

Olga Nikandrova. Denis Shumakov

# TEATIPSBRIEF100

100 pieces of info to use in tea stories

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## Table of content

<b>Tea micro-trends.....</b>	<b>5</b>
Micro-trend. Tea and wine experiments .....	5
One more time on tea machines. Teforia Leaf .....	5
Micro-trend. Nitro Tea .....	6
Nano-trend. Teafe in Raipur and Bangalore .....	7
Micro-Trend. Cheese tea. 40 degrees and 15 minutes .....	7
Micro-trend: kombuchading kombucha at topical bars.....	8
Ambient Brew: Tea and Food Pairing.....	9
Micro-trend: Albino tea cultivars .....	10
<b>Study of tea .....</b>	<b>12</b>
Elephants, pangolins, leopards, chimpanzees and baboons .....	12
Metal-phenolic networks, green tea and rusty nail.....	12
Tea absorbent against Acid Orange 7 dye.....	13
For fish tea polyphenols are best consumed together with selenium .....	13
Greed and survival instinct as tea taster tools .....	13
Oolongs in Yixing and non-Yixing teapots.....	14
The tea share in monetary diet cost of Japanese women.....	14
African tea origins.....	14
Antioxidant activities of Japanese post-fermented teas .....	15
The influence of brewing water quality on the quality of tea .....	15
Pink tea challenge .....	15
Coordinating vision and action while making tea and sandwiches .....	16
World caffeine intake and its sources .....	16
Tea causes epigenetic changes in women .....	16
Epigallocatechin-3-Gallate helps mice swim longer .....	17
On saturating guinea pigs with Indian tea .....	17
Japanese spectrometers ready to stand up to dyed tea .....	17
Phytosterols and fatty acids in camellias .....	18
Profiles of Tea Drinkers in the US Air Force.....	18
Bacterial Community in Chinese Dark Teas .....	19
Oolongs from Yunnan and Fujian smell similar, but taste different.....	19
On tea genome sequencing.....	20
Theanine Content and Related Gene Expression .....	21
Pure water makes white tea better.....	21
Ascorbic acid in tea leaves.....	21
Of green tea, thighs and wings .....	22

<b>Tea and health.....</b>	<b>23</b>
Decaf green tea catechins formulation doesn't modify body weight.....	23
Harmful pyrrolizidine alkaloids and healthy tea .....	23
Pu-erh and the osteoporosis development in female rats .....	24
Tea was found a good alternative for sugar-sweetened beverages .....	24
Milk, sea fish, shellfish, tea and other healthy plants .....	24
EGCG against anthrax.....	24
Theanine vs. stress; caffeine and catechins vs. theanine .....	25
Epigallocatechin-3-gallate and its antiallergic potential.....	25
Two catechins of green tea and muscle regeneration .....	25
Tea and coffee consumption has little effect on pregnant Dutch women .....	26
Mice on green tea diet do not lose weight at night.....	26
Green tea, oxidized fish oil and 270 fish .....	27
Tea mouth rinse as a worldwide therapy for dental caries prevention .....	27
Meta-analysis on tea consumption and risk of cognitive disorders.....	28
Tea intake vs. artery calcification and cardiovascular events.....	28
The association between salt intake and hypertension .....	28
GABA-tea, post-stroke depression and tail-suspension .....	29
Effects of oolonghomobisflavan A on oxidation of low-density lipoprotein.....	29
Epithelium is an effective barrier against tea-stain discoloration.....	30
Nano particles of tea leaves and their bactericidal power.....	30
Epigallocatechin-3-gallate ameliorates insulin resistance in hepatocytes.....	30
Tea polyphenols vs. <i>Fusobacterium nucleatum</i> .....	31
The shorter the sleep, the sweeter the drink.....	31
Tea-induced calmness.....	31
<b>Tea technologies .....</b>	<b>33</b>
Getting rid of catechins and caffeine .....	33
On engineering properties of tea seeds .....	33
New technology for determining the origin of tea helped to recognize the counterfeit .....	33
Self-learning system for tea quality recognition.....	34
Orb-weaving spiders vs. harmful moths.....	34
Two isotopes and four elements for Wuyi-Rock tea .....	34
Fusion of electronic nose and electronic tongue for tea assessment .....	35
(E)-Nerolidol is formed in oolongs under stress .....	35
Yellow light irradiation during withering improves black tea quality .....	35
Green tea leafhoppers are still at large and uncontrolled .....	36
<b>Tea events and phenomena .....</b>	<b>38</b>

Tea events in Russia and Belarus .....	38
Cold brew in any container.....	38
Tea with cold soba and kegani crab .....	38
Ten tea Sri Lankan rupees .....	39
To see London and nibble some Banksy.....	39
“Tea Scrolls & Ceremony” photo exhibition .....	39
Afternoon Tea with no sugar. But with carrots.....	39
Tea by me. Hothouse tea from the Netherlands.....	40
Tea and cheese at the Georgian House Hotel.....	40
All kinds of tea things for students.....	40
Kenyan Tea for China .....	41
Cold tea constructor sets from Flamingo Bloom.....	41
Samovarfest in Moscow Hermitage Garden .....	41
Sharks, rays and sea cucumbers.....	42
“World’s most expensive Bubble tea” project.....	42
Tea Infused Wine .....	42
Tea Board India’s Special Awards.....	43
Fairly Traded instead of Fairtrade .....	43
Tea Merchants Have Outstripped Barbers!.....	43
Japanese tearooms on the Internet.....	44
Aince nine farmers from three Scottish shires... ..	45
Tea without Borders, Zakarpattia 2017 .....	45
<b>Tea traditions .....</b>	<b>47</b>
Japanese post-fermented (dark) teas. Part 1. Awabancha .....	47
Japanese post-fermented (dark) teas. Part 2. Goishicha.....	48
Japanese post-fermented teas. Part 3. Ishizuchi-kurocha .....	49
Japanese post-fermented teas. Part 4. Batabatacha.....	49
They do it all wrong in Coventry. And this is right .....	51
<b>Tea recipes.....</b>	<b>52</b>
Tea drinks in coffee style .....	52
Seven things that make green tea tasty.....	52
120 pages, 40 Royal Tea Recipes .....	53
Tea and cucumber variations .....	53
The blondie! That’s my jam! Wicked watermelon! .....	55
<b>Index .....</b>	<b>56</b>

## Tea micro-trends

### Micro-trend. Tea and wine experiments

Not long ago, we wrote about the Teasters Tea Company's experiments on infusing wine with tea. Of course, the Texan experiments (<https://goo.gl/pXefHv>) are not the only attempt to find successful variants of combining the two drinks. We've also held our hands to classic gastronomic compositions, we even have an article on tea and sherry combinations. But this is only one of variants to combine tea and wine.

Spaniards with Indians, who have released a line of wines with tea flavors Poet (<https://winetea.club/>), Portuguese, who have developed the Wine Tea Collection (a line of teas with wine flavors, (<http://lisbonteatcompany.com/wine-tea.html>) and a small Russian-Taiwanese tea company (<http://turquoisetea.com>) selling Isabella oolong (where Isabella is the name of the grape the tea is flavored with) and Muscat (another grape) black tea are fellows who love experimenting.

### One more time on tea machines. Teforia Leaf

Sources: <https://teforia.com/>, <https://www.facebook.com/teforia/>

Automation of tea preparation (or creating a tea machine) is both very simple and very difficult at the same time. Its simplicity lies in the fact that there is nothing special to automate in the process of brewing: regulating the temperature, the time of infusion and a bunch of other parameters – that's it. Creating brewing modes for specific water characteristics is a little more difficult – but this task is also solved with acceptable quality and at least in three possible ways. But developing the right brewing regime for a specific tea is difficult. You can, of course, offer several universal tea brewing regimes, as Keurig does, but this approach is suitable only for ordinary mass market tea. Quality automatic brewing of high-grade tea is possible only if the machine “knows” the tea it works with.

This is the approach that the developers of Teforia Leaf machine have chosen. The machine works with tea packed in chipped and partially biodegradable containers (supplied by the same manufacturer). The chip allows the machine to identify the tea and, based on the results of this identification, set brewing temperature, amount of water, steeping time, aeration and agitation modes, the number of microinfusions and water quality requirements. Information about brewing regimes of a particular tea can be updated (the machine is wi-fi connected), moreover, for each tea the machine offers two brewing regimes: more and less caffeinated.

In general, there is nothing fundamentally new in this approach – containers with brewing profiles and machines working with them appear on the market from time to time for the last fifteen years, or so. But we have not yet come across the machine with tuning so fine and such a decent assortment of tea.

Questionable is the niche of such a machine. For catering and office it is small. For the role of a household appliance (a device that facilitates preparation of something) it is clearly not good either. In our opinion – this is an interesting tool for a tea connoisseur, habitual for long and attentive tea tasting. A sort of alternative to gaiwan.

399 US dollars for the machine. From 1 to 6.5 dollars per chipped tea container. Expensive. And the market niche is unclear. But cool. Here are two reviews on Teforia Leaf: a critical English one in the style of “My Mom Brews it Better” (<http://gizmodo.com/a-400-smart-tea-machine-gave-this-brit-an-existential-1796219286>) and a benevolent American one with a discount code word in the comments (<https://worldoftea.org/teforia-leaf/>).

### **Micro-trend. Nitro Tea**

Nitro Tea is tea saturated with gas. Basically, such tea is served in bars the same way as tap beer, poured from kegs. But there are also gas saturation systems that are designed for home use. Most often, nitro tea is cold, but, in fact, it can be any temperature. Most often the saturating gas is nitrogen, but some other gas mixes that are safe for people and technically suitable can also be used. For example, the standard beer keg mix is nitrogen plus carbon dioxide.

When several years ago, nitro-coffee successfully entered the market, the consequent appearance of nitro-tea was only natural. Currently, one can find bars serving nitro-tea in almost all cities of the USA (in Los Angeles, for example, it looks like this: <https://www.youtube.com/watch?v=qbc1tclK6yl>).

The main virtue of nitro tea is its texture. The drink turns out to be creamy and tender, it is willingly compared with Guinness. The taste of nitro tea is usually described without using such convincing comparisons, which is understandable, as the taste of nitro tea depends on the kind of tea used for its preparation (and this can be a mixed fruit tea drink as well as a high-grade tea). Quite often, matcha serves the basis for nitro-tea, which normally opens up very well in a foamy, creamy or bubbling form.

Below, there are several links to see how it looks.

Here is a review article on nitro tea at World of Tea: <https://worldoftea.org/first-nitro-matcha-tea/>, which, among other things, announces the appearance of canned nitro tea. Like this one, for example: <https://www.mybsweet.com/coffee>. And, to top it off, a couple of articles on nitro-tea at Tea People: <http://www.teapeople.us/nitrotea/>.

Here is a website where you can find equipment for making nitro tea or other beverages saturated with gas: <https://nitrobrew.com/>. And a video, demonstrating the process of making drinks with this equipment: [https://www.youtube.com/watch?v=3zLmt3z\\_t-8](https://www.youtube.com/watch?v=3zLmt3z_t-8).

Here are some establishments where, among other drinks, nitro-tea is served. Here is a US company specializing in coffee: <http://www.mcall.com/entertainment/dining/mc-nitro-drinks-and-more-at-fieldstone-coffee-roasters-20170523-story.html>. Here is a more or less classical tea shop also in the USA: <https://www.smithtea.com/pages/retail>. Here is a bar, again in the US: <http://www.rubiesanddiamonds.com/index.html>. And, finally, a classic restaurant with a tea accent, where they make nitro Bao Zhong: <http://www.olmstednyc.com/food-and-drink#tea>. All the time in the USA.

## **Nano-trend. Teafe in Raipur and Bangalore**

There are several establishments in India, that call themselves “teafe” (an obvious hybrid of tea and cafe). Judging by the fact that there’s only a handful of them, the new name has not been caught up so far, although some of these establishments have been operating for more than five years. But we find it valuable to be aware of all tea trends, even if they are vanishingly small.

Now then.

Chaipatty Teafe Chain (<http://www.chaipatty.com/main.html>) has been operating in Bangalore since 2011. Named after the famous Mumbai beach, it offers guests all kinds of food and inexpensive Kullad Tea – traditional Indian tea with milk and other things, served in clay cups (here is an excellent video: <https://www.youtube.com/watch?v=3kY8VJanIC4>). In addition to the website of the teafe, it is also interesting to read an interview with its owner: <http://www.supportbiz.com/articles/top-story/tete-tete-chirag-yadav-chaipatty-teafe.html>. From which, in particular, you can learn that the business entered the market very successfully, broke even very soon, became a tourist attraction and is well-developing in general.

Nukkad Teafe (<http://chaibolochai.com/>) operates in Raipur and, in addition to tea specialization, it is remarkable for employing hearing and speech impaired individuals here are deaf-mutes. The teafe menu contains explanations of how you can make an order using the sign language, and one of the goals of the project is the socialization of people suffering from hearing and speech impairments.

By the way. The founders of both Chaipatty Teafe and Nukkad Teafe are electronic engineers by education.

Tapri Teafe Town (<https://www.facebook.com/tapriteafetown/>) is also located in Raipur and it is difficult to say anything certain about the place solely by its facebook page. It is clear only that people going there are young and pretty. And tea is also served in clay cups.

The format of a teafe, like the format of a cafe, does not impose strict restrictions on the repertoire. Coffee, pizza, and any other food are also served there. Just tea is given a little more attention. And it is wonderful that in the Russian language we have the word “chainaya”, which makes such word-hybrids as teafe unnecessary for us.

## **Micro-Trend. Cheese tea. 40 degrees and 15 minutes**

Source: <http://www.foodandwine.com/news/people-are-waiting-in-lines-hours-get-taste-cheese-tea>

In China, Vietnam, Taiwan, Malaysia and other countries, drinks made with tea and cheese are becoming more and more popular. They are called Cheese Tea and share the consumer niche with Bubble Tea (these two drinks are often served at the same place, and sometimes even mixed together as a “cheese and bubbles” tea).

In fact, cheese tea appeared several years ago, but only now has become trendy; and this trend, by the way, has already reached the USA and Great Britain. This drink is a tea with creamy cheese topping.

Combining different teas, different toppings and their proportions, you can get a whole range of drinks – from sweet to salty, from harmonious to contrasting.

Cheese tea is interesting not only by its composition, but also by curious drinking instructions. It should be consumed right away – within 15 minutes after preparation – and holding the cup 40 degrees tilted, so that tea and cheese topping would get into your mouth at the same time. Do not use a straw for this drink.

Below are a few links to some tea shops serving cheese tea.

<http://regiustea.my/regiustea-story.html>

<http://www.happy-lemon.com/en/drink/drink.php>

<https://www.facebook.com/heekcaabyroyaltea/>

[https://www.facebook.com/pages/Chizu-Drink/1895840743964286?hc\\_ref=PAGES\\_TIMELINE](https://www.facebook.com/pages/Chizu-Drink/1895840743964286?hc_ref=PAGES_TIMELINE)

### **Micro-trend: kombuchading kombucha at topical bars**

Source: [http://www.columbiachronicle.com/arts\\_and\\_culture/article\\_f4ee3606-26d5-11e7-8e57-8785fd5cfc55.html](http://www.columbiachronicle.com/arts_and_culture/article_f4ee3606-26d5-11e7-8e57-8785fd5cfc55.html)

The first kombucha-bar in Chicago opened on April 29. It's name is Kombucha Room and it's owners hope to open a new path for kombucha inside of the US. In fact, traditionally kombucha-bars are popular in coastal cities of the US, having more idle money and people actualizing their consumption. First mentions of kombucha in the USA dates back to the mid 1990-s, there's even a hypothesis that it came to America not from Japan, but from Russia via Europe.

