Upcoming Events

2000

June 8th – 9th **Australian Institute of Packaging National Conference**, Conrad Jupiter's, Gold Coast, Queensland. Contact Shan Fleming, Event Solutions, Tel: 07 3855 3711, Fax: 07 3855 2811, E-mail: eventsol_@tpgi.com.au

Aug. 20th – 23rd **Annual Australian Institute of Food Science and Technology Convention**, "Millennium Marketing through Food Science and Technology", Brisbane. Contact Mel Malloch, Tel: 02 9959 4455 Fax: 02 9954 4327.

Sept. 4th – 5th **Advanced Flavour/Aroma Research Workshop: Synergism in Sensory Evaluations & Instrumental Analysis**, Goodwood Park Hotel, Singapore. Contact the Centre for Advanced Food Education (CAFÉ), Tel: 65 5635095, Fax: 65 5660967, E-mail: cafemail@singnet.com.sg

Sept. 24th – 28th **International Congress on Differentiation and Cell Biology**, Conrad Jupiter's, Gold Coast, Queensland. Website: www.celldiff.unsw.edu.au

2001

Feb 9th - 11th **Sydney Aromatherapy Conference and Trade Fair**, Sydney. Contact Organisers, Tel: 02 9369 2039, Fax: 02 9369 2039, E-mail: sac2001@sydaromaconf.com.au.

COMING UP in ChemoSense

Human olfactory genetics

Buttery wine notes

Food cravings

*** Visit us at our NEW WEBSITE http://www.chemosensory.com**

Subscribe to ChemoSense NOW!

Register your subscription for 4 issues of ChemoSense at AUD$48

Fax: (+61 2) 9209 4081
Phone: (02) 9209 4080

Email: m.styles@unsw.edu.au

ChemoSense (ISSN: 1442-9098) is produced and published quarterly by the Centre for ChemoSensory Research, University of New South Wales, Australian Technology Park, Sydney, Australia 1430
Production: This issue was edited by Karyn Weitzner and Graham Bell **Layout:** Karyn Weitzner
Goodbye everybody!
Subscriptions: Annual subscription A$48, postage inclusive. Fax your order to The Centre for ChemoSensory Research (+61 2) 9209 4081 or email m.styles@unsw.edu.au Advertising rates available upon request.

Vol. 2 No.3 May 2000

Chemo Sense

This issue features the woozy world of wine.

Over the last two years Gallo Winery in Modesto California has invested heavily in sensory research – recruiting a panel and building their own testing facilities. The winery has used their sensory research with great success to investigate flavour characteristics of wine and to aid marketers and winemakers alike. Isabelle Lesschaeve of E & J Gallo Winery has described her experiences as a sensory leader in the wine industry.

Harry Lawless of Cornell University describes the task confronting the wine judge. Wine amateurs can learn from this how to appreciate a good drop.

Wine judges should but don't always practice the most objective way to assess wines, allowing fashion and market forces to influence them.

We also explore the problem of off-tastes in wines. How is the latest research tackling cork taint? Are synthetic corks the answer? We speak to researchers in the field, and wine industry representatives, about obliterating TCA - the bane of wine lovers and wine producers everywhere.

Once you're finished sniffing corks you might want to consider sniffing your computer. A number of companies have recently developed software to encode smells, with the aim of enabling computers to convey odours. The possibilities for the new technology are huge, and entertainment seems set to undergo a fragrant experience driven by the e-commerce revolution.

Our Asian Market focus this issue is on India. Is there a market for Australian food products? What will happen when quota restrictions are removed from exports to India? The Centre for ChemoSensory Research is looking toward an Indian fieldtrip in the near future. Any takers?

New scent of e-commerce: Smell the DotCom!

by Karyn Weitzner

Smells emanating from your computer as you grocery shop online; a series of scene-setting odours as you play your favourite video game; and scents wafting through the cinema, *à la* Brave New World, while you watch a movie. They're all feasible, and they're all coming soon.

Right now, companies such as DigiScents (www.digiscents.com), Aroma Jet (www.aromajet.com), and TriSenx (www.trisenx.com), are working on the technology to smell-enable our computer hardware. They see applications in the fields of e-commerce, entertainment and medicine. Their thinking is that smell is one of the last missing ingredients for a total media experience. Will the arrival of digitised smell have the same revolutionary effect upon our lives as the advent of recorded sound?

