hand Kangle⁴ has as his translation of the same text: “And one-tenth part of these is the formulation of the essence”.

“The liquor that is manufactured from mango fruits (*sahakārasurā*) may contain an even greater proportion of essence (*rasottara*) or of spices (*bījottara*). It is called *mahāsurā* when it contains *sambhāra* (spices as described above)”. Kangle⁴ says that *sahakārasurā* may represent the liquor made from mango juice, and *mahāsurā* this liquor with a higher proportion of juice or of essence.

Then follows an elaborate recipe which we need not quote for additives to a liquor “payable by a king”, to which additionally “5 *palas* or *phānita* (molasses) are added.....in order to increase its flavour”.

LIQUORS AND THEIR PREPARATION

Some comments on these textual translations will now be attempted.

Individual liquors:

Prasannā is based on cereal flour, and the description of a ferment implies a fermentation step, though the period is not specified. Since astringents and spices are both part of the ferment, the end-product must certainly have been an already flavoured one.

Medhaka is similarly made from rice, but the proportion of ferment is far higher than for *prasannā*. This must have had some effect on alcoholic strength and flavour of the product. Kangle translates white liquor as *medhaka*, suggesting that it was a distilled product.

The raw material for *maireya* is not specified. It was a favourite drink of royalty, Sītā, for example, being tenderly administered the liquid by Rāma⁵. The *Gautama Dharma Sūtra* states that kṣatriyas and vaiśyas were not permitted drinks distilled from flour, but were allowed to imbibe those made from sugar, honey, guḍa, madhuka flowers and presumably other flowers like Jāti and dhātaki⁵. If so, *maireya* must have been made from the latter sources. Kangle⁴ assumes, probably from other literally allusions, that it was a distilled liquor, and also postulates, that it was distilled over astringents and spices. However it seems more probable that these additions were made after distillation. This is further strengthened by the observations of Agrawala⁶ that the price of *maireya* depended on whether it was finally sweetened with expensive honey, cheaper *guḍa* or even cheaper *phānita* (molasses). The *Arthaśāstra* also clearly states that jaggery was added to a distilled liquor, always with *triphalā* as well, presumably to confer both the sweetness and astringency that Indians expected of a good liquor.

Where *dsava* is concerned, there is no mention in the text of a ferment or even of any source of enzymes (like cereals or spices). This has led Kangle to state that an *dsava* was only an infusion, strong or light depending on the quantity of the ingredients employed. If so, its occurrence is unlikely in a chapter in the *Arthaśāstra* addressed to the Superintendent of Liquor, and in the middle of a text dealing with products of the

latter's concern. Almost certainly something has been left unsaid, and it is likely that the ingredients mentioned (*phānita*, *kapittha* and honey) are to be fermented using the same ferment as for *medhaka* and *prasannā*. The Rāmāyaṇa terms it a strong drink⁵, and this tends to be confirmed by the long list of additives to *āsava* given later in the text of the *Arthaśāstra*, which includes sweeteners, spices and astringents. *Āsava* was in fact a generic name, to which was prefixed the source, such as *pushpa-*, *phala-*, *madhvika-*, *śarkarā-* and *nārikela-āsava*.

The mango liquor mentioned seems to have been called *sahakārasurā*, as Kangle postulates⁴, and its thick version, also heavily-spiced, was *mahāsurā*. From other sources⁵ we know that a date-based liquor was called *khajurasāra*, that from *kādambari* fruit (a distilled liquor) was *kādambari*, that from the ber fruit was *kaula*, that from palm fruit *thālakka*, and the wine from grapes, *madhu* or *mṛdvika*. *Jāthi* (jasmine flowers) yield the drink *jāthi* and *madhuka* flowers were processed to yield the strong distilled drink *vārunī*. Sugarcane juice, flavoured with *dhātaki* flowers, was distilled to yield the exceptionally strong liquor *sīdhu*, commonly used by the non-Āryan population⁵.

The ferment:

Description of the ferment is unambiguous. It consisted of about equal quantities of rice and *urad dal* with a very small quantity of *morata* perhaps the fruit of *Alangium salviifolium*. Optionally six other spices were also employed, and it is likely that apart from providing a final flavoured product, these also served as a source of enzymes. It is known that spices induce fermentation, as is currently practised for example in the preparation of the pulse product, warri or vadian. Shama Sastry² perceived this, stating in a footnote that the same spices that serve as enzyme sources also serve as additives to the final drink.

As ferments in the preparation of *medhaka* and *prasannā*, no less than ten items are added as "*sambhāra*", requisite spices. This can be misleading till one realises that this direction precedes the section which deals with additives to liquor, and must therefore refer to additions of spices before fermentation, that is as ferments.

Additives:

These can be classed as sweeteners, spices and astringents. The first group included sugar, *guḍa*, *phānita*, liquorice, *madhuka* flower extract and honey. That these were also raw materials for fermentation can give rise to some confusion. Additives could apparently be used with an undistilled drink like *prasannā* even if they had already been present before the fermentation. In distilled drink they were obligatory to please Indian palates.

The section on flavourants for *āsava* is straight-forward enough. That which follows brings in an "essence" that is one-tenth the strength of the one earlier

prescribed. Its addition is described as *bijabandha*, but leaves uncertain what the addition is to, or its purpose. The next entry concerning mango liquor is apparently linked again with use of an additive of full strength, but distinguishes between spices (*bijottara*, according to Shama Sastry²) and essence (*rasottara*). It would appear that these terms should be interchanged, since *bijottara* are likely to mean nut extracts or astringents, which could conceivably be called essence, while *rasottara* would well apply to spice extracts.

Practices in South India

A few remarks on the practices of south India may serve to round out this account. Liquor in the south was widely consumed, and there were as many as 60 pure Tamil names for it in the *Saṅgam* literature of the first few centuries of the Christian era⁷. Toddy was brewed in pots tied below incisions made in the spathes of the toddy or palmyra palm (*Borassus flabellifer*). The intensely sweet juice, called *nīrā*, was collected overnight, and fermented naturally during the heat of the day. The practice of smearing the pots with *cunām* (slaked lime) to prevent fermentation, if the juice was needed either for drinking or to make palm jaggery by boiling down, is an ancient one, since such pots turn up in excavations. Arrack was distilled from toddy and was described as a favourite of those who lived risky lives, like sailors.

Liquor was also brewed in strong-mouthed jars from paddy and from rice. Pounded germinated paddy mixed with a porridge of rice was stated to yield "after two days and two nights a high-flavoured wine"⁸. The flavour of wine was enhanced by burying it underground, filled in the hollows of stout bamboo stems.⁷ Thoppi was a home-brewed rice liquor carried out in the presence of fragrant flowers like the *dhātaki* (*jagi* in Tamil) by richer people.⁹ In mountainous areas, where honey was available, this was fermented to wine after dilution, and again matured underground before use.⁷

A favourite drink of women was *munnīr* or triple-liquid, a mixture of tender coconut water, sugar-cane juice and palmyra juice, which may or may not have been fermented.¹⁰ Pre-Āryan society in the south showed no prejudice against consuming liquor.

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