In 2012-2013, out of an exotic drink started to turn into a micro-trend, kombucha-bars opened in New York, Virginia, California, South Carolina, Oregon and other places. Currently, not only specialized kombucha-bars are operating in the US market, but also companies selling ready-made kombucha-solutions. The existing micro-trend was even fixed in the language with the verb kombuchade.

By the way, Kombuchade is the name of a company which brews kombucha for the abovementioned Chicago bar. Here is their fb-page: <https://www.facebook.com/Kombuchade/>. And here is a site of another company with a wide range of all sorts of kombucha things:

<http://www.kombuchabrooklyn.com/kombucha-home-brewing-kits.html>. A standard kit includes containers, yeasts, tea (you can make different kombucha with different teas) and different other add-ins, like dry berries, for example. Classic three-liter jars with craft-gauze (typical containers used for making kombucha at Russian homes, they were often labeled with the proper name of the tea mushroom) are not supplied though.

To see how an establishment with an stylistically impeccable kombucha serving can look like, take a look at this: <http://indigoagecafe.com/>. It's not the US, though. It's Canada. But we'd like to allow ourselves some geographic cretinism. It is difficult to withstand a place which is a vegan restaurant and an indigo-cafe with Ukrainian cuisine (borshch, vareniki and all). In such a company, kombucha feels very good for sure.



Australian projects in Cairns (<http://lafew.weebly.com/>) and in Sydney (<https://wildkombucha.com/>) also fit in the kombucha micro-trend. Sydney colleagues kombuchade particularly seriously, with the involvement of the laboratory. Their laboratory reports aren't exhaustive, but you can find some interesting figures there: <https://wildkombucha.com/kombucha-101/>.

It is worth mentioning the experience of the kombucha modification of the "Moscow Mule" cocktail – here (<https://www.kombuchaontap.net/mixology>) they offer the "Southern California Mule" with kombucha and other goodies. Under the same link, you can find some other kombucha-cocktails, including Kombucha Mimosa. Very touching. It seems that, although kombucha-bars are often promoted as establishments with a bar atmosphere, but without alcohol, compositions based on the principle "and now let's add vodka" look more convincing.

Standard bar equipment seems to work perfectly well with kombucha on tap (<https://www.facebook.com/revel365/videos/826759934094062/>), the drink can be combined with ice-cream (<https://www.facebook.com/revel365/videos/807294839373905/>) and can be colored weird lilac (<https://www.instagram.com/p/BTEexUdBlgl/>). Do not forget that kombucha can have some technological difficulties about it: it is not very well stored, it becomes aggressive-acid with over-fermentation and can get infected with wrong microbiology. But with a competent and accurate work, everything is fine.

We haven't heard of single-product kombucha establishments in Russia. However, some places do work with kombucha for some years without extra ado. Some six years ago, kombucha (and tea mushrooms with proper names, of course) appeared at Chaynaya Vysota (Tea Height: House of tea and ice-cream, <http://cha108.ru/>), and this year kombucha menu is announced at Pueroport. Of course, it is possible to find American bottled kombucha (one of the producers of such kombucha was recently bought by Pepsi Co) in Russia. But 3l-jars with gauze on top would be more interesting, of course. There are also small kombucha projects like That's My Booch (<https://www.facebook.com/Thatsmybooch/>), and, naturally, we cannot help recalling the spectacular performance of Vivien Petrovskaya from Latvia at TMC International 2016 in Seoul, in which kombucha played a key role.

### **Ambient Brew: Tea and Food Pairing**

Source: <https://www.mrporter.com/daily/is-lukewarm-tea-the-new-wine/2087>

London restaurant Fera at Claridge's hotel in partnership with Postcard Teas shop has included on the menu a group of drinks which they called Ambient Brew. These are high-grade teas brewed in lukewarm water (still or sparkling) for 45-60 minutes. The teas are served in wine glasses as a part of gastronomic composition. Fera's specialists state, for example, that tea pairs with asparagus and artichokes better than wine. Here is a link to the restaurant's tea carte.

<http://feraatclaridges.co.uk/wp-content/uploads/2014/05/fera-at-clairdges-tea-and-coffee-menu-18-04-2017.pdf>

We'd like to add that cold or room-temperature brewing can be implemented convenient for a restaurant. The serving of such teas in glasses is eye-catching and doesn't require extra equipment – so, the ambient brew teas, or whatever you call them, have good chances to become a restaurant micro-trend.

### **Micro-trend: Albino tea cultivars**

Albino tea cultivars are tea trees whose leaves at some time (for example, in spring, at the beginning of the vegetation season) are notably lighter in color than those of common tea trees. Such trees are mentioned in The Treatise on Tea (大观茶论, Da Guan Cha Lun) written by the Chinese emperor Huizong of the Song Dynasty in 1107. The emperor, whose end is known to be an unhappy one, stated that white-leaf tea trees are very rare, but very delicious tea is made from them, if a proper processing method is applied.

At present, one can speak of a surge in interest in albino tea cultivars, they are actively and comprehensively studied. Before making a short review of such studies, we'd like to make a couple of remarks.

First, leaves of albino tea cultivars can be almost white, light green, and yellow. They are lighter in color than “standard” green tea leaves, but usually they are not pure white. Second, usually, albino leaves are used for making green tea. It can look like ordinary green or white tea. It's not an extreme rarity. Anji Baicha green tea, which is often found in tea shops, is made from an albino tea cultivar, for example.

So, at the moment, there's a number of tea cultivars, which, if properly reproduced, allow us to receive albino tea trees. Here is a list of Chinese albino tea cultivars which we came across in scientific studies. The names are given the way they were mentioned in the studies:

- Baijiguan. Wuyishan (Fujian province).
- Anji Baicha (aka Baiyecha 1, aka White leaf No. 1, aka Bai Ye Yi Hao). Anji (Zhejiang province).
- Huangjinya. Ningpo (Zhejiang province).
- Anji Huangcha. Anji (Zhejiang province).
- Suyuhuang. Wuxi (Jiangsu province).
- Huangjincha 1. Hunan province.
- Zhonghuang 1. Zhejiang province. Developed by Tea Research Institute (TRI) of CAAS, Hangzhou.
- Xiaoxueya.
- Qiannianxue. Zhejiang province, expanded in also Sichuan and Guizhou.
- Yu-Jin-Xiang. Zhejiang province.
- Jinguang. Zhejiang province.

All albino tea trees can be divided into two groups: photosensitive and thermosensitive.

Photosensitive cultivars have light-colored young shoots during the time of the year when the sun is most active, and when there's less sunlight, their leaves become darker and acquire usual green color. Huangjinya, Yu-Jin-Xiang and Jinguang are photosensitive albino cultivars. Young leaves of thermosensitive albino tea trees are lighter in color when air temperature is cool, but when it raises

up to 20-22 °C, the leaves become greener. Anji Baicha and Xiaoxueya are thermosensitive albino cultivars.

The main properties of teas made from albino leaves are approximately the same and do not depend on the nature of albinism. In teas made from leaves of albino tea cultivars, comparable to non-albino teas, there are more amino acids and similar compounds (including theanine), less caffeine and less catechins. As a rule, albino teas have more pronounced umami taste, no bitterness, and less astringency.

As any potential micro-driver of the market, albino teas are subjects of many studies nowadays. The collection of these studies is systemless, so our review will most likely remind a patchwork quilt.

If albino tea trees are shaded, their leaves turn greener, but the content of catechins in them remains lower than in non-albino teas: <http://www.nature.com/articles/srep45062>

Near-infrared spectroscopy and chemometrics make it possible to quickly and non-destructively distinguish between white tea and green tea made from albino tea leaves. This is, undoubtedly, a very valuable piece of knowledge, since we all have spectrometers which are only gathering dust now: <http://agris.fao.org/agris-search/search.do?recordID=US201400102467>

DNA-markers help identifying albino tea trees and their young plants at times when their leaves are green (e.g. in autumn):

[http://www.academicjournals.org/article/article1380812705\\_Wang%20R%20et%20al.pdf](http://www.academicjournals.org/article/article1380812705_Wang%20R%20et%20al.pdf)

In Sichuan ([http://en.cnki.com.cn/Article\\_en/CJFDTotal-XNYX201504036.htm](http://en.cnki.com.cn/Article_en/CJFDTotal-XNYX201504036.htm)) and in Hubei (<http://www.zjnyxb.cn/EN/Y2017/V29/I2/251>) newly introduced albino tea cultivars were compared with local commonly used cultivars. In Sichuan, albinos Huangjinya, Jinguang and Yujinxiang were compared with Fudingdabaicha; and as a result it was noted that Yujinxiang has strong production potential. In Hubei, albinos (Huangjingcha 1, Anji Baicha and Zhonghuang 1) were compared with Echa 1, which was a dominant tea cultivar in Hubei. Besides the analysis of biochemical components, the study focused on sensory quality detection, which showed that “Anji Baicha was the most excellent one, followed with the Huangjingcha 1, and Zhonghuang 1 showed a similar level with Echa1”. The three albino tea cultivars were found suitable for high grade green tea production.

And below there's a link to a Japanese study, where they say that Japan also has its own albino tea cultivars (Hoshinomidori, Kiraka, Yamabuki и Morokozawa), that one of them was first registered in 1981, and that, at present, they use leaves of albino tea cultivars to make light-green matcha tea.

<http://www.o-cha.net/english/conference2/pdf/2010/files/PROC/pr-p-11.pdf>

## Study of tea

### Elephants, pangolins, leopards, chimpanzees and baboons

It turns out that the interaction of tea and animals is not limited to insect pest damage, in which tea suffers, and scientific researches, in which animals suffer. The interests of tea farmers often intersect with the interests of fairly large animals – and, most often, this intersection turns out to be sad for one of the parties.

The use of pesticides on tea plantations in Uganda is a cause of congenital pathologies in young chimpanzees and baboons: <https://www.ncbi.nlm.nih.gov/pubmed/28454037>

In Bangladesh, Hindu migrants working on tea plantations actively use pangolins for food. Local Muslims do not eat them, but Hindus do not have any restrictions on the meat of these placental mammals – and the population of these pleasant animals in the tea areas of the country is shrinking: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0175450>

In India, everything is vice versa. Between January 2009 and March 2016, in northern West Bengal, 171 leopard attacks on humans were recorded. Most of the attacks occurred from January to May and on tea plantations. Fortunately, none of the attacks were fatal, but it is probably because of leopards that Indian tea plantation workers are moving to Bangladesh and “take it out” on pangolins there: <https://www.ncbi.nlm.nih.gov/pubmed/28493999>

But it is elephants, apparently, who suffer the most from the tea plantations. Well, or maybe they're simply the cutest. Anyway, the University of Montana has launched an elephant-friendly tea certification program. If a tea plantation is surrounded by narrow and deep irrigation trenches, which can become deadly traps for baby elephants, then there is no chance for a Montana elephant certificate for such a plantation. But if, on the contrary, you have irrigation trenches wide and shallow, your electric wires do not pose a threat to elephants and in general elephants feel at home at your plantation, then your certificate of Elephant Friendly Certified Tea can be said to be already in the bag. Naturally, a part of the proceeds from the sale of elephant-friendly tea go back to support elephants conservation in the communities where the tea is grown. The first certificate of Elephant-Friendly Tea was received by a farmer from Assam, where the relationship of elephants with tea plantations has a long and rich history. [http://missoulia.com/news/local/um-partners-with-local-businesses-to-launch-elephant-friendly-tea/article\\_cd1ccb79-c721-5e36-936d-72eab2795f47.html](http://missoulia.com/news/local/um-partners-with-local-businesses-to-launch-elephant-friendly-tea/article_cd1ccb79-c721-5e36-936d-72eab2795f47.html)

### Metal-phenolic networks, green tea and rusty nail

Source: <http://pubs.acs.org/doi/abs/10.1021/acsami.7b09237>

Australian experts have developed a technique for assembling metal-phenolic networks using green tea infusions. Metal-organic (including metal-phenolic, of course) networks is not a very young but very promising direction of materials science, which has applied significance for a wide range of areas, such as catalysis, luminescence, work with gases, nonlinear optics, energy storage and other smart words. Obtaining such a demanded material using such a cheap “consumable” as green tea is

economically attractive. In addition, the study has demonstrated that the choice of phenolic ligand and its source, as well as the assembly protocol (e.g., using solution-based or solid-state iron sources), can be used to tune the properties of metal-phenolic networks.

It should be noted that in their experiments, Australian scientists used a rusty nail, which was immersed in green tea.

### **Tea absorbent against Acid Orange 7 dye**

Source: <http://www.ephysician.ir/2017/4312.pdf>

Iranian experts have studied the effectiveness of Kenya Tea residue absorbent (granular) to purify water from the Acid Orange 7 dye. This dye is widely used in the textile industry, it gets into sewage and pollutes water. Kenyan tea residues showed high efficiency in absorbing Acid Orange 7 – their best result was “collecting” more than 98% of the dye. This is a very optimistic result, especially considering the cheapness of the tea residue absorbent.

### **For fish tea polyphenols are best consumed together with selenium**

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28705720>

Chinese scientists for 60 days were feeding Wuchang bream (*Megalobrama amblycephala*) with selenium yeast and tea polyphenols in various combinations (basal diet group; basal diet + tea polyphenols group; basal diet + selenium yeasts group; basal diet + tea polyphenols + selenium yeasts group). And found that the groups of fish that received selenium yeasts and selenium yeasts plus tea polyphenols demonstrated better growth performance than the two other groups of fish that received basal diet and tea polyphenols. The better growing groups of fish showed also a greater increase in the antioxidant capacity of the liver. Then the fish were exposed to nitrite stress, and it was found that the fish on the combined selenium-polyphenol diet were the least affected by nitrites.

### **Greed and survival instinct as tea taster tools**

Source:

[https://www.researchgate.net/publication/315477608\\_Recognition\\_Without\\_Words\\_Using\\_Taste\\_to\\_Explore\\_Survival\\_Processing](https://www.researchgate.net/publication/315477608_Recognition_Without_Words_Using_Taste_to_Explore_Survival_Processing)

American scientists have conducted a series of experiments in order to find the conditions in which people better memorize the taste of tea without using words to describe the tea. Participants of the study needed to blindly taste a control set of teas and evaluate all the teas according to the given parameters. And then, after a short pause, to blindly taste an expanded set of teas (the control set of teas + an equal number of new teas). And to indicate for each tea whether it was present in the control set.