Smelly toys

Despite the fact that humans are primarily visually oriented creatures, we can have strong emotional reactions to certain smells. As a result we like to add scents to the objects we manufacture, even aside from the usual smells for deodorising and perfuming.

We also like to add new features to our toys. Ventures such as the American group AromaJet.com are cashing in on this trend. They have developed a prototype device (with the code-name 'Pinoke') that can dispense odours during the course of a video game. According to AromaJet's press release, 'Pinoke' operates via "…proprietary micro-jetting technology that enables software code to control the selection and mixture of fragrances for release at precisely the right time coinciding with on-screen events."

The aroma compounds reside within replaceable scent cartridges that are volatilised in response to software codes.

Other groups, such as DigiScents Inc., have developed their own systems for incorporating odours into games. DigiScents has come up with a unit called 'iSmell' that can be connected to a personal computer and that will, according to their website, "synthesise

cont. page 2

INSIDE:

Centre for ChemoSensory Research
The University of New South Wales

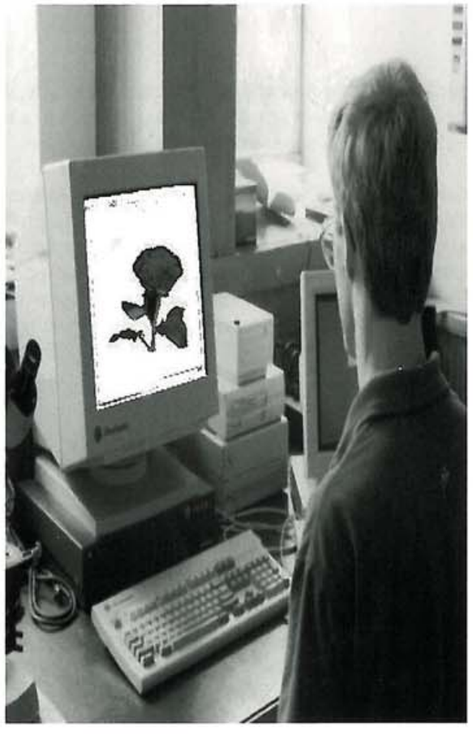
Digitised scents:
A breath of fresh air...

by Karyn Weitzner

smells from a palette of 'primary odours' following the guidelines of a digital file". Each smell is digitally coded according to its chemical makeup and where it lies "on the scent spectrum". Files can be sent to 'iSmell' over the internet. The same technology could eventually be used to add the dimension of smell to movies.

Using smell and taste to sell

Those touting the new digitised smell technology also foresee its potential as a marketing tool. At DigiScents, developers are excited at the prospect of introducing odours to online shopping and advertising. Joel Bellenson, CEO of DigiScents, says "Smell will radically transform the online shopping experience for foods, beverages, perfumes, cosmetics, soaps, candles and lotions. Imagine being able to create your own fragrances and flavours online and instantly finding products that match your personal tastes."



AromaJet.com has similar projects in mind. On their website you can read about their ideas for interactive kiosks in department stores, and for devices for market research into the aromatic properties of products. On a more serious note they also describe a digital Olfactometer: a device that dispenses different odorants and that could aid in the diagnosis of neurodegenerative diseases by measuring olfactory deficits.

Another American company, TriSenx, is going about smell-delivery in a different manner. They are already selling a device akin to a desk-top printer – they call it 'FirstSENX' – to embed odorants onto a special type of paper. Users can download odours off the internet. An extra attraction is that the compounds on these pieces of paper can be tasted. TriSenx plans to eventually substitute edible wafers for the paper. The prices of this scent-making hardware is pretty hefty at the moment. TriSenx's basic FirstSENX machine is US$398 and this price climbs to US$1,198 for the deluxe UltraSENX.

Who will buy it?

Companies pioneering digitised smell technology admit that the first generation of smell-making devices will have relatively 'low resolution'. The complexity of many odours would make their coding and delivery too difficult at this stage. But developers are confident that there is a place for smell in the media, and that it will be a breath of fresh air to young people jaded by hundreds of special effects movies with digital surround sound.