It turned out that the recognition of teas depends on the criteria by which they were evaluated during the first tasting. There were three options for such criteria. The first criterion was bitterness – the participants were to rate each tea on a scale of 0 to 10 based on how bitter the tea was. The second criterion was the commercial value of the drink – the participants were to imagine that they would

need to trade the tea, and rate a selection of teas based on how well they think each one would sell. The third criterion was danger. Participants were asked to imagine that all tea leaves naturally contain a certain amount of poison, and this poison has a flavor marker. And that during the production of tea the poison becomes harmless, but its taste remains. Accordingly, each of the tasted teas was to be rated based on the degree of “poisonousness”.

So. It turned out that the worst recognition of teas was in the situation when people rated teas for their bitterness. Survival condition (teas being rated for poison) showed a much better result. And the best recognition of tea taste (only by a small margin) was demonstrated by the marketing condition, when teas were rated for their commercial value.

This once again demonstrates a very slight superiority of commercialism over the fear of death.

### **Oolongs in Yixing and non-Yixing teapots**

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28675436>

Taiwanese experts have compared the quality of oolong tea brewing in teapots made from two kinds of Yixing clay (Zisha and Zhuni), stainless steel, glass, plastic and ceramics (the meaning of the term is not specified), and concluded that the tea brewed in Yixing clay pots contains more catechins and less caffeine than tea brewed in glass, plastic and ceramic pots. Tea prepared in clay teapots also contains less mineral substances (including potassium) and volatile compounds. The difference between the teas brewed in different clay, and the difference between the clay and stainless steel teas was not significant.

### **The tea share in monetary diet cost of Japanese women**

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5468738/>

Japanese scientists have interviewed about 10,000 women of three different age groups in order to assess the cost ratio of different components of their diet. According to the results of the study, it was found that young women over 18 years old spent on tea 7.7% of the total money spent on food and drink, and tea in this age group ranks the fifth in the list of the most costly products after meat, vegetables, sugar and sweets, fish and seafood. Middle-aged women spend on tea 6.1% of the money spent on food and beverages, and again it is the fifth place in the spendings list. And, finally, elderly women spend on tea 5% of their food-and-drink budget, and it ranks the seventh in the list, letting forward fruit and white rice. By the way, the average consumption of tea is 261.2, 233 and 256.2 grams per month for young, middle-aged and elderly Japanese women, respectively.

### **African tea origins**

Source: <https://www.nature.com/articles/s41598-017-04228-0>

An international team of specialists has conducted a study of 439 tea tree samples from 11 African and Asian countries and concluded that 79% of African tea trees are Indian Assam tea (*Camellia sinensis* var. *assamica* which has likely originated from India and/or Sri Lanka). Only 4% of African samples were Chinese Assam tea (*C. sinensis* var. *assamica* of Chinese origin), and it is mostly grown

in Kenya, while in other African countries there's almost no such tea. In all African countries, a small, but noticeable fraction of the grown tea trees is *C.sinensis* var. *sinensis* brought from China, and in Madagascar this tea variety even dominates over Indian Assam tea.

### **Antioxidant activities of Japanese post-fermented teas**

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5448361/>

Japanese scientists have studied four traditional Japanese post-fermented teas (awabancha, goishicha, ishizuchi-kurocha and batabatacha) and green tea as a control sample and found the following. The content of caffeine and catechins in the infusions of post-fermented teas was found to be lower than in the infusion of green tea. The most catechin-rich post-fermented tea is ishizuchi-kurocha, while batabatacha is the poorest in catechins. Awabancha, goishicha and ishizuchi-kurocha showed antioxidant activity comparable to the level found in green tea, despite the lower content of catechins. Batabatacha has manifest almost no antioxidant activity. Since of all the post-fermented teas under the study only batabatacha does not undergo anaerobic fermentation, experts have concluded that the content of catechins and antioxidant properties of tea increase during its anaerobic fermentation involving lactic acid bacteria in the manufacturing process. The researchers have also noted that one of the possible reasons for the lower content of catechins in post-fermented teas compared to green tea is the coarser leaves used for their production and later harvest time.

### **The influence of brewing water quality on the quality of tea**

Source: <http://www.sciencedirect.com/science/article/pii/S0308814616319598>

Chinese experts have studied the physicochemical characteristics, sensory quality, and antioxidant activity of tea infusions prepared with purified water, mineral water, mountain spring water, and tap water from Hangzhou. After a series of experiments, experts found that the taste of Chinese green, black and oolong teas is worse and content of catechins in the infusion is lower when tea is brewed in mineral and tap water than that of the same teas prepared with purified water. And also that extraction of catechins is worse when tea is brewed in high pH water. Purified water and mountain spring water are found better suited for brewing green tea and oolong tea, and mountain spring water is also good for black teas. Lowering the pH of mineral water partially improved the taste quality and increased the concentration of catechins in the infusions. It should also be noted that not long ago, scientists from the same institute (Tea Research Institute of the Chinese Academy of Agricultural Sciences) found that purified water is the most suitable for brewing white tea.

### **Pink tea challenge**

Source: <http://paperity.org/p/80009380/pink-tea-challenge>

Once every three months, Springer publishing company holds challenges for various scientific topics. Their current puzzle is about tea. It is required to accomplish a couple of tasks until September 1, 2017. The input data are as follows. To make a drink, green tea, nuncha or blend based on Darjeeling is used. It is brewed, then soda, salt and milk are added to it. This drink is traditional in Kashmir and turns pink. The first scientific task is to explain what are the chemical reasons for the pink color and why this phenomenon is observed only with certain types of tea leaves (e.g. green, but not white)?



And the second task is to pick up such a substitute tea (including herbal ones) so that the drink after the same procedure (boil tea leaves in water, add salt, baking soda, and milk) becomes green. The prize – books of the publishing house up to a value of 100 euro.

### **Coordinating vision and action while making tea and sandwiches**

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28604050>

Scottish psychologists investigated the temporal coordination between eye movements and other actions during the preparation of tea and a sandwich. Usually vision leads action by about half a second, but this time can vary in different conditions. During the experiments, the researchers found that when preparing tea, people have longer eye-hand latencies, have more “look ahead” fixations, and more looks to irrelevant objects. And when preparing a sandwich, people are quick and specific. Contrary to the initial hypothesis, the requirement to move around the environment did not influence the coordination of vision and action. The researchers concluded that the dynamics of visual behavior during motor acts is related to the content of the task and the objects involved in its solution, but not to the spatial demands requiring movement around an environment.

Which is rather understandable in the case of tea and a sandwich. Making a sandwich is a well-defined task, done with concentration, because you make it when you want to eat. And tea is prepared slowly and relaxed, because it is done for pleasure, and because you don't want to get scalds.

### **World caffeine intake and its sources**

Source: <http://www.tandfonline.com/doi/full/10.1080/10408398.2016.1247252>

Austrian and Australian (so as not to confuse) specialists supported by Red Bull GmbH have collected data from researches on caffeine consumption in different parts of the world, processed them and came to the following conclusions. First, none of the studies recorded caffeine intake at doses exceeding the recommended maximum (400 mg per day). The closest approximation to this point is Austria, where adults consume an average of 357 mg of caffeine per day. Secondly, the main sources of caffeine are coffee, tea and soft drinks, with energy drinks (which, as you might have guessed, the researchers paid special attention) contributing little to total caffeine intake. Third, the leadership of coffee, tea or soft drinks as sources of caffeine depends on the age of consumers and the country of consumption. In the US, it's coffee and soft drinks. In Canada – soft drinks and tea. In England and Ireland – tea, while in the rest of Europe – coffee. In Australia – soft drinks and coffee. In New Zealand – coffee and tea. In South Korea – coffee, with an outstanding breakaway (89%).

### **Tea causes epigenetic changes in women**

Source: <https://academic.oup.com/hmg/article-abstract/doi/10.1093/hmg/ddx194/3848993/Tea-and-coffee-consumption-in-relation-to-DNA>

Swedish scientists have studied the effect of tea and coffee consumption on epigenetic changes in Europeans. According to the results of the study with the participation of more than 3,000 people, scientists found no association between coffee consumption and the occurrence of epigenetic changes. Also, there was no association found between such changes and tea and coffee consumption in men. But the consumption of tea by women has been linked to DNA methylation in the regions



which contain genes known to interact with estradiol metabolism and cancer. This means that the effects resulting from tea consumption in women, in theory, can manifest themselves in old age and be inheritable.

### **Epigallocatechin-3-Gallate helps mice swim longer**

Source: <http://www.phcog.com/article.asp?issn=0973-1296;year=2017;volume=13;issue=50;spage=326;epage=331;aulast=Teng>

Experts from Liaoning Normal University (Dalian, China) have conducted a study on the anti-fatigue effect of green tea polyphenols. To this end, four groups of mice (12 mice each) received four types of diet for 28 days and then were tested for fatigue by forced swimming. The first group of mice received no catechins, the second group received 50 milligrams of Epigallocatechin-3-Gallate (EGCG) per kilogram of weight per day, the third group – 100 mg, the fourth – 200 mg. The forced swimming test demonstrated that the mice, that received no catechins, could swim for 15 minutes before they were exhausted, the second group (that received 50 mg of EGCG) – about 20 minutes, the third group (100 mg of EGCG) – about 22 minutes and, finally, the fourth group (200 mg of EGCG) – about 28 minutes.

The monument to the laboratory mouse, by the way, is located not that far from Dalian. In Novosibirsk, Russia.

### **On saturating guinea pigs with Indian tea**

Source: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0163498>

Indian scientists have undertaken a study on a group of guinea pigs. The animals spent a week of adaptation period on a polyphenol free diet. Then they were divided into three groups of 6 guinea pigs each. The first group was given water for two weeks, the second group – Assam black tea, and the third – Darjeeling black tea. Tea was prepared in a cunning scientific way: half a gram of tea per 10 ml of water brewed for 5 min with continuous stirring. Guinea pigs were given 20 ml of freshly brewed tea per kilogram of weight, twice a day with a four-hour interval between the intakes.

Two weeks later, the scientists examined all possible tissues of guinea pigs and found that in the tissues of the guinea pigs that were given Darjeeling, there were approximately twice as much catechins as in the tissues of the Assam-drinking guinea pigs. While, there were more theaflavins in the tissues of the Assam-drinking animals. Given the lesser degree of fermentation of Darjeeling tea, there is nothing surprising in the results, but it's nice, of course, to have it in figures.

### **Japanese spectrometers ready to stand up to dyed tea**

Source: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0169430>

A group of scientists from Zhejiang University bought green tea of various brands at a local supermarket. The tea was divided into a large number of samples and powdered. Then, industrial dye Lead Chrome Green of three different manufacturers was added to a part of tea samples. Describing their experiment, the scientists noted that adding colorants to tea is prohibited by law in China, so,

legally, there can't be artificially colored tea. But wise people are prepared for everything in advance, so they need to have a reliable way to detect the dye in tea. Just in case a saboteur would add paint in tea.

In order to distinguish dyed tea from un-dyed one, the researchers used the Japanese Jasco FT-IR-4100 spectrometer, since it is impossible to determine the presence of dye in tea with the naked eye. While with the help of the spectrometer, dyed samples were detected quickly, with a 100% accuracy and nondestructively.

It seems that all our news is a spectrometers' promotion campaign.

### **Phytosterols and fatty acids in camellias**

Source: <http://www.sciencedirect.com/science/article/pii/S0308814617306714>

Chinese scientists studied the sterol composition and the content of fatty acids in the oils obtained from the seeds of plants belonging to three different sections of the *Camellia* genus: tea camellias (*Thea*, which includes all known species and varieties from which tea leaves are made: *C. sinensis* var. *assamica*, *C. sinensis* var. *sinensis*, *C. taliensis*), paracamellia (it includes, in particular, *Camellia oleifera*, whose seeds are most often used for making tea oil) and red camellia (*Camellia*, this section comprises different species of decorative camellias, for example *Camellia japonica*). The study revealed that tea camellia (*Thea*) oil contains more linoleic and palmitic acids, but less oleic acid than red camellia and paracamellia oils. It was also found that the red camellia and paracamellia clustered together based on the data of 12 out of 13 investigated phytosterols as well as squalene and, accordingly, differ in the content of these substances from the tea camellia.

### **Profiles of Tea Drinkers in the US Air Force**

Source: <http://www.sciencedirect.com/science/article/pii/S0278691517302284>

In the USA, caffeine consumption among active duty US Air Force personnel has been studied. The following facts have been revealed.

The proportion of people consuming caffeinated beverages in the US Air Force is similar to the national average, about 84% of personnel drink anything caffeinated at least once a week. The most commonly consumed caffeinated beverages (% users) are sodas (56%), coffee (45%), teas (both hot and cold, 36%), and energy drinks (27%). Daily consumption (mg/day) of caffeine was higher among Air Force personnel than in the country on average. Characteristics independently associated with caffeine use among Air Force personnel included older age, ethnicity other than black, tobacco use, less aerobic exercise, and less sleep. Considering solely at the tea results of this study, we can get the following tea drinkers profiles.

Hot tea drinkers in the US Air Force are predominantly thin women-officers, who are former smokers, over forty years old, with Bachelor's degree, sleeping more than seven hours a night, serving more than 13 years, but not participating in special operations. Their ethnicity, marital status and sports do not affect hot tea consumption.

Cold teas drinkers in the US Air Force are predominantly thin smoking men over forty, with secondary education, not Hispanic or black, sleeping less than four hours a night, serving more than 13 years, in the rank of junior enlisted, who took part in special operations. Their marital status and sports do not affect their drinking habits.

Now you see how many things can depend on the temperature of tea.

### **Bacterial Community in Chinese Dark Teas**

Source: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0162719>

Chinese experts have studied bacterial communities in Chinese dark teas. In total, 11 tea samples were studied: Fuzhuan brick-tea samples (from Hunan and Zhejiang), two samples of the Qingzhuan brick tea (from Hubei), three samples of pu-erh (from Yunnan) and two samples of liubao (from Guanxi). In the tea samples, 14 types, 128 families and 238 genera of bacteria were detected. 21 of 128 families are quite numerous and account for more than 1% of the total amount of bacteria.

The samples of Fuzhuan and Qingzhuan brick tea were dominated by lactococcus (from the streptococcaceae family), their share is from 50% to 74%. And almost all bacteria (including lactococcus, naturally) in these teas are of firmicutes type. The samples of liubao were almost absolutely dominated by saccharopolyspora (they belong to actinobacteria type) – 96-97%. That is, in the bacterial sense, liubao is the simplest tea.

The most diverse community of bacteria was found in puerh. In significant quantities, there were found bacteria of such genera as lactococcus, saccharopolyspora, bacillus, brevibacterium, brachybacterium, kocuria and staphylococcus. The bacterial community of pu-erh tea can be roughly divided into two almost equal groups of firmicutes and actinobacteria types.

Thus, the study showed that the bacterial communities of Fuzhuan and Qingzhuan brick teas as well as pu-erh are similar in composition, but differ in the ratio of different genera. Experts explain this by the proximity of regions and similar environment. The impact of raw materials used for the production of tea on its bacterial communities hasn't been evaluated yet.

The researchers also noted that of the 18 known to date families of beneficial bacteria involved in the production of fermented beverages and foods, 17 are presented in Chinese dark teas. So, it seems that they must be very well fermented indeed.