"At very few points in our lives have we ever been deceived by our sense of smell. Further, we have not been exposed to media that is manipulating scent to achieve a mood, so we have not built up the levels of disbelief that we have for visual and audio entertainment," says Ralph Thomas, a director at DigiScents.

Undoubtedly, though, some people will not be able to get past the Brave New World connotations. "People are growing wary of the unsolicited intrusion of odours (pleasant and unpleasant) in their lives," says Graham Bell of the Centre for ChemoSensory Research, "The shopping mall of the future may indeed draw in customers by proclaiming: 'No manipulative odours are permitted on these premises!'"

Sources:
www.digiscents.com
www.trisenx.com
www.aromajet.com
"Scents and Sensibility" by Richard Thieme, Village Voice, March 22-28, 2000.
"Smell-a-net" The Wall Street Journal,

Focus on INDIA

Vol. 2 No. 3 May 2000

India has signed an agreement with the World Trade Organisation binding it to remove remaining quantitative restrictions on imports. These quotas are due to be lifted by April 1st 2000, creating new opportunities for importers, including Australia, to get their products onto Indian supermarket shelves and into Indian homes. Unfortunately, high tariffs and duties will remain on most import items.

India is one of the largest food producers and consumers in the world. With a population of about 971 million people, it seems that there should be room for outsiders to get in on the act. In the 98/99 financial year India ranked 12th on Australia's list of export destinations, with exports including Australian fresh fruit and vegetables to the value of A$47 million. Australia also sent some processed foods to India, including jams, fruit juices, sauces and packaged soups, and the volume of these imports has shown a steady increase.

Although the removal of quota restrictions is good news for potential exporters, tariffs and duties on import items are still prohibitive: most dairy products, for example, attract duties around 47%, processed fruits and jams, 57% and chocolate 68%. These rates make imported food too expensive for most Indian people, according to the Indian Commerce Minister Murasoli Maran, who believes that the liberalisation of India's economy will not mean that locals will rush to buy foreign imports: "How many Indians can afford such products? Maybe 0.001 per cent."

He seems to be forgetting India's 20 million millionaires, and its 100 million middle class.

The fact is Western-style foods are gaining in popularity in the big cities of India, where there is a middle class with a high disposable income and a taste for new culinary experiences.

Attitudes to Western foods

The Indian website *Food Guide to India* (www.foodguideindia.com) is a great place to find out more about Indian perceptions of all types of food, including staples of the Western diet. The site's recent feature of pasta recipes laments that "...pastas are relatively recent entrants in the Indian supermarkets and none of the manufacturers suggest anything on the packaging except giving instructions on how to boil them." As a result, they say, pasta is unnecessarily considered to be a gourmet dish and slotted into the too-hard basket.

Here is an opportunity going begging. Remember too that India has over 200 million vegetarians that could find pasta extremely interesting.

The same site offers an interesting snapshot of the restaurant scene in India - Indian, Chinese, Japanese, Continental, Pizzerias, Carribbean and Mexican to name a few. This degree of diversity is apparent mainly in the larger cities such as New Delhi and Bangalore. American fast food restaurants, KFC, McDonald's, Pizza Hut and Wimpy's have sprung up in many Indian cities.

Some commentators believe that the more affluent part of the Indian population is even losing touch with its culinary heritage: "The onslaught of the American multinationals saw the emergence of a new breed of Indians: the on-the-go yuppie. The ghee-doused parathas were replaced by greasy burgers and calorie-rich colas took the place of creamy lassis. It is not uncommon to find a family of eight, encompassing three generations, gorging on pizza at the Pizza Hut in Jaipur."

Opportunities

The Australian Department of Foreign Affairs and Trade (DFAT) believes that the lifting of quota restrictions on imports will mean a big shift for Australian food exports into India. A spokeswoman for DFAT says, "We see opportunities for Australian foods to be carried by the big Indian supermarket chains: Foodworld, Vitan's, Nilgiri's and Nanz. There will also be the chance to supply food products and food service items to the American fast food restaurants already in India."

Another opportunity identified by DFAT is for Australia to contribute to the improvement of the cold chain storage process in India, the deficiencies of which hamper transportation of imports within India at the moment.