### **Oolongs from Yunnan and Fujian smell similar, but taste different**

Source: <https://www.researchgate.net/publication/302916829>

The study of light oolongs collected in different districts of Yunnan and Fujian has shown that the composition of the components determining the aroma of oolongs is the same for different samples, whereas the composition of the components determining the taste of oolongs varies. Scientists from Kunming University of Science and Technology studied different teas (green, black, oolongs, pu-erhs)

collected and produced in different tea regions of China and noticed that the aroma compounds of oolongs from the two different regions were similar and couldn't be clearly distinguished from each other. And, at the same time, they are very different from green, black and Pu-erh teas. It means that the aroma of light oolongs depends on their processing technology, while their taste, which turned out to be different for different oolongs, largely depends on the characteristics of the raw materials.

In fact, this information can be a topic for an exceptionally interesting tasting in the style of «let's look for common features in aroma and difference in taste for technologically close teas.» Well, and don't forget about nerolidol.

### **On tea genome sequencing**

Source: [http://www.cell.com/molecular-plant/fulltext/S1674-2052\(17\)30103-X](http://www.cell.com/molecular-plant/fulltext/S1674-2052(17)30103-X)

The news feed being full of messages on the tea genome sequencing in Yunnan, we'd also like to make a small commentary on the study.

To begin with, scientists in different countries have been working with the tea tree genes for many years, and their researches often have a rather applied character. For example in Nanjing they have figured out what genes are responsible for the content of Ascorbic acid and L-theanine in tea and are planning to use this information for developing new tea cultivars. In case of the full genome sequencing the answer to the question “now that we have it decoded, what's next” is not that straightforward obvious. And the suggested variant of the answer “now we know why tea is so popular” doesn't fit either – we knew, without the genome being sequenced, that we appreciate tea for its flavor and the pleasant physiological effect.

This, however, doesn't mean that, in Yunnan, scientists have worked hard only to tell us the obvious, only with genetic pictures. The fact is that during the study they were able to identify specific groups of genes that are responsible for those characteristics of the tea tree, which the group of scientists considered most attractive to consumers. These are: the content of caffeine, catechins and theanine.

Here we need to make a remark. The matter is that in Yunnan, they have studied one tea tree cultivar – Yunkang 10 (*C. sinensis* var. *assamica*). Genetic codes of different varieties of one plant may be very different. For example, the genome size of Coffee arabica is almost 1.5 times bigger than that one of Coffee robusta. And the sequencing of every new variety from scratch is a time-consuming and expensive task (the study of Yunkan-10 took more than five years). And now, knowing which genes are responsible for the consumer-relevant characteristics of tea, specialists will be able to carry out targeted decoding of genomes of other varieties faster and cheaper. Very roughly speaking, now they know what to look for.

For example, Yunnan experts are very much interested in the idea of studying genetic mechanisms that predetermine the consumer appeal of old wild tea trees. We consider this idea attractive too, of course.

Well and as it happens, such a large-scale research couldn't do without interesting and amusing observations. In particular, Yunnan specialists found out that the genes responsible for the content of theanine are common to all Camellia species that they studied. And high expression of genes responsible for the content of catechins and caffeine is present only in Thea species of Camellia genus. And, casually, scientists have demonstrated that tea is genetically not at all like potatoes and peppers, and is closer to kiwi fruit than to coffee.

<http://www.cell.com/cms/attachment/2092385158/2076541360/mmc1.pdf>

And this is wonderful!

### **Theanine Content and Related Gene Expression**

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5383724/>

Specialists from Nanjing Agricultural University continue their studies on the mechanisms determining different properties of tea cultivars. We wrote about their study on the content of ascorbic acid in tea leaves in one of our previous notes. This time it is the content of theanin.

The content of theanin was measured in the 1st, 2nd, 3d and old leaves, roots and stems of Anjibaicha, Yingshuang and Huangjinya tea cultivars. The highest level of theanin was found in young leaves and roots of Huangjinya, the richest in theanin stem was in Yingshuang, and the poorest in theanin stem – in Anji Baicha. So, the correlation between theanine content and genes expression is mostly revealed, the prospects for creating tea cultivars optimized for the content of theanine in the stem and roots are becoming increasingly clear.

It's time to make it happen, comrades!

### **Pure water makes white tea better**

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28416871>

Hangzhou Tea Research Institute has conducted a study aiming to investigate the effect of water quality on the content of catechins, caffeine, theanine and free amino acids in Fuding white tea infusions. Pure, tap and spring water were tested, and water quality was found to have a distinct effect on the extraction of main compounds. Pure water (weakly acidic, low in dissolved ions) achieved the highest catechin content, whereas caffeine and theanine, and amino acids, were higher in infusions made with spring and tap water, respectively. Sensory evaluation was performed to evaluate infusion colour, taste and aroma. Pure water was recognized more suitable for brewing white tea.

Please find the abstract of the study here, the full text is due on April 1, 2018.

### **Ascorbic acid in tea leaves**

Source: <http://www.readcube.com/articles/10.1038/srep46212>

Scientists from Nanjing Agricultural University have studied the content of ascorbic acid (vitamin C) in three different cultivars of *Camellia sinensis* (Anjibaicha, Yingshuang and Huangjinya) in leaves of three development stages (1st, 2nd and 3d leaves). First, the researchers determined which of the leaves have the highest content of ascorbic acid. The first leaves of Huangjinya cultivar was the richest in vitamin C, and the third leaves of all plants were the poorest. Then they identified genes responsible for that. Their next step will be to explore the possibility to increase the content of ascorbic acid via metabolic engineering and transgenic engineering in tea plant leaves. And then youthfulness, beauty and high immunity will become inevitable.

It's noteworthy that of the three cultivars used in this study, two – Anjibaicha and Huangjinya – are Albino tea cultivars. And the content of ascorbic acid in these cultivars is higher than in the green-leaf cultivar Yingshuang.

### **Of green tea, thighs and wings**

Source: <http://www.tandfonline.com/doi/full/10.1080/1828051X.2016.1261007>

An international group of scientists, supported by Islamic Azad University, has conducted a study on how dietary green tea powder affects the immunologic parameters of broiler chicks and concluded that green tea feed supplementation is not likely to be able to induce any negative effects on immunological parameters. We would probably have never pay attention to a research in the style of “another way to make sure that nothing has changed”. But... The abovementioned study gives references to different works devoted to effects of green tea powder supplementation in the daily ration of broilers. It appears that green tea improves improve feed conversion ratio – it means that you can feed chicks less, but they would still gain weight alright. Besides, with green tea intake, proportions of some parts of the carcass were influenced. “Proportion of thigh meat was increased by feeding 1.5% green tea powder while that of wing meat decreased; at the same time the quantity and percentage of abdominal fat decreased significantly”.

So if you are considering to include green tea in your personal weight control program, do not forget about possible changes in the proportions of some parts of the carcass.

It is probably worth mentioning that the inclusion of green tea in the diet of domestic animals has not only experimental nature and is associated not only with broilers. In Boseong, South Korea, and in Japan, some farmers feed green tea to pigs and then make special cutlets with their meat, for example. Must be delicious.

## Tea and health

### Decaf green tea catechins formulation doesn't modify body weight

Source:

[http://www.impactjournals.com/oncotarget/index.php?journal=oncotarget&page=article&op=view&path\[\]=18858&path\[\]=60527](http://www.impactjournals.com/oncotarget/index.php?journal=oncotarget&page=article&op=view&path[]=18858&path[]=60527)

American specialists observed a group of 97 men who were diagnosed with High-grade prostatic intraepithelial neoplasia and atypical small acinar proliferation (both of these diagnoses indicate a high risk for prostate cancer). During one year, on a daily basis, 49 men received Polyphenon E®, which contains a large amount of EGCG (200 mg/capsule) and a minimal amount of caffeine. The rest 48 men received a placebo. According to the results of the observations, the pharmaceutical formulation is well absorbed, but its use does not lead to changes in weight, body mass index and abdominal obesity, which are often associated with a decrease in the risk for prostate cancer. The scientists concluded that men who are obese and at high risk for prostate cancer should use effective weight loss techniques and avoid ineffective ones. The effectiveness of green tea, reported in previous studies, was attributed to the effects of green tea caffeine, which singly and in combination with catechins significantly increases energy expenditure.

### Harmful pyrrolizidine alkaloids and healthy tea

Source: <http://www.mdpi.com/2072-6643/9/7/717/html>

German scientists have compared the risks, arising from tea consumption due to pyrrolizidine alkaloids contained in it, with the positive influence of tea on health and concluded that tea is much more healthy than harmful.

The thing is that pyrrolizidine alkaloids (PA), which can trigger the development of liver cancer, are found in many foods, including tea and herbal infusions. The highest concentration of PA (among different teas and herbs) was found in rooibos, the lowest – in chamomile tea. But while almost all food items we eat from time to time, tea is very often consumed regularly on a daily basis. And for Europeans, for example, tea and herbal infusions are the main “suppliers” of PA into the body. Therefore, a legitimate question arises – should we avoid tea consumption to escape possible PA contamination.

Having studied the data of other scientific publications, German specialists have established that the use of tea reduces the risk of cardiovascular diseases, ovarian cancer, breast cancer, and prostate cancer. And the exclusion of tea from the diet leads to its replacement with more caloric beverages and an increased risk of developing type 2 diabetes. And at the same time they did not find any data confirming the deaths associated with the use of products containing PA.

This is a queer study with a good end and a wonderful table demonstrating how many people (marked dark green) have survived thanks to their habit of regular tea consumption.

## **Pu-erh and the osteoporosis development in female rats**

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5450042/>

In order to establish the association between pu-erh tea consumption and the development of osteoporosis, Chinese scientists provoked ovariectomy-induced osteoporosis in a group of female rats, divided this group into five subgroups, three of which were given pu-erh tea in different amounts during thirteen weeks. Positive changes in the health of rats were found in the sixth week of the experiment; in rats receiving large doses of puerh, these changes were more noticeable. The content of estradiol has increased, the biochemical parameters of blood, the state of bone tissue and some other indicators have improved. The obtained results prove that pu-erh tea consumption can ameliorate osteoporosis induced by ovariectomy, which is one of the most common causes of the development of this disease in women.

## **Tea was found a good alternative for sugar-sweetened beverages**

Source: [http://www.nutritionjrnL.com/article/S0899-9007\(17\)30060-6/fulltext](http://www.nutritionjrnL.com/article/S0899-9007(17)30060-6/fulltext)

Australian experts have conducted an experiment substituting sugar-sweetened beverages in diets of more than 9 thousand adult obese Australians with tea, coffee, milk, water or juices. Observing the dynamics of changes in body mass index and waist circumference of the subjects showed that the most effective substitutes for sugar-sweetened beverage, with regard to weight loss, are tea, coffee, water and milk.

## **Milk, sea fish, shellfish, tea and other healthy plants**

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28603896>

Taiwanese scientists have studied the associations between dietary patterns and frailty phenotypes in an elderly Taiwanese population. Having compared the diets and health of 923 people over 65 years old, they concluded that elderly people whose diet contains more phytonutrient-rich plant foods, tea, omega-3-rich deep-sea fish, and other protein-rich foods such as shellfish and milk, have lower prevalence of frailty.

## **EGCG against anthrax**

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28605495>

American scientists have found that in vitro epigallocatechin-3-gallate inhibits the development of *Bacillus anthracis*, the etiological agent of anthrax. Experiments have shown that EGCG is effective against both attenuated *Bacillus anthracis* and its virulent strains. In fact, this means that green tea can have interesting prospects as an affordable therapeutic bactericidal agent, very useful in a world with a growing threat of bioterrorism. And, of course, in order to better assess these prospects, further research is needed.

Poor mice.



## **Theanine vs. stress; caffeine and catechins vs. theanine**

Source: [https://www.jstage.jst.go.jp/article/bpb/40/6/40\\_b17-00141/\\_html](https://www.jstage.jst.go.jp/article/bpb/40/6/40_b17-00141/_html)

Japanese experts have conducted a pilot study of the anti-stress effect of tea with a lower content of caffeine and catechins. The matter is that theanine, contained in tea, in its pure form has an anti-stress effect. But besides theanine, tea contains caffeine and catechins, which block the action of theanine. This is why, for this experiment, tea with a reduced content of caffeine and catechins was chosen.

The tea was prepared in a special way. Fresh tea leaves (harvested in Shizuoka) were treated with a hot water shower at 95°C for three minutes, then the tea leaves were “dried through a standard manufacturing process”. Hot water treatment reduced caffeine content in tea leaves by 75-80%. Moreover, this tea was infused in room-temperature water (3 grams per 500 ml) – so that the remaining caffeine and catechins (primarily EGCG) would go out to infusion badly (they dissolve better in hot water), and theanine, on the contrary, would go out well.

Twenty students of the fifth year were divided into two groups. During 17 days, one group drank tea with a low content of caffeine and catechins, the second – a placebo drink (barley tea). The study was synchronized with the beginning of the extra-university practice period, which, traditionally, is a source of stress for students. All subjects daily filled questionnaires and submitted saliva for analysis in the morning and in the evening.

The results of the experiment are the following. Before the practice period, all subjects had a low level of stress. After the practice began, the morning stress level was low for all students. In the students who drank barley tea, the evening stress level was much higher than the morning one. And in the students who drank low-caffeine tea, the evening stress level tended to be higher, but not significantly, than the morning one. The average score for subjective stress at the end of daily practice was significantly lower in the low-caffeine-group than the placebo-group.

And now you have the recipe for anti-stress green tea.

## **Epigallocatechin-3-gallate and its antiallergic potential**

Source: <http://www.sciencedirect.com/science/article/pii/S1567576917302035>

Chinese scientists with the help of ovalbumin provoked allergic rhinitis in a group of mice. After this, one part of the mice was given epigallocatechin-3-gallate (EGCG). The observation of the mice demonstrated that mice receiving epigallocatechin-3-gallate sneeze and rub their noses less often than mice that were not receiving it. A study of the nasal mucosa tissue of the mice showed that in the EGCG group of mice the level of cytokines, which participate in the mechanism of allergic reactions development, is lower.

## **Two catechins of green tea and muscle regeneration**

Source: <http://www.sciencedirect.com/science/article/pii/S0006291X17309981>

Experiments conducted in South Korea in mice showed that epicatechin gallate and epigallocatechin gallate contained in green tea stimulate muscle stem cell activation, thereby, promoting muscle regeneration. Muscle weakness is a most common problem in aged individuals and the results obtained in the course of the study can be useful for its solution.

### **Tea and coffee consumption has little effect on pregnant Dutch women**

Source: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0177619>

Dutch experts have analyzed data on tea and coffee consumption as well as health conditions of 936 pregnant women (healthy, with uncomplicated pregnancy). The results of their study report the following.

In the course of this study, the experts found no associations between coffee or tea intake and birth weight or birth length (also with regard to gestational age). At the same time, they identified a significant association between high caffeine consumption (more than 300 mg per day) and a modest increase in gestational age at birth. And also a possible relation between high tea consumption and increased risk for pregnancy induced hypertension, which the scientists hope to further investigate in more detail.

By the way. In 2013, a Norwegian study on coffee, tea and chocolate consumption by pregnant women demonstrated that every additional 100 mg of coffee caffeine per day delayed labor for eight hours.

A thing to remember.