What to do now

It's clear that Australia's food exporters will be thinking carefully about expanding their exports into India over the coming 12 months. While many city-dwelling Indians have already had some exposure to Western foods, and have embraced them as an interesting addition to their cosmopolitan lifestyles, there is a need for manufacturers to provide more information on how to use their products.

So now is the time to do the homework on India and to think seriously about catching on to this great emerging export opportunity.

Sources:
"Open to the World", Rohit Saran, *India Today*, April 17, 2000.
"The Great Indian Curry Trick", Adite Chatterjee, India Today Online Group, *www.india-today.com/iplus/1999_4/curry.html*

Sensory science for WINEMAKERS

The Introduction of Sensory Science to E. & J. Gallo Winery

by Dr Isabelle Lesschaeve, Senior Sensory Specialist,
E. & J. Gallo Winery, Modesto, California

When I took up the sensory specialist position at E. & J. Gallo Winery over 2 years ago, I knew it would be a challenge to implement a new way of tasting wines and alcoholic beverages. It was a challenge indeed, but after 2 years of activity I believe that we are making an impact.

Gallo Winery is a family owned business, started in 1933 by Ernest and Julio Gallo. Since that time, the business has grown: always with the goal to make wines that represent value for money. It is now the largest winery in the world.

Scientific research at E & J Gallo Winery. This building was constructed in 1996.

Investing in research

The winery has always shown an interest in research in viticulture and oenology. In 1996, they built a research building (see picture, right) where a group of American and international scientists now work together on life sciences, chemical sciences and flavour and sensory sciences programs to assist the winery in achieving its vision of a bottle of Gallo wine on every table.

The sensory science program is new. The sensory suite has been customised to fit our needs - it consists of a basic preparation area and a tasting room with 10 booths built according to ISO standards, and it is equipped with a computerised data collection network (see picture, top of facing page).

We have recruited 125 Gallo employees who each join one of our two panels. The selective panel is in charge of determining the existence of differences between products. The trained descriptive panel describes and quantifies the differences perceived between the products.

Before joining either sensory panel, candidates go through some screening tests to make sure they have normal olfactory or gustatory acuity. They are then enrolled in a training program to learn the basics of sensory tests.

Year round, panelists have access to an ongoing training program to maintain their interest and abilities whenever they are not enrolled in a sensory project. The ongoing program is also a platform for the sensory science program to be proactive. We have developed some internal standards with the descriptive panel to be used in future descriptive studies and to establish a common vocabulary within the company to describe our products. We experiment with difference test alternatives, considering that the carry-over effect and sensory fatigue are the main biases to control in the testing of alcoholic beverages.

Sensory science is for everyone

As a new discipline in the winery, our role and responsibilities were unclear when we started. Winemakers thought we would tell them how to make wine, marketing managers thought that it looked interesting but too technical for their use, and researchers wanted to experiment with no specific questions to be answered. Through a sustained communication effort, we have attempted to educate our colleagues about '*what sensory can do for you*'.

We have convinced marketers that sensory science is a new tool for decision making, by producing preference maps on major varietal wines. Preference mapping is now seen as a tool to explore market trends, to identify market opportunities, and to provide guidance to winemakers. Winemakers first saw the preference maps as a new tool that Marketing could use to dictate their preference. However, once we showed that the preference map trends were in accordance with the winemakers' instincts and were supporting what they believed in, the communication became smoother. On the research side, sensory science has been used to characterise the flavour potential of yeasts or to enhance the understanding of oak influence in wines.

The future

The introduction and establishment of the discipline of sensory science within Gallo Winery has been challenging, and to date it has been successful. We still have some challenges to meet, for example in product optimisation and quality assurance.

Our future looks very exciting. We plan to utilise some of these modern sensory and statistical tools to gain a better understanding of the sensory and non-sensory attributes that determine consumer acceptability and satisfaction of our products. By this consumer science approach, we will be able to develop new products that fit consumer expectations and needs.

Sensory testing booths in the sensory suite at Gallo Winery. Data collection is computerised.

Wine Tasting - Pitfalls & Protocols

by Harry Lawless. Ph.D.
Department of Food Science, Stocking Hall
Cornell University, Ithaca, NY 14853

Wine is a complex stimulus, with important visual, aromatic, gustatory and tactile properties. Anyone who tastes wine for a serious purpose, or even merely for personal enjoyment, should know how to inspect and evaluate a wine sample.