### **Mice on green tea diet do not lose weight at night**

Source: <http://www.funpecrp.com.br/gmr/year2017/vol16-2/pdf/gmr-16-02-gmr.16029605.pdf>

For twenty days Brazilian scientists fed twenty Swiss four-month-old female mice two different diets. One group of mice received a standard diet, and the other – a high-glucose mixture of standard food, sucrose and condensed milk (1: 1: 1,2). In the second 20-day experimental period, the animals were separated into the 4 following groups: group 1 received the standard diet and green tea hour after the start of the light phase of the day; group 2 received the standard diet and green tea one hour after the start of the dark phase; group 3 received the high-glucose diet and green tea one hour after the start of the light phase; and group 4 received the high-glucose diet and green tea one hour after the start of the dark phase.

Twenty days later, the results of various analyzes revealed the following. The appetite decreased in all groups of mice, regardless of the preliminary diet and the time when green tea was consumed. A noticeable and rapid weight loss was observed only in those mice that were given green tea in the light phase of the day.

The results are beautiful and seem tempting to take a shot oneself. However, it would be right to first mention the recipe of the green tea that Brazilian scientists were giving the mice. 200 grams of

powdered tea diluted in a liter of distilled water and boiled for 20 minutes in a 2.5-liter glass flask, filtered and then stored in a refrigerator for 3-4 days. And the mice were to drink this tea forcibly at the rate of 0.2 grams of the drink per kilogram of weight per day. That is, an average man to achieve a similar effect will need to take 16 grams of such extract per day. Well, perhaps, one can try doing it without extra enforcement.

### **Green tea, oxidized fish oil and 270 fish**

Source: <https://link.springer.com/article/10.1007%2Fs10695-017-0374-z>

During 6 weeks, Iranian researchers were adding fish oil and green tea to diet of a hybrid of beluga and sterlet in order to find out whether a tea diet can compensate for potential harm from consuming oxidized fish oil. The fact is that fish oil is very susceptible to oxidation, especially when stored for a long time, and is often consumed (not only by fish, but also by humans) already oxidized. Short-term intake (for 10 days, for example) of oxidized fish oil, in principle, is safe, but a longer one may have side effects, for example, some negative effect on lipid metabolism.

270 fish divided in 27 fiberglass tanks were kept on one of nine diets composed of different dosage and combination of oxidized fish oil and green tea extract. In six weeks it was found that:

First, feeding with oxidized fish oil had no effects on fishes' growth. Oh well. Second, growth indices improved slightly in fish fed green tea extract. Third, feeding with oxidized fish oil had negative effect on lipid metabolism. Forth, in fish that received both oxidized fish oil and green tea extract, negative changes in lipid metabolism were less significant. Based on these facts, scientists concluded that green tea extract has protective effects from the adverse effects of oxidized fish oil.

It is all so fine. But not as fine as the poeticity of the experiment itself. 270 fish. Fish oil. Green tea. A hybrid of beluga and sterlet...

### **Tea mouth rinse as a worldwide therapy for dental caries prevention**

Source: <http://www.jisppd.com/article.asp?issn=0970-4388;year=2017;volume=35;issue=2;spage=150;epage=155;aulast=Hegde>

Tests on children, conducted by Indian scientists, have demonstrated that a mouth rinse made with fresh tea leaf powder can be a good tool for dental caries prevention. In the course of the study, a group of 71 children aged 8 to 12, with 4 and more decayed and/or missing due to caries or filled teeth, was divided into three subgroups. Two of the subgroup were using commercial mouthwashes (Chlorhexidine (0.12%) mouth rinse and combination (chlorhexidine + sodium fluoride) mouth rinse), while the third subgroup was washing mouths with powdered fresh tea leaves from Kerala tea gardens solved in distilled water. The experiment lasted two weeks, salivary samples were taken from children in the beginning and at the end of the experiment to check the content of *Streptococcus mutans* and *Lactobacillus*, which are strongly associated with caries development. It turned out that chlorhexidine (0.12%) is the best inhibitor of the two bacteria species, but its use can cause unpleasant side effects. Tea rinse, although being less effective than chlorhexidine, was not inferior

to a combination of sodium fluoride + chlorhexidine. In addition, tea rinse is said to be five to six times cheaper than commercial rinses, it is safe and can be made at home and worldwide.

### **Meta-analysis on tea consumption and risk of cognitive disorders**

Source:

[http://www.impactjournals.com/oncotarget/index.php?journal=oncotarget&page=article&op=view&path\[\]=17429&path\[\]=56607](http://www.impactjournals.com/oncotarget/index.php?journal=oncotarget&page=article&op=view&path[]=17429&path[]=56607)

Chinese experts have conducted a meta-analysis of studies related to the association between tea consumption and risk of cognitive disorders. Having analysed the data of 17 studies conducted between 1990 and 2016 worldwide and involving a total of 48,435 participants, experts found the following.

First, the use of tea in general reduces the risk of cognitive disorders. Second, the analysis of studies has shown that drinking green tea reduces the risk of cognitive disorders, but the use of black tea and oolong tea does not affect this risk. Thirdly, the amount of tea consumed markedly affects its positive effect. Consumption of 100, 300 and 500 ml of tea per day reduces the risk of cognitive impairment by 6%, 19% and 29%, respectively.

### **Tea intake vs. artery calcification and cardiovascular events**

Source: [http://www.amjmed.com/article/S0002-9343\(16\)30925-1/fulltext](http://www.amjmed.com/article/S0002-9343(16)30925-1/fulltext)

American researchers have found that the regular use of tea slows down the progression of coronary artery calcification and reduces risk for cardiovascular events. In a study that lasted more than 11 years, the diet, bad habits and health of 6508 Americans aged 44 to 84 years were studied. 92% of the observed persons survived until the end of the study. Almost 13% of the experiment participants (800 people) consumed one or more cups of tea daily, and more than half of the participants (57.6%) reported never drinking tea. The study involved representatives of different social strata and different ethnic groups, including 801 Chinese, while out of 800 regularly drinking tea participants, the Chinese were almost half, while the least tea drinking group was Hispanic Americans.

So. After the results were adjusted for a number of other factors (smoking, alcohol consumption, excess weight, etc.), it turned out that moderate consumption of coffee as well as other caffeinated drinks and food has no effect on artery calcification and the risk of cardiovascular disease. While regular moderate consumption of tea slows down calcification and reduces risk for cardiovascular events.

The researchers themselves note that it is still possible that tea consumption can be associated with other habits that are favorable for the cardiovascular system, which were not evaluated in this study.

### **The association between salt intake and hypertension**

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5371982/>

Salted tea and hypertension prevalence among Chinese Kazakhs living in the town of Hongdun, Altay, Xinjiang has been studied in China. The researchers linked the high prevalence of high arterial tension among Kazakhs (45.5%) with their diet and belonging to a particular social stratum. In the research, the diet and health 1,668 adults were studied. And the obvious hypothesis that the main source of problems with high pressure are traditional for Kazakhs dishes – salty tea and salted meat – was confirmed in the course of the study. Due to the consumption of these products, salt intake for of some people in the examined group reaches almost 50 grams per day (the level of hypertension prevalence among these people is about 50%). The obtained data, in addition to the need for explanatory work with the population, imply the need for similar studies of other minority groups of the Chinese population, whose diet includes salted meat and salted tea – the Mongols and the Tibetans.

### **GABA-tea, post-stroke depression and tail-suspension**

Source: <http://www.mdpi.com/2072-6643/9/5/446/htm>

An international group of scientists modeled the post-stroke depression in a group of 60 Iranian mice. Then, for two weeks, scientists gave mice green GABA-tea and GABA-oolong (orally) from an Italian tea store and tested, throwing mice into water and suspending them by tails, from which GABA-tea mice would get out of the depressive state better.

It turned out that both GABA-teas attenuated depressed mood, while green GABA tea worked more efficiently. In fact, the issue raised in this study is very serious, because at least one third of stroke survivors suffer from post-stroke depression.

It is noteworthy that the content of GABA in GABA-oolong is higher than in green GABA-tea. And the fact that, in the described study, green GABA tea proved to be more active was associated with the complex effect of GABA and antioxidants, in which green GABA-tea is richer.

### **Effects of oolonghomobisflavan A on oxidation of low-density lipoprotein**

Source: <http://www.tandfonline.com/doi/full/10.1080/09168451.2017.1314758>

One of the most important qualities of a tea man is the ability to see high poetry in the simplest and most common things. In the murmur of clear water flowing, warmth of the hearth, a cup of oolong ...

Japanese scientists have found that polyphenol oolonghomobisflavan A (or oolong-homo-bis-flavan A, if you prefer) suppresses formation of cholesterol ester hydroperoxides and thiobarbituric acid reactive substances, as well as inhibits fragmentation, carbonylation, and nitration of apolipoprotein B-100 in low-density lipoprotein oxidized by reactive oxygen and nitrogen species (ROS and RNS).

In addition to unconditional poeticity, the obtained results suggest that oolonghomobisflavan A – a polyphenol specific for oolongs – can be effective in the prevention of atherosclerosis.

Wabi-Sabi.

## **Epithelium is an effective barrier against tea-stain discoloration**

Source: <https://www.ima.org.il/imag/viewarticle.aspx?year=2017&month=03&page=152>

Scientists from Israel have conducted a series of experiments to study the effect of warm black tea on the discoloration of the cornea. The motive of the study was the widespread use of warm black tea compresses as a household remedy for ocular surface disorders (a speck in the eye, some minor inflammation and all). So, the scientists wanted to find out whether the use of such compresses may have harmful side effects. Considering discoloration of the cornea as one of the possible side effects, they found that if the corneal epithelium isn't damaged, the cornea doesn't get stained with tea.

Everything in this news would be good and optimistic if, for their experiments, scientists did not use eighteen fresh porcine eyes, divided into six groups of three eyes in each.

## **Nano particles of tea leaves and their bactericidal power**

Source: <http://www.nature.com/articles/srep19710>

For their study of bactericidal activity of green tea extracts, Korean scientists were adding biofilm collected from teeth of volunteers into tea extracts of different concentration and different degree of purification from suspended particles of tea leaves. In the course of the study it was found that relatively rough purification of the extract (removal of tea-leaf particles larger than 30 µm) increases the bactericidal activity of the extract; eradication of smaller particles (0,5–10 µm), on the contrary, decreases it. In further assays, larger particles standalone demonstrated no bactericidal activity, whereas nano-particles showed anti-bacterial as well as anti-oxidative activity. According to the researchers, preservation of nano tea-leaf particles in infusion leads to the fact that the activity of epigallocatechin gallate (EGCG), released into the infusion, is enhanced by the activity of EGCG remaining in the nano particles.

Do not strain the tea too carefully, colleagues. Use only the finest tea powder. And remember that every 300 ml of a tea-bag infusion contains 50 milligrams of suspended particles of tea leaves.

## **Epigallocatechin-3-gallate ameliorates insulin resistance in hepatocytes**

Source: <https://www.spandidos-publications.com/10.3892/mmr.2017.6450>

Examining human and primary mouse liver cells treated with high glucose and epigallocatechin gallate (EGCG), scientists from China found that EGCG enhances the insulin-signaling pathway. And, accordingly, it ameliorates high glucose-induced insulin resistance. The Scientists suggest that this activity of EGCG can be explained by its potential ability to decrease ROS-induced signaling of some kinases. In fact, it means that EGCG-rich teas can be good for hyperglycemia and type II diabetes.

This kind of news are lacking two things: links to shops where to buy EGCG-rich teas and guides on how and how much should one drink his tea, so that this EGCG would work.

Words for horizons expansion: kinase, ROS (Reactive oxygen species), insulin resistance

## Tea polyphenols vs. *Fusobacterium nucleatum*

Source: <https://www.nature.com/articles/srep44815>

Oral Ecology Research Group of Laval University (Quebec, Canada) conducted a experiments which proved that epigallocatechin gallate (EGCG) and theaflavins inhibit the growth and virulence properties of *Fusobacterium nucleatum*, which, in its turn, reduces the risk of such diseases as destructive periodontitis and inflammatory bowel disease.

The experiments engaged black and green tea extracts – both drinks proved their antibacterial activity against *Fusobacterium nucleatum*.

Words for horizons expansion: periodontitis, *Fusobacterium nucleatum*.

## The shorter the sleep, the sweeter the drink

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28393097>

A study of habits and lifestyle of American adults showed that people who sleep fewer hours consume more sweet and, mainly, caffeinated drinks. In the course of the study, an inverse association was also revealed – people consuming more sweet and refreshing beverages sleep less. Researchers interviewed about 19,000 people and found that those of them who sleep five hours or less per night, drink 21% more sugary beverages, mostly containing caffeine (coffee, cola, tea, etc). The starting point of this dependence hasn't been found. Either sleep is disturbed by excessive consumption of caffeine- and sugar-containing beverages, or lack of sleep causes the need for energizing drinks. But scientists warn that such habits (short sleep and overdoses of sugared caffeinated drinks) may lead to obesity and heart problems.

In fact, dear colleagues, this study allows us to reformulate the well-known question about the egg and chicken in our professional realia.

## Tea-induced calmness

Source: <http://www.nature.com/articles/srep36537>

Department of Food Science, University of Arkansas, has studied the effect of tea (instant tea powder, pure and sweetened with sugar, sucralose and stevia) on the emotional state of consumers exposed to acute stressor. The results proved that only sugar-sweetened tea had sedative effect – neither pure tea, nor tea with non-nutritive sweeteners calm down people after stress.

For the experiment, a group of 50 healthy adults (25 women and 25 men) were selected, who, on two days, one week apart, were questioned for their emotional state, then they were given four teas (unsweetened, sweetened with sugar, sweetened with stevia and sucralose), after then were questioned after drinking each tea. One of the days of questioning was for the participants associated with stress, the source of which was an IQ test with assignments in physics, mathematics and logics.

Strictly speaking, they didn't have to use tea in this experiment. Calmness is induced by calories. It's all about the compensation for energy loss caused by the stress. Besides, it's very difficult to imagine

a person who would be soothed by instant unsweetened tea. Maybe only if he or she had seven legs of different colors.



## Tea technologies

### Getting rid of catechins and caffeine

Source: <https://www.ncbi.nlm.nih.gov/pubmed/28690306>

Life often poses sophisticated challenges for inquisitive researchers. For example, in order to analyse pesticide residues in tea infusion, you need to clear this infusion from catechins and caffeine. For this, cleaning agents are used, which, of course, have different efficiencies. The report under the link describes the results of using S-NH<sub>2</sub> and S-Si cleaning agents for cleaning tea infusion and the subsequent recoveries of eighty pesticides. S-NH<sub>2</sub> and S-Si demonstrated high efficiency in removal of catechin and caffeine, respectively, and allowed to recover more than 70% of the investigated pesticides with a recovery greater than 70%.

### On engineering properties of tea seeds

Source: <http://journals.sfu.ca/africanem/index.php/ajtcam/article/view/4716/2933>

Turkish specialists have studied the engineering properties of shelled and kernel tea seeds collected in the vicinity of Rize, and found the following. Firstly, tea seeds can be large as well as small. The average size and average weight of large shelled seeds are 15.8 mm and 1.47 grams, of small ones – 10.7 mm and 0.49 grams, respectively. After de-shelling, the average size and weight of large seeds become 11.8 mm and 0.97 grams, and of small seeds – 8 mm and 0.31 grams, respectively. Both large and small seeds best slide on laminated surfaces, worst of all – on rubber. For kernel seeds, the most slippery surface was also laminate, but the most non-slippery surface turned out to be different for different seed sizes. Small kernels tea seeds slide worst on chipboard, and large – on plywood. And, finally, the density values were found to be higher in smaller than in larger size tea seeds, both shelled and kernel.

Based on such funny, at first glance, data, people then make fascinating machines (for de-shelling, for example), whose work can be watched for hours.

### New technology for determining the origin of tea helped to recognize the counterfeit

Source: <http://focustaiwan.tw/news/asoc/201706130017.aspx>

In 2015, a Taiwanese farmer from Nantou, named Lai, purchased 5.4 tons of Vietnamese tea and got local tea cooperative members to enter it as locally-grown premium oolong tea in a competition held in Lugu. The same year, Lai's tea received a second-degree diploma at the Lugu Dong Ting Oolong Tea Competition. Since a considerable number of people were involved in the scheme, information about the fraud became known to specialists, but until recently they could not prove anything. In late 2016, the Council of Agriculture of Taiwan developed a new technology to determine the origin of tea, after which the investigation of Lai's case got into an active stage and not long ago the fraud was proved. investigators seized more than 240 kg of tea labeled as Taiwan-grown, which, in fact, appeared to be Vietnamese. Now the farmer faces imprisonment for up to five years, and, evidently, at all Taiwan tea competitions, the control over the origin of tea will be strengthened.

Perhaps, the very scandal with tea counterfeit, and the use of new technologies to verify tea terroir will speed up the process of protecting the name of the famous Taiwan teas by origin. Which is good, in the end.

### **Self-learning system for tea quality recognition**

Source: <http://www.zju.edu.cn/jzus/article.php?doi=10.1631/jzus.B1600423>

Chinese specialists have launched a system for visual recognition of the quality of needle-shaped green tea. For a start, 140 samples of needle-shaped tea (Maofeng and Sparrow Tongue tea) were evaluated by three sensory experts from the China Tea Science Society and Department of Tea Science of Zhejiang University. Then 95 of these samples were used to train a system consisting of a camera connected to a computer with image analysis software. After a sufficient amount of data was compared with the estimates of the experienced specialists, the system was used to assess the remaining 45 samples on its own. The assessments of the system largely coincided with the assessments of the experts – and its developers are confident that they will be able to use it not only for utilitarian purposes, but also in order to adopt and preserve the valuable veteran tea makers' experience.

We urgently need tea hackers.

### **Orb-weaving spiders vs. harmful moths**

Source:

<http://onlinelibrary.wiley.com/doi/10.1002/ps.4613/abstract;jsessionid=B377F8A99CD08669A9933031933549FC.f03t01>

Chinese entomologists have studied nine spider species living on tea plantations in China and potentially suitable for protecting these plantations from the moth *Ectropis obliqua* – one of the most destructive pest insects on tea plants in southern China. The results showed that only four spider species preyed on *E. obliqua*. This was evaluated by the presence of fragments and residual DNA of *E. obliqua* in spiders' guts. The largest amount of them was found inside the orb-weaving spider *Neoscona mellottei*. Researchers expect that spiders might be used as part of a system protecting tea plants from pests without the use of chemicals.

### **Two isotopes and four elements for Wuyi-Rock tea**

Source: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5394888/>

Chinese scientists have studied oolongs from 11 sub-districts of Wuyishan (9 samples from each sub-district, 99 samples in all) and replicas of Wuyi-Rock tea from other tea producing Chinese districts (3 samples from each district, 33 samples in all) to determine markers which would allow laboratories to tell Wuyi-Rock tea from its counterfeit. In the course of the study, it was found that the combination of two isotopes ( $\delta^2\text{H}$ ,  $\delta^{18}\text{O}$ ) and four elements (cesium, copper, calcium, rubidium), whose contents in tea are determined primarily by the composition of soils, are significant indications for provenance discrimination of Wuyi-Rock tea.

The researchers note that Wuyishan oolongs are sold in larger amounts than they are produced, and that an experienced tea taster can recognize the counterfeit, but it is a very difficult task to find such a tea taster. On the contrary, to determine the content of two isotopes and four elements in tea with the help of the mass spectrometer MAT-253, to evaluate their combination with Support Vector Machine and to compare this combination with the reference one for Wuyi-Rock tea is a piece of cake.

### **Fusion of electronic nose and electronic tongue for tea assessment**

Source: <http://www.mdpi.com/1424-8220/17/5/1007/htm#B32-sensors-17-01007>

Beijing engineers, combining digital signal processing techniques in time domain and frequency domain, developed a framework for the multi-level fusion of electronic nose (Fox 4000, Alpha MOS Co., Toulouse, France ) and electronic tongue ( $\alpha$ -ASTREE, Alpha MOS Co., Toulouse, France) for tea quality assessment. The proposed algorithm showed good results on testing tea samples of four grades from seven different manufacturers. The authors of the methodology believe that adding a visual analyzer to the complex of test equipment and appearance attributes to the multi-level fusion system will allow to determine the quality of tea with even higher efficiency.

In addition, we'd like to say that looking closely at the current trends of automation, one can notice that most effectively automation is introduced in the professions usually considered highly skilled. So there is no doubt that effective robots for tea testing and robots for tea brewing will appear much earlier than normal robots for high-quality plucking of tea leaves or robots cleaning tea clubs. Be far-sighted, dear colleagues.

### **(E)-Nerolidol is formed in oolongs under stress**

Source: <http://www.sciencedirect.com/science/article/pii/S0308814617305162>

(E)-Nerolidol is a volatile sesquiterpene that contributes to the floral aroma of teas (*Camellia sinensis*). Since (E)-nerolidol is not known to form in tea leaves, the mechanism of its formation in tea was interesting for the Chinese scientists. During their experiments, the specialists discovered that in tea leaves undergoing continuous mechanical damage, farnesyl diphosphate (found in tea cells) transforms into (E)-nerolidol under the action of special enzyme, activated by this mechanical damage. If, in addition to mechanical damage, tea leaves also receive low-temperature stress, then there will be even more nerolidol in them (toss and bruise your oolongs in the refrigerator, colleagues).

Such a mechanism of the formation of volatiles is not unique to tea. Similarly, only with the participation of other components, bergamotenes are synthesized.

Words for horizons expansion: sesquiterpene, bergamotene.

### **Yellow light irradiation during withering improves black tea quality**

Source: <https://link.springer.com/article/10.1007%2Fs13197-017-2558-z>

Researchers from Hanzhou and Huazhong used different light sources (ultraviolet, yellow, blue, purple, orange, red, cyan, green and white) to irradiate tea leaves, which were then used to make black tea, during withering. “The results indicated that the yellow, orange and red light withering significantly improved the aroma and taste, imparting the tea a sweet flavor and a fresh and mellow taste. Tea treated with yellow light was scored highest the sensory scores and showed the highest content in catechins, theaflavins, amino acids and aroma components, followed by the orange and red light treatments. The black tea withered with ultraviolet light showed a strong astringency, probably resulting from low contents of theaflavins, amino acids and soluble sugar. The green light irradiation remarkably damaged the aroma and taste of the tea, leading to a strong greenish flavor and an astringent taste, probably owing to the lowest contents of chemical compositions. No significant cumulative effect was found in the hybrid light withering treatments. Therefore, monochromatic yellow, orange and red lights were suggested for withering the black tea to improve its overall quality”.

In conclusion we'd like to add that Franz Guske in his book “Die Arbeit des Friseurs” says that yellow light irradiation promotes memory and provokes the brain to take especially difficult tasks. The point about provoking the brain to most difficult tasks is a bit frightening with regard to the hairdresser, but it seems that it can be recommended to irradiate tea farmers together with their tea during withering.

### **Green tea leafhoppers are still at large and uncontrolled**

Source: <http://www.nature.com/articles/srep41818>

Specialists from Hangzhou Tea Research Institute, Chinese Academy of Agricultural Science, are working on the creation of attractants for green tea leafhoppers, which are well-known as tea pests, but at the same time they play an important role in the creation of famous pest-bitten teas.

Attracting the leafhopper appeared to be a challenging task. The experiments revealed that the most appealing odours for leafhoppers are the ones of grapevine, peach plant, and tea plant. The scientists developed two attractants, one based on benzaldehyde, the other – on ethyl benzoate (specific components relative to tea plant volatiles). Laboratory tests proved the attractants to be appealing for tea leafhoppers more than tea plant itself. But when traps with attractants were used in the field (tea plantations at Hangzhou and Shaoxing), the leafhopper refused to react to them.

Following studies of the air at the tea plantations showed a high content of extraneous benzaldehyde, not associated with tea (and associated, for example, with automobile emissions), which partially overlapped with the attractant. The researchers advise to take into account field background odour when formulating a pest attractant, and in case of the presence of similar volatiles in the air, either to increase the concentration of the main components or take an attractant based on different volatiles.

Specialists of Tea Research Institute would like to continue their research on developing a safe and effective method to monitor and control leafhoppers focusing on how to enhance the efficiency of the attractants, and how to efficiently kill the attracted leafhoppers. Because in their parts, leafhoppers are primarily pests.

A small note: In different regions, tea leafhoppers are classified differently. In Taiwan they can be called *Jacobiasca formosana* (Paoli), in China – *Empoasca vitis* (Goëthe) and *Empoasca onukii* (Matsuda), and in Japan – *Empoasca onukii* (Matsuda). At present, they are considered to be the same species, biting tea leaves and bearing different names. Here is a link to the relevant study (with pictures):

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4589377/>

## Tea events and phenomena

### Tea events in Russia and Belarus

In the nearest future, several tea events will take place in Russia and Belarus, with all attributes characteristic of such events – non-stop tea tastings, lectures, master classes, informal communication and various accompanying activities.

IX Siberian Tea Festival, July 28-30, Novosibirsk Region (<https://vk.com/sibcha2017>). LetoChai (SummerTea) Festival in Belarus, July 28-30, near Minsk (<https://www.facebook.com/events/146200849264157>). Tea Open Air Festival, August 6, St. Petersburg (<https://vk.com/teaopen>).

### Cold brew in any container

Source: <http://boston.cbslocal.com/2017/07/12/boston-entrepreneur-evy-chen-cold-brew-tea/>

The Boston project Cold Brew Evy Tea, founded in 2014 by Evy Chen, was conceived as a compromise between the main American consumer tea culture (cold and sweet) and a natural attitude to tea. Well, not really a full-fledged compromise – the beverages of the project are still quite sweet and quite cold. But they have interesting contents and smart supplying options. As a basis for Cold Brew Evy Tea drinks, teas of cold and long (from 16 to 24 hours) infusion are used, which are then supplemented with organic honey, ascorbic (in light teas, so as they wouldn't become dark) and all sorts of other things. And these teas are bottled (becoming high quality RTD tea), pouched (supplied as 2.5 gal concentrate pouches for homes and offices) or kegged (ready for immediate use at a cafe, bars or co-working spaces).

Here is the project site – <https://evytea.com/ontap>, and here's its facebook page with nice photos <https://www.facebook.com/ColdBrewedTea/>

### Tea with cold soba and kegani crab

Source: <http://www.scmp.com/lifestyle/food-drink/article/2102295/how-pair-tea-and-sake-food-find-out-hong-kong-special-lunch-and>

Just two days – on July 22 and 23 – a Hong Kong restaurant Tenku RyuGina is featuring tea-pairing kaiseki lunch with tea from India, China, Taiwan and Japan and some special dishes: sea urchin cracker, fruit tomato, cherry salmon (it is the name of fish, not a dish) crispy noodles, foie gras with figs, konowata (cured sea cucumber entrails) with seaweed, peach and tofu paste, charcoal-grilled alfonsino (red bream) with white onion and plum powder, and cold soba with kegani crab (hairy crab) and sudachi.

The set of eight-course lunch with 11 teas will cost 330 euros. There is the Tenku RyuGina web-site: <http://www.ryugin.com.hk/>

## **Ten tea Sri Lankan rupees**

Source: <http://www.plenglish.com/index.php?o=rn&id=15504&SEO=new-coin-celebrates-150-years-of-ceylon-tea-in-sri-lanka>

The Central Bank of Sri Lanka has issued a commemorative coin of ten Sri Lankan rupees in honor of the 150th anniversary of Ceylon tea. The obverse of the coin depicts the Ceylon tea lion, tea leaves, the years 1867-2017 and the number 150. The reverse shows the coin's denomination (the number and words in several languages) and the year of release.

The coin was put into circulation on July 13, so the hunt after it has just started. In addition to it, Sri Lanka has also made larger "coins" of pressed tea to celebrate the anniversary of Ceylon tea.

## **To see London and nibble some Banksy**

Source: <https://www.rosewoodhotels.com/en/london/dining/Art-Afternoon-Tea>

The Rosewood Hotel in London has launched the London's Art Afternoon Tea, the desserts for which are based on works of contemporary artists. More precisely, based on those of them that are exhibited in London. Mark Perkins, the executive pastry chef of the hotel, devoted some time to visiting art galleries of the city and was inspired by the works of Yayoi Kusama, Damien Hirst, Alexander Calder, Banksy and Mark Rothko. It turned out very nicely. The only thing Rosewood lacks is the matching dishes. Afternoon tea with such desserts would certainly win being served in Soviet propaganda porcelain.

## **"Tea Scrolls & Ceremony" photo exhibition**

Source: [http://www.santafenewmexican.com/pasatiempo/art/gallery\\_openings/steeped-in-history-kitty-leaken-s-tea-scrolls-ceremony/article\\_4caf5ed6-62a6-11e7-b075-4fa6842a83c4.html](http://www.santafenewmexican.com/pasatiempo/art/gallery_openings/steeped-in-history-kitty-leaken-s-tea-scrolls-ceremony/article_4caf5ed6-62a6-11e7-b075-4fa6842a83c4.html)

On July 14 Natasha Santa Fe gallery opens an exhibition of photos soaked in tea, called "Tea Scrolls & Ceremony". Their author, Kitty Leaken, specializes in working with tea and, it seems, loves Milorad Pavić and is very accurate with word meanings. The exhibition is made up of photographs depicting various dead things: bird skeletons, cut flowers and all. Still life or 'nature morte', so to say. Kitty Leaken prints her images on photo canvas and then soaks them in tea, and not in any tea, but in different teas that the photographer drinks, using the same dose and the same steeping time as she uses for herself. Not only do the photos get a pleasant tea shade, but also perfectly fold into tubes (scrolls). You can deploy it in the right place, drink tea there against the life-affirming art object, then fold the photo back into the scroll and continue your way.

Here is the gallery site with the announcement of the exhibition:

<http://natashasantafe.com/upcoming-exhibition>. They promise a tea ceremony at the opening.