The tasting sequence

The inspection begins with a visual assessment, looking at the wine in the glass at several different angles. Edge colour can be ascertained by looking directly down into the glass. It is important to have a white or at least neutral grey background. The glass may be tipped slightly to see if "legs" or streamers develop. Sparkling wines have different degrees of effervescence and should be examined for bubble-size and rate of formation.

Next, the aroma in the glass is tested. The initial sniffing should be done while the wine is just sitting there in the glass. The nose can be placed into the opening of the glass – but beware of snorting too vigorously! The evaluator should then begin to swirl the wine to create a vortex. This increases the surface area of the wine and helps release the aromatic volatiles to make them more apparent.

The third step in the evaluation sequence is the actual tasting. A small portion of the wine is taken into the mouth. At this point, it is possible to register the taste properties - namely sweetness to acid/sour balance - and to try to get some impression of the body or perceived weight of the wine in the mouth. It may be helpful to distribute the wine across the tongue to note the various sensations that occur — the tongue is not a uniform surface.

Tasting techniques

Once the taste properties have been registered, it is time to examine the volatile flavours once again. Flavour-by-mouth may not match the aroma-in-the-glass, since the wine is being warmed in the mouth, diluted by saliva, and the acids are being buffered by salivary bicarbonate. So the relative mixture of volatiles may be different in the two cases, as well as the change in route of smelling.

Aroma sniffed from the glass travels to the olfactory apparatus from the front of the nose while flavour by mouth is sensed via the retronasal route (Lawless & Heymann, 1997). It is common at this point to encounter the illusion that what is smelled from the mouth is really a taste. It is not. Pinching the nose shut, and holding it closed before sipping, can easily dispel this illusion. This manoeuvre restricts the retronasal flow so no smell is perceived. Once the wine is swallowed or expectorated, the evaluator can release the nose pinch, breathe out through the nose and the aromatic flavour will become apparent.

Another helpful practice is the aeration or slurping that one commonly hears in the presence of professional tasters. A small portion of wine is taken into the front of the mouth and air is drawn rapidly over the sample to create the bubbling effect.

It is also useful to "chew" the wine or sufficiently move it around the mouth so that all oral tissues are stimulated. This is helpful in getting a good impression of astringency, the drying, roughing and puckering sensations from tannins as well as mouthfeel characteristics contributed by acids.

After the wine is swallowed or expectorated, the evaluator must take time to note the nature and length of the finish of the wine. Does it leave the mouth with any lingering tastes or sensations? Are they pleasant and refreshing? There are taste buds on the back of the tongue, the soft palate and the throat, which are sensitive to bitterness (Lawless & Heymann, 1997).

The Tasting Sequence

Action	Details
Look	
against a neutral background	Examine for colour (edge vs interior), clarity, cloudiness and sediment
Sniff and Swirl	
the sample in the glass	Aroma inspection, increasing surface area
Sip	
and hold sample in the mouth	Appreciate taste properties
Aerate	Appreciate retronasal aromas, "flavour by mouth"
"Chew"	
distributing sample to all oral surfaces	Appreciate mouthfeel characteristics, body and astringency
Swallow	
or expectorate as appropriate	Appreciate finish, residual flavours, residual mouthfeel characteristics

(adapted from Amerine et al, 1983)

Good Protocols

In addition to the tasting sequence and techniques mentioned above, there are number of important considerations in the physical setup that insure a fair and informative evaluation.

The glass: A moderate size tasting glass should be colourless and have a tulip shape with a bowl and somewhat constricted upper opening to allow for efficient swirling.

Serving temperature: About 10°C for white wines and 15° to 17°C for reds.

Tasting environment: Distractions and background noise should be minimised. Judges should be seated so that they are not facing each other. The traditional notion of separating evaluators harkens from the first principle of sensory data collection, that **judgments should be independent**, uninfluenced by the opinions of others. Often in wine judging, scores are arrived at jury-style, by consensus. This is a poor procedure that allows some individuals more influence than others.

Blind Tasting: Sensory evaluation practitioners have for years employed a principle of blind testing (Lawless & Heymann, 1997). This principle states that the evaluators should not know the identity of the product nor any details concerning its processing, ingredients, experimental nature and so on. In sensory evaluation of food, samples are labeled only by random three-digit codes and this should always be done in wine evaluations, too.