## **Afternoon Tea with no sugar. But with carrots**

Source: <https://www.forbes.com/sites/joanneshurvell/2017/07/06/i-quit-sugar-author-sarah-wilson-launches-new-afternoon-tea-at-harvey-nichols/#79a236ed685c>

Harvey Nichols London luxury department store, with the direct involvement of Sarah Wilson, the author of “I Quit Sugar”, has launched at one of its restaurants sugar-free Afternoon tea service – with “no added sugar”. Sugar is not used not only in tea, but also in all dishes that are served for tea, all the sweetness in them is from natural ingredients such as carrots, berries or cocoa. The menu sounds convincing: <http://www.harveynichols.com/news/2017/05/24/i-quit-sugar-sugar-free-afternoon-tea/> Carrot burgers with tahini sauce, pork and fennel sausage rollsl, cardamom and sea salt ganache tart, carrot cake with cinnamon frosting, raspberry chia jam and chocolate cherry tart, which sounds a bit out of place in this list.

### **Tea by me. Hothouse tea from the Netherlands**

In the Netherlands, in the town of Zundert, there is a nursery called Special Plant, which works since 2008 and, among other things, breeds tea plants. Modern greenhouse farming allows nursery specialists not only to grow and sell seedlings of *Camellia sinensis* (in flowerpots and mini greenhouse jars), but also to harvest from cultivated tea bushes (a variety of their own Dutch selection, by the way). A small harvest, but quite sufficient to produce real Dutch tea. Here is the tea section on the nursery's website: <http://specialplantzundert.nl/en/tea-by-me/>, and a FB page of their tea project: <https://www.facebook.com/teabymepecialplant/>.

Beautiful. Well, and there's a new goal in life. We have not tried the Dutch hothouse tea yet.

### **Tea and cheese at the Georgian House Hotel**

Source: <https://www.timeout.com/london/blog/forget-cream-tea-a-cheesy-afternoon-tea-is-coming-to-london-062917>

The London Georgian House Hotel, like many other London high-grade hotels, serves Afternoon Tea. Three versions of it, actually. Two of them are quite standard, but the third one made us remember our own gastronomic experiences (<http://www.teaexpress.ru/abouttea/gastronomictea/teaandcheese>). Because Georgian House Cheese Afternoon Tea is tea with cheese and cheese snacks. Smoked cheddar, sandwiches with cheese and 'nduja, sheep's curd parfait with bilberry and basil, ricotta with whiskey soaked apricots, toasted almonds and honey, mascarpone cheesecake cone with red berries and other pleasant things, here is the full menu: <http://georgianhousehotel.co.uk/wp-content/uploads/2017/07/Cheese-Afternoon-Tea-Menu-v2.pdf>. It's a pity that there is no link to the hotel's tea card to evaluate the combinations.

But the idea itself is beautiful. Tea with cheese is served from 14.30-17.00, you need to book a table in advance and take 35 pounds with you. And, it seems that the tea-and-cheese set will be served only in July-August 2017.

### **All kinds of tea things for students**

Sources: [http://www.mlive.com/business/ann-arbor/index.ssf/2017/06/tea\\_haus\\_opens\\_new\\_storefront.html](http://www.mlive.com/business/ann-arbor/index.ssf/2017/06/tea_haus_opens_new_storefront.html), <https://www.eatmoretea.com/>



In the US, in the town of Ann Arbor (Michigan) where students comprise a third part of population, Eat More Tea store, fully packed with tea and tea things, has been opened. Among these different tea things there are delicacies made with tea, funny accessories for a tea table, tea gelato and various accompanying textiles. Eat More Tea is also planning to organize regular master classes on tea-cocktail-food pairing and cooking, as well as other various pleasant events.

An ideal project for a student city.

### **Kenyan Tea for China**

Source: [http://news.xinhuanet.com/english/2017-06/27/c\\_136399168.htm](http://news.xinhuanet.com/english/2017-06/27/c_136399168.htm)

In July, Kenya and China intend to sign a memorandum of understanding, according to which Chinese specialists will train Kenyans to produce tea matching the tastes of Chinese consumers. Kenyan specialists expect that after such training, Kenya will be able to increase the volume of its tea exports to China (now China imports 4-5 thousand tons of Kenyan tea per year). Kenyan specialists also expect that China will lower its quality standards for imported tea, which currently hinder the increase in Kenyan tea exports to China.

### **Cold tea constructor sets from Flamingo Bloom**

Sources: <http://www.marketwatch.com/story/flamingo-bloom-tea-salon-launches-all-natural-tea-this-july-2017-06-25-23160167>, <https://www.facebook.com/flamingobloomhk>

In the beginning of July, a new tea place called Flamingo Bloom opens in Hong Kong. It will specialize in serving cold made-to-order tea based on four basic drinks: Jasmine Green Tips tea from Fujian; Highland Oolong from Taiwan; Chrysanthemum Pu'er from Yunnan; and Honey Orchid Black tea from Sichuan. All these teas will be brewed every four hours, cooled and, at the request of guests, served on the rocks, with various additives and toppings, on special inflatable pink flamingos.

Flamingos are beautiful.

### **Samovarfest in Moscow Hermitage Garden**

Source: <https://www.msk.kp.ru/daily/26690.7/3714432/>

On June 12, in Moscow Hermitage Garden, Samovarfest took place – a big family festival with a nice accent on tea drinking and festive culture of different peoples of Russia. From the tea point of view, the event was interesting, first of all, for its location – it's a pleasure to see that the main, in the recent past, tea garden of the country has retained links with tea culture. Secondly, the big number of samovars is also pleasing. And, finally, thirdly, there were especially large specimens of samovars at the Samovarfest – e.g. a two-meter high and 300-liter six-tap brass fire samovar “Moskva (Moscow)”, which was made in Tula city specially for this occasion.

Under the link, please, find the official web-site of Samovarfest: <http://samovarfest.ru/>

## **Sharks, rays and sea cucumbers**

Source: <http://en.rocketnews24.com/2017/05/29/marine-creature-themed-tea-bags-transform-teapots-into-aromatic-oceans/>

It seems that differently shaped and artistically designed tea bags are gradually coming to the boundary where quantity transforms into quality. There aren't any particularly breakthrough solutions in this direction, but the inquisitive researcher already has the opportunity to make thematic collections. Under the link, for example, you can find marine creature-themed tea bags – fish, aquatic mammals, and different sea animals. 10 pieces all in all. Sea cucumbers are especially good, with stingrays and sharks pale into insignificance against its ruthlessness.

## **“World’s most expensive Bubble tea” project**

Source: <http://www.foodandwine.com/news/worlds-most-expensive-bubble-tea-its-way>

TEALEAVES company, specializing in the creation of tea blends for luxury hotels, together with Franck Desplechin, executive chef at The St. Regis San Francisco, have developed Bubble Tea with the proud name Boba Teashake, which, with a high degree of probability, is the most expensive beverage of its kind in the world.

In order to make Boba Teashake, you must first prepare tapioca pearls, then cook them in infusion of one of TEALEAVES' blends (Master Blend No. 2130), then brew Lychee Passionfruit Bubble Tea Black (Master Blend No. 7502: blend of Indian, Chinese and Ceylon teas with lychee and passionfruit flavors), add ice and shake the tea with ice in a shaker to chill the drink (leave ice-cubes behind), then prepare caramel foam with Fleur de sel, then – passion fruit coulis and, finally, serve it all in a chilled Riedel glass. Place the tapioca pearls at the bottom, then add coulis, pour Lychee Passionfruit Bubble Tea Black, fill the glass to the top with the caramel foam, top the foam with Fleur de sel, then pierce it with a straw and serve chilled.

Sounds promising. Here is the special web-site for Boba Teashake:

<http://www.worldsmostexpensivebubbletea.com/>, here is the site of TEALEAVES:

<http://www.tealeaves.com/>, and here is their facebook page, which, among other things, gives details of the company's cooperation with Chefs of other hotels: <https://www.facebook.com/TealeavesCo/>

## **Tea Infused Wine**

Source: <http://www.everythinglubbock.com/news/trends-and-friends/tea-infused-wine-new-in-lubbock-at-teasters-tea-company/730157584>

A new version of combining tea with wine has been launched by our colleagues from Teasters Tea Company, Texas, the USA. Using the new-fashioned BKON Craft Brewer, which is known to brew anything with the help of negative pressure in the container where the infusion takes place. Put simply, it is quickly pumped out of the air during tea infusion, sometimes repeatedly. Since BKON Craft Brewer allows you to work effectively with cold infusion, there are no technical problems with pouring wine into it, instead of water. This is exactly what the specialists of Teasters Tea Company do.

Puerh-infused zinfandel, some sweet and fruity tea infused in Merlot – and so on. Teasters have started selling tea-and-wine drinks with the proud name of Tea Infused Wine on June 5.

The Ambient Brew concept is more kindred to us, but cold tea infusion on wine is also cool. By the way, here is Teasters Tea Company FB-page: <https://www.facebook.com/TeastersTea/>

### **Tea Board India's Special Awards**

Source: [http://www.teaboard.gov.in/pdf/India\\_Tea\\_Awards\\_Circular\\_Notice\\_5\\_pdf5632.pdf](http://www.teaboard.gov.in/pdf/India_Tea_Awards_Circular_Notice_5_pdf5632.pdf)

Tea Board India launches India Tea Awards project, which will distinguish the best tea companies in 22 categories. You can find the list of nominations under the given link. The special award of the Chairman of the Board for Top Graded gardens in category A+ and awards for the highest prices in auctions for Darjeeling, Assam and Nilgiri seem most interesting to us. Looking forward for the first results.

### **Fairly Traded instead of Fairtrade**

Source: <https://www.ft.com/content/b0a5ba16-3fdd-11e7-82b6-896b95f30f58>

British company J Sainsbury, which owns Sainsbury's chain of supermarkets intends to remove the Fairtrade marque from its own-brand tea. Representatives of the company announced the start of its own ethic program to ensure the normal living conditions and work of those tea industry workers who grow and produce tea for Sainsbury. This program will be called Fairly Traded. In the framework of this project, Sainsbury guarantees tea farmers a decent salary and deductions to the Sainsbury's Foundation, which will help making individual projects for farmers through an advisory board made up of all sorts of experts.

The program starts in June 2017 with the sales of boxes marked as Fairly Traded Red Label Tea. Representatives of Fairtrade and those tea farmers who do not receive assistance from J Sainsbury, criticize the new program. While J Sainsbury and those farmers who are participating in this project consider it more flexible and simple and do not doubt its success.

### **Tea Merchants Have Outstripped Barbers!**

Source: <http://www.timescolonist.com/news/local/downtown-victoria-salon-brewing-up-a-new-kind-of-high-tea-1.20137471>

The authorities of British Columbia (Canada) have allowed the sale of alcohol by non-traditional businesses. They assume that alcoholic beverages will be in demand in wedding salons, at hairdressers' and other places that provide clients with services where waiting is expected. And the first project that applied for this kind of alcohol license was Terroir Tea Salon (<https://www.terroirteamerchant.com>). The owners of the tea room have already organised events on pairing tea with cheese and chocolate. And they believe that their guests will enjoy pairing tea with whiskey or brandy just as well.

No doubt about it.

## Japanese tearooms on the Internet

For this short review, we have selected Japanese tea places with two requirements in mind: the place needed to have a website, and be of interest for the authors of the review (which is purely subjective, of course). Let's start with the classics.

Yakumo Saryo (<http://www.yakumosaryo.jp/e/introduction/>). A traditional tea room and a restaurant with a beautiful site and an unusual age restriction for visitors (at least it seems so to us). You can visit their tea room on the first-come first-served basis, but you need to book the place at the restaurant in advance, and only persons who have reached the age of 12 are allowed for lunch, and the age of 20 – for dinner. Perhaps this is a standard restriction for such establishments, but it looks very intriguing.

Alice's Fantasy Restaurant (<http://www.alice-restaurant.com/>). A chain of restaurants inspired by Walt Disney's interpretation of L.Carroll's Alice. To date, the chain comprises seven restaurants, mainly in Tokyo, although the latter one opened in Nagoya. Such bright stylizations for popular cartoons are rather common in Japan – but in this case the theme is very closely associated with tea parties, and the solutions are very effective. It will just suffice to mention their beautiful interiors.

Afternoon tea at Aman Tokyo Hotel (<https://www.aman.com/resorts/aman-tokyo/the-lounge-by-aman>). An exquisite solution for a typical for high-level hotels Afternoon Tea service. At the Black Bar on black bamboo hand-made tiered trays and on other black dishes a set of signature snacks is served (also black, as far as possible). The fact that tea and tea cups are also black there is needless to mention.

Afternoon tea at Grand Hyatt Tokyo (<https://www.tokyo.grand.hyatt.co.jp/en/restaurants/french-kitchen-tokyo/news/hermitage-afternoontea.html>). Another interesting variation on the Afternoon Tea theme. It is called Hermitage Afternoon Tea, set at the restaurant of French cuisine and dedicated to the Russian royalty. The Afternoon tea menu includes tea with a Russian name (Ekaterina II from NINA'S), beef and cabbage-stuffed pirozhki, apple pastila pastries, and ptichie moloko, or “bird's milk” cake, blueberry compote and all sorts of other familiar things. You can upgrade your tea to a “Royal” afternoon tea and get an addition of caviar-topped blini pancakes and glasses of Louis Roederer Cristal Brut Champagne, “which was created in 1876 to satisfy the demanding tastes of Tsar Alexander II”. This menu is offered until June 30, 2017.

Another Afternoon tea, this time at The Peninsular Tokyo (<http://tokyo.peninsula.com/en/special-offers/Blooming-Afternoon-Tea>). It is called Blooming Afternoon Tea. Performed with amazing thoroughness, it looks like an etalon English Afternoon tea with flowers and butterflies, and with the famous Japanese attention to detail. Available until June 19, 2017.

Finally, Greentea Afternoon Tea Set from The Strings By InterContinental Tokyo (<http://www.intercontinental-strings.jp/en/restaurant/news/detail.php?no=ODO>). It is based on the British Afternoon tea tradition, of course, but with a completely Japanese filling. Green tea is not only

in the cups, but also an ingredient of various snacks. A very interesting interpretation. Well, that's enough for Afternoon teas, perhaps.

Because, for example, there is still Tokyo Saryo (<http://www.tokyo-saryo.jp/>). This is a laconic tea salon-bar with drippers. It serves only seven single-garden teas with small traditional Japanese sweets and fairly detailed descriptions.

Or, here is Sakurai Japanese Tea Experience (<http://sakurai-tea.jp/>). It's simply a feast for a connoisseur of Japanese tea terroirity. Tea from different regions of Japan is served there, and the preparation combines traditional and innovative elements. They also prepare and serve alcoholic drinks infused on Japanese tea.

Well, since we started with the classics, we'll finish with the classics and that'll do. Happo-En (<http://happo-en.com/banquet/>). This is a manor in Tokyo with a well-preserved traditional Japanese garden. In the garden there's a tea house called Muan of Meiji period. Having been built in Yokohama, it was later relocated to the garden with all due care. In this tea house, on preliminary order, you can get an idea of the Japanese tea etiquette.

Beautiful!