Random sampling: Another common problem is that the taste or flavour of one sample will tend to influence the score given to the next sample in a flight or sequence. This can be avoided by proper rinsing and palate cleansing, and pacing the tasting session sensibly. In addition, sensory evaluation practitioners tend to use random or counterbalanced orders for tasting. Each judge receives a different order. This way the sequential effects are averaged out across the data set.

Common pitfalls of informal wine evaluation

Given all the advice and guidelines mentioned above, it is easy to see where wine evaluation often falls short of good sensory evaluation practice. The first common pitfall is lack of blind tasting. Wine judges may have considerable knowledge about a sample's history and so may find it difficult to maintain a truly objective approach. As noted above, blind coding by a third party, using benchmark samples (good and poor) and disguised replicate "catch trials" can help to avoid these problems.

Often, wine is tasted in an unsuitable environment. The winery floor, for example, is loaded with background odours, which may bias the impression of a wine's aroma.

The next plague is the problem of too many samples to evaluate. There are natural limits on human gustatory function as well as attention and motivation. The natural pacing for a serious evaluation is about seven wines per flight, and no more than two or three flights per hour with sufficient break time for recovery (Goldwyn & Lawless, 1991). It goes without saying that expectoration is required.

Finally, wine judging for numerical scores should never be undertaken as a consensus decision by discussion like a trial jury. The discussion/consensus model may be fine for jurisprudence, but it violates the principle of independent judgment and leaves too many possibilities for undue social influence among the evaluators.

Elimination of as many of these problems as possible will help insure a fair and informative evaluation of wine samples.

References

Goldwyn, C. and Lawless, H. 1991. How to taste wine. ASTM Standardization News, 19 (3), 32 - 27.

Heymann, H. H. 1992. The use of sensory evaluation in the small winery. Proceedings of the seventh annual midwest regional Grape and Wine Conference, Orange Beach, MO. M. R. Dharmadhikari, C. E. Edson, and K. L. Wilker, Eds. pp. 85 - 97.

Lawless, H. T. and Heymann, H. 1997. Sensory Evalution of Food, Principles and Practices. New York: Chapman & Hall.

Amerine, M.A., M.A. Joslyn, and Roessler, E.B. 1983. Wines: Their Sensory Evaluation. New York: W. H. Freeman and Company.

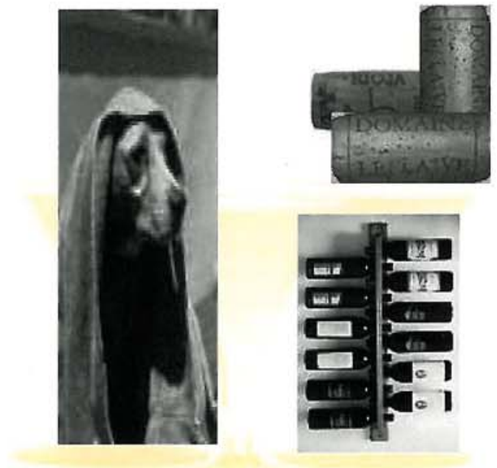
When Good Wines Go Bad ...
Sniff the Cork

by Karyn Weitzner

It's an issue as complex as the flavours of the wines themselves.

Sometimes you open a bottle of wine and instead of subtle berry and peach notes, for example, the pong of wet dog assaults you. Or you uncork a Chardonnay that has been cellared for the past couple of months and it has turned from gold to brown in colour. Why does this happen? How can it be prevented?

There are many causes of off-aromas and flavours in wine. Wine may undergo oxidation due to an ineffectively sealing cork, or due to high oxygen permeability of the cork [1]. Plastic or wood storage vessels can introduce malodorous compounds to the wine. But the most high profile of all the causes of bad taste wine is that of cork taint.



The "Serial Killer" of Wine

- that's the way Richard Gawel, formerly of Adelaide University Department of Horticulture, Viticulture and Oenology, and now a winemaker, describes cork taint. "It strikes sporadically, randomly and often very ferociously. No wine is immune." [2]

Cork taint manifests itself as an unpleasant odour (see Table 1) associated with the wine. While several compounds have been identified as contributors to cork taint, one in particular - 2,4,6-trichloroanisole (TCA) - is thought to be present in about 80% of all cases [2].

TCA is created by the action of microscopic fungi on chlorophenols, a class of compounds that are often present as an environmental pollutant. Chlorophenols can be taken up by cork while still on the tree, or during processing. The generation of TCA happens only in the presence of moisture, so it generally only becomes apparent that a wine cork is tainted once the wine bottle is opened. One or two tainted corks can contaminate a whole batch.

TCA can be detected at levels of around two parts per trillion (2×10^{-12} g L^{-1}) by the human nose. Not everyone, however, will have that degree of sensitivity. At very low levels the presence of TCA may not be obvious – it may simply act to suppress the normal flavour and aroma of a wine.

The various tastes and aromas created by these compounds are listed in Table 1.

Incidence

Ask a few different wine experts how often cork taint occurs, and chances are you will hear at least a couple of different answers.

Richard Gawel quotes statistics from the Australian Wine Research Institute that place the usual incidence of cork taint at around 5%, but sometimes reaching as high as 30%. Portuguese cork exporters Amorim claim that in their own corks "...fewer than half a percent (0.48%) were defective due to faults such as taint."[3] The Australian Wine and Brandy Corporation's export appraisal panel found that taint occurred in less than 2% of wines, based on a study of about 10 000 wines [3].

As long as there is any chance of a natural cork tainting a wine, winemakers will be willing to look at alternative closures. As a result a synthetic cork industry has emerged that offers some advantages over the natural product. While some wine experts believe that if it's not closed with cork it doesn't taste the same, others such as Manda Duffy of Tamburlaine winery in the Hunter Valley of New South Wales, are more pragmatic.

"In a new set of a dozen wines closed with cork there is a chance that from 1-3 bottles of wine will be tainted. You might get lucky and find that 12 out of 12 wines are OK [using natural cork]. But you would be guaranteed to get 12 out of 12 OK with synthetic corks."

Unfortunately, synthetic corks are not necessarily the answer for premium wine. After switching to the synthetic product, Tamburlaine recently switched back to natural cork when oxidation, probably associated with leakage around the synthetic corks' edges, was discovered. "Unfortunately, synthetic closures are not a good long term alternative. We have noticed a degree of taint associated with rapid aging," says Manda.

In view of results like these, many winemakers are experimenting with screw cap closures, which promise to provide an efficient seal without tainting problems, and these may prove to be the preferred closure of the future.

But maybe there's hope for the humble cork yet.

Research

Australia and the United States are leading research into the effects of cork on wine quality. The Australian Wine Research Institute is involved in a number of projects, including a long-term trial of 13 different closures (cork, synthetic and screw caps). It is hoped that this research will help to develop the best methods for assessment of the performance of these closures by industry.

Table 1 Compounds Responsible for "Cork Taint"

Compound	*Aroma*
TCA	Must, mouldy, wet hessian
MIB (2-methylisoborneol)	Earthy/muddy
Geosmin	Earthy/muddy
Guaiacol	Smoky/medicinal
Octen-3-ol	Tinned mushrooms
Octen-3-one	Tinned mushrooms

Another area under investigation at the Institute is the use of electronic noses for quality control of corks and wines. Dr Leigh Francis, Senior Research Chemist, is currently investigating the feasibility of using an electronic nose, a system that uses an array of semi-specific sensors to detect changes in complex mixtures of volatile compounds, to screen corks for taints.

"Current methods used in wineries rely on a panel of one or two assessors to determine the incidence of TCA in a batch of corks, by soaking individual corks in white wine for a period then assessing by aroma the level of TCA or other taint."

The main advantages of using the e-nose for quality control, are the rapidity of analysis and the ease of use says Dr Francis. "We can set up 40 or 50 samples to be analysed with little or no preparation, and the e-nose system will take a portion of the air (headspace) above the sample and give a result in five minutes. Conventional instruments would take hours to get a meaningful result. It may be that wineries will see the economic value in investing in an e-nose, or a central lab might offer cork QC screening as a service."

The Bottom Line

With reputations worth millions of dollars on the line, winemakers are following developments in cork research with great interest. Wine drinkers are learning that they don't necessarily have to put up with off-wines, and they will turn their backs on natural cork unless it cleans up its act.

"Consumers know about taints of all types," says Manda Duffy, "We're fooling ourselves if we think we can tell the public what to do."

References

1 Elizabeth Waters, "Random post-bottling oxidation of bottled wines", *The Aust. Grapegrower and Winemaker*, December 1997.

2 Richard Gawel, "Corked Wine", *Winestate*, July/August 1998.

3 Francisco Brito Evangelista, "Corks: it ain't half the taint", Correspondence in letters section of *The Australian* newspaper, 11-12/3/00.

IN THE NEWS

The Nature of 'Taste'

In its April 6 issue, Nature On-line's feature of the week was the topic of taste (www.nature.com/nature/fow/). Prompting the feature was the news that Matsunami's team from the Howard Hughes Medical Institute have discovered a new family of bitter-taste receptors. This was reported in their paper "A family of candidate taste receptors in human and mouse". Implications of this discovery include how this new knowledge could be used to help make bitter foods and medicines more palatable. Other articles featured on the Nature site cover subjects that include the thermal stimulation of taste receptors and the mechanisms by which sodium chloride enhances the flavour of foods.

Space Food

Does sensory research have a place in space exploration? A menu was recently devised and tested by Cornell University Department of Agricultural and Biological Engineering researchers, using ingredients nominated by NASA as crops that could potentially be grown on Mars. The 200 vegetarian recipes, including stews, stir-fries and sandwiches, were developed to cater to the needs of astronauts on NASA's planned 1000-day mission to Mars. The importance of this research lay not only in finding meals that are easy to prepare and nutritious, but also in building a library of recipes with enough variety of taste, aroma and texture to keep future space-dwellers in good shape mentally as well as physically.

After existing for a month on the limited fare, human guinea pigs from the Cornell staff gave the food the thumbs up.

New Scientist (22 April 2000)

New report on Australian exports

In March this year Agriculture, Fisheries and Forestry – Australia (AFFA) released a report entitled "Exporting Australian Processed Foods. Are we Competitive?" One of the issues highlighted by the report was that right now value-added Australian food products are not matching up to the tastes and needs of the Asian markets. The report calls for the development of more Asian-style foods for export into Asia, and stresses a need for greater investment in research and development by Australian food companies.

News from the CCR

Korea Seminar

On May 9th the CCR hosted an information evening focusing on the Korean market in the lead-up to its field trip to Korea in June. Our expert speakers included Jim Murison (Agsell), Gary Tilsley (BIS Shrapnel), Hae-Jin Song, and Graham Bell from the CCR. They gave an insight into the Korean market, food habits and future prospects. A feast of Korean food and Australian wines rounded off discussions, and were presented by Hae-Jin Song and Clara Yoon. The seminar was well attended by Australian food companies and marketing executives.

Japan in August

A team from the Centre is offering Australian food manufacturers the opportunity to have products evaluated in the Japanese consumer market during August 2000. If your company is interested in joining this field trip contact Marilyn Styles (ph: 02 9209 4086, e-mail: m.styles@unsw.edu.au).

Studentship

Hae-Jin Song has been awarded a scholarship by the Korean Association of Science and Technology in Australia (KASTA) to undertake work experience at the Korean Rice Research Institute. Hae-Jin will work in Korea for 5 weeks in June/July 2000, after which time she will return to the CCR to continue her PhD studies on dietary fat.

Farewell to Editor

Karyn Weitzner, founding editor and writer for "ChemoSense" will be leaving following this May issue. Our thanks for such a stirling job, and best wishes go with her.

AChemS XXII 2000

The annual American ChemoSensory Conference was held again in Sarasota, Florida from April 23rd to 26th. 323 presentations of research were made with topics ranging from bacteria to elephants. The Centre presented two papers on odour identification (Bell & Paton) and dietary fat (Song).

New 4th Year Food Science and Technology Students

We have a new crop of students undertaking research, adding to the reservoir of specialist knowledge available at the CCR this year. They include Clara Yoon who is investigating the lunchtime food habits of Australian primary school children, Joanne Wong who is researching Korean food consumers and Lynda Nguyen who is looking at texture, colour and flavour perception in foods.