### **Aince nine farmers from three Scottish shires...**

Source: <http://www.forfardispatch.co.uk/news/business/tea-on-tayside-1-4435176>

Artisan Tea Gardens Ltd (<https://www.facebook.com/teagardensofscotland/>) – a collaborative of nine tea farmers from three Scottish counties (Angus, Fife and Perth & Kinross) – has been awarded a grant of £49,550 by the local area groups. The grant is intended to be spent on tea growing equipment and expert consultations. The web-site of the collaborative (<http://teagardensofscotland.co.uk/>) informs that farmers are also planning visits to Georgia and Japan to acquire expertise there. In two-three years the group aims to develop a tea-trail, allowing visitors to see the tea gardens and taste and compare their teas. A comment from the donors about the development of tea business in Scotland wins us with its pure excitement and sincerity. No references to the developed consumer tea culture, historical traditions or healthy lifestyle, only solid arguments: Vodka, gin and now tea are all being made in Angus...who'd have thought?"

We drank Scottish white tea in 2015 during our SummerTea Meeting (LetoChai) – it was expensive and quite decent. Over the past couple of years, the assortment of Scottish tea has expanded significantly, and now one can find Scottish oolong, matcha, stem tea, pure black tea and black tea, scented with monarda petals. We haven't yet had the possibility to appreciate the quality of these teas, but the prices for them are still very high – around £ 35 for 15 grams (<http://weeteacompany.com/buy-tea/tea-by-origin/scotland.html>).

### **Tea without Borders, Zakarpattia 2017**

On May 26-28 in the Zakarpattia Oblast, Ukraine, in the alpine art-estate "Zolotaya Rybka (Golden Fish)" a meeting of tea connoisseurs "Tea without Borders" will take place. The programme of the

meeting includes a guiding tour to the Krasnaya Gorka tea plantation (plucking of tea leaves, making tea and then brewing it), tea-drinking at the waterfall Skakalo, watching architectural monuments of Mukachevo city and Chinadievo, and, naturally, constant tea tastings and unofficial tea-drinkings. The registration closes on April 25.

Please find details at <https://www.facebook.com/events/176801916164556/>

## Tea traditions

### Japanese post-fermented (dark) teas. Part 1. Awabancha

Japanese post-fermented teas are a small and little-known outside of Japan group of teas. As is the case with other post-fermented teas, in the production of Japanese post-fermented teas there is a stage of enzymatic oxidation under the action of external enzymes. Most often, this is either aerobic fermentation with the participation of different types of fungi, or anaerobic fermentation with the participation of lactic acid bacteria, or both of these fermentations.

Each of the Japanese post-fermented teas is quite rigidly attached to a specific locality (most often to the prefecture, but sometimes the localization can be more precise). The association can be due to both cultural background (the established tradition of making and drinking tea), and technological reasons (for example, microorganisms specific for the particular place participating in the tea production).

To denote post-fermented teas, the term Kurocha (黒茶) is often used in Japan, which is a synonym for Chinese hei-cha and English dark tea. Currently, Japanese post-fermented teas enjoy some support from the Japanese government as traditional local products. Perhaps this will lead to some increase in their visibility in the market.

It's interesting to note that the anaerobic fermentation used in the production of some Japanese post-fermented teas and the increased content of gamma-aminobutyric acid in these teas allows us to “put years” on the Japanese part of GABA tea history and to associate it with traditional Japanese teas.

Now, let's have a closer look at the traditional Japanese post-fermented tea.

Awabancha (阿波番茶, 阿波晩茶, Awa-ban-cha), Tokushima prefecture, east of Shikoku island. “Awa” in the name of this tea is the old name of the region, which now belongs to the Tokushima prefecture. The last two hieroglyphs in the title are read as “buncha” in both spelling variants (阿波番茶 or 阿波晩茶). The first combination coincides with the name of the traditional Japanese green tea bancha (番茶), translated as “rough leaf” – and this is a very accurate characteristic for the raw materials used for the production of this tea. In the second combination, another hieroglyph is used for the sound of “ban” (晩, evening), so that the person reading the name of the tea wouldn't have the illusion that this is one of the traditional green teas. And for the sake of poetry, perhaps. The second version of the hieroglyphic name of the tea (阿波晩茶) appears to be more common.

For the production of awabancha, mature tea leaves are used, which are collected in the middle of summer, mostly from wild trees. The collected leaves are fixed by boiling (about 10 minutes). After that, the tea leaves are rolled and sealed for 7 to 30 days in a barrel under press for anaerobic fermentation with the participation of bacteria. Basically it is *Lactobacillus plantarum* and *Klebsiella pneumonias*, other bacteria do not feel well in the harsh conditions of fermenting tannic tea leaves. During fermentation, the “broth”, remaining after the leaves were boiled, may be added to the barrels. After fermentation, tea is dried in the sun for one day.

Awabancha can be brewed as an ordinary tea (and can take several infusions), or can be boiled for a few minutes. Since awabancha does not pass through aerobic fermentation stage, the infusion of this tea is fairly light; in the aroma, there are fruity notes, and in the taste – sourness.

Here is a link to a large Japanese website about awabancha (<http://awabancha.com/>), and here is the description of this tea on My Japanese Green Tea website (<http://www.myjapanesegreentea.com/awabancha>). And a couple of manufacturers. Irodori Bancha company (<https://www.irodori-bancha.com/>), which produces and sells Awabancha tea in both traditional and RTD versions (the bottles are cute). And Kamikatsu Bancha company (<https://www.facebook.com/kamikatsubancha/>), which, seemingly, works only with classics. And here (<https://yunomi.life/collections/furyu-bancha-specialty-shop/products/furyu-awa-bancha?variant=4101685253>) is a site where one can buy awabancha, with pictures and entertaining videos.

## Japanese post-fermented (dark) teas. Part 2. Goishicha

Goishicha (碁石茶, Go-ishi-cha) is produced in Kochi Prefecture, in the south of Shikoku island. The words “go-ishi”, which form the name of this tea, denote pebbles for playing Go. Goishicha has the form of rectangular tiles, which, despite their rectangularity, when laid out in large quantities on a flat surface (during drying, for example), remind go board game.

For the production of goishicha, shoots (branches with leaves and all) of tea trees are used, which, after being cut (in mid-July), are fixed with steam, and the liquid drained from the processed raw material is collected for further use. After that, the tea leaves are made into a pile, some 50-70 cm high, which is then covered and left for aerobic fermentation with the participation of fungi, for 7-10 days. Then the tea leaves are placed in barrels, wetted with the liquid collected during steam fixation, and put under a heavy stone press for about 20 days for anaerobic fermentation involving mainly lactic acid bacteria. After that, the mass of tea leaves is first cut into large “bricks” still in barrels, removed from the barrels, then cut again into rectangular tiles with a side of about 3 cm and left outdoors to dry in the sun for three days.

In the past, goishicha was mostly used as an additive to different dishes (for example, it was added to rice porridge), but now it is often brewed (steep it for 4-5 minutes, make several infusions or boil for a couple of minutes) for drinking as any other tea. As a rule, you get a light drink with gentle sourness, without bitterness and with slight pleasant astringency.

Here is an excellent page about goishicha in Japanese (<http://www.m-ys.co.jp/goisitya.html>), with a bunch of photos. Here is a description of the tea (<http://www.myjapanesegreentea.com/goishicha>) and tasting notes (<http://www.myjapanesegreentea.com/furyu-goishicha>) on My Japanese Green Tea. Here (<https://yunomi.life/collections/furyu-bancha-specialty-shop/products/furyu-bancha-goishicha>) is a link to a company selling goisicha (with nice pictures and videos). Here is one excellent “process-oriented” video (<https://www.youtube.com/watch?v=Kzlc8g9Myqq>), and another, more romantic one (<https://www.youtube.com/watch?v=92mEGbHO3xg>). And one more purely commercial video (<https://www.youtube.com/watch?v=gkbFpxBu5ec>).



### Japanese post-fermented teas. Part 3. Ishizuchi-kurocha

Ishizuchi-kurocha (石鎚黒茶) is a Japanese post-fermented tea from Ehime Prefecture, in northwestern Shikoku. “Ishizuchi” is the name of the mountain where this tea is grown (the mountain itself is quite high, about 2000 meters, but the tea is grown at the height of six hundred meters, approximately). And “kurocha” means “dark (post-fermented) tea”.

In the middle of summer, to produce ishizuchi-kurocha, shoots (branches with leaves and buds, and the twig part may be very long) are cut from fairly high tea trees. Then the shoots are fixed by steaming, during which the leaves fall off from the branches. After fixation, the tea leaves are placed for 4-6 days in wooden boxes for aerobic fungal fermentation. After that, the leaves are manually rolled and subjected to anaerobic fermentation involving lactic acid bacteria, for 2-3 weeks. Nowadays, for this fermentation, the leaves are placed in plastic bags, from which the air is pumped out. After the leaves are removed from the bags, the tea is dried in the sun.

Ishizuchi-kurocha was originally used as a food ingredient, but now it is often used as an individual drink. Prepared by infusions or short boiling, it is recommended to be served chilled, sometimes on the rocks. People find the aroma of this tea similar to that of GABA-tea with sour fruity notes, but the taste of ishizuchi-kurocha is close to goishicha – sour, but not bitter, with a pleasant aftertaste.

At some point, ishizuchi-kurocha was almost lost, it is believed that there was left only one master who could make this tea. But some enthusiasts have saved the technology of making ishizuchi-kurocha. According to the enthusiasts themselves, their tea does not yet match the original taste, so they call it Tengu-kurocha (天狗黒茶). Tengu is the peak of the Mount Ishizuchi. Such a nontrivial modesty.

Ishizuchi-kurocha is rich in gamma-aminobutyric acid, but it has little theanine and catechins. It is believed to be impossible to buy outside of Japan. Here are a couple of similar tasting notes about this tea: one (<http://www.hanamichiflowerpath.com/2016/12/tea-review-ishizuchi-kurochatengu.html>) and two (<http://www.myjapanesegreentea.com/tengu-Kurocha>), and the description of the tea on My Japanese Green Tea (<http://www.myjapanesegreentea.com/ishizuchi-kurocha>). And, finally, an excellent illustrated description of ishizuchi-kurocha on Setouchi Finder (<https://setouchifinder.com/en/detail/609>).

### Japanese post-fermented teas. Part 4. Batabatacha

Batabatacha (バタバタ茶, Batabata-cha) is a Japanese post-fermented tea produced in Toyama Prefecture, in the north of the central part (chubu Region) of Honshu Island. Sometimes, it is called toyama-kurocha and asahi-kurocha, where Toyama and Asahi stand for the names of the prefecture and a small town in it, and the word kurocha, as was mentioned earlier, is used in Japanese to denote post-fermented (dark) tea. Whereas the beautiful word “batabata” is partially based on onomatopoeia designation of quick moves or actions (something like “helter-skelter”). In fact, the name of this tea can be interpreted as “tea that is prepared by quick moves”; we’ll speak about these moves later.

To make batabatacha, mature tea leaves are collected in July-August; then the leaves are boiled for fixation until they become yellowish. Then the wet leaves are left to dry in the shade on straw mats

for several hours. After drying, the leaves are tightly stuffed (by means of human body weight) into large wooden boxes for aerobic fermentation involving fungi. In the process of fermentation, the temperature of the raw material should not rise above 60 degree Celsius, otherwise the important fungi may die. Every four days the tea leaves are stirred, the whole fermentation process lasts about a month. After fermentation, tea is dried for several hours in the shade and 2-3 days in the sun.

Batabatacha is brewed the following way. At least 6 grams of tea for minimum 10 minutes are boiled in a liter of water (boiling time can be increased up to several hours). The resulting broth (not a suspension, as is the case with matcha, but rather a decoction) is beaten with a special whisk (different from chasen for the matcha tea ceremony) with possible addition of salt. It is curious that historically batabatacha, as well as matcha, which is also whipped, is associated with the Buddhist tradition. And, since we've mentioned history here, it is worth to note that the first written mention of batabatacha refers to the year 1472. Rafael was not yet born, and Columbus, probably, was not even thinking about his strange India.

So. For the preparation and consumption of batabatacha, special bowls are used (it is better, of course, not to change vessels when preparing whisked tea, but drink right from the cup where it was whipped), and for its whipping, special whisks are used, which bear a beautiful name (batabatachasen), and look beautiful – they are twinned and remind big brushes. But, of course, it is possible to prepare batabatacha in any bowl and with any suitable tool, e.g. cappuccinators and milk-frothers.

The taste of batabatacha tea is noted to be slightly sweet with woody notes. Its pleasant aftertaste has mild hints of mint. And the froth – although you can brew this tea in the usual way just as well – comes out very good.

Here (<https://yunomi.life/products/furyu-batabatacha-rare-bancha-tea-30g>) one can buy this tea and have a look at its beautiful pictures, and here (<https://yunomi.life/products/coupled-Bamboo-whisk-for-batabatacha>) – a whisk for it. Here is a description of batabatacha (<http://www.myjapanesegreentea.com/batabatacha>) on My Japanese Green Tea and tasting notes from the same site (<http://www.myjapanesegreentea.com/furyu-batabatacha>). Here's a video demonstrating how the tea is whisked (<https://www.youtube.com/watch?v=4rtPFog6jAI>), but here is a study (<https://www.ncbi.nlm.nih.gov/pubmed/14969549>) which has found that batabatacha is rich in vitamin B12.

We'd also like to note that frothy tea with names formed according to a similar principle can be also found in other regions of Japan. In Okinawa, for example, there is bukubukucha (ブクブク茶) and a special ceremony of preparing and serving this drink. And in Shimane prefecture (west of Honshu), there's botebotecha (ボテボテ茶). These drinks are different from batabatacha. The main ingredient is mostly different (the whisked drink is prepared from roasted rice and its froth is even richer), and the serving may differ – in Okinawa, for example, the froth is used as a topping which is placed on top of an unwhisked tea.

## **They do it all wrong in Coventry. And this is right**

Source: <http://www.coventrytelegraph.net/news/coventry-news/coventrians-dont-know-how-make-13086513>

In Coventry, England, a tea survey was conducted. Its purpose was to find out how the tea knowledge and tea daily life of the city's residents correlated with the traditional English tea etiquette.

The survey has revealed that 60% of respondents have never prepared tea using tea leaves, 95% didn't include a strainer in the list of items necessary for brewing tea, and 7% did not even know what the strainer was. 95% of the respondents do not know how to stir the tea properly (they use obvious circular motions instead of the correct back and forth motion from 12 o'clock to 6 o'clock). 90% have not included lemon in the mandatory serving set supplements, limiting it to sugar and milk. 41% of the respondents incorrectly pronounce the word scone, rhyming it with 'bone' instead of 'gone'. Well, the worst thing, of course, is that 61% of the respondents dunk their cookies in tea. But since these misguided people realize that they are not doing things right, English tea culture isn't lost yet.

## Tea recipes

### Tea drinks in coffee style

Source: <http://sprudge.com/stonerolled-tea-118336.html>

In fact, the idea of grinding tea and making a drink from it in a coffee way lies on the surface and, for sure, was repeatedly tested in practice by various curious tea connoisseurs. But, apparently, the preparation of tea by traditional coffee methods has not gone beyond unsystematic experiments. Various specific coffee pieces – siphons, purovers and other cold drippers – tea people are borrowing willingly. Style of preparation too – it is enough to recall coffee-type drinks from matches (matchachino, yeah).

Another series of experiments in the direction of style was put by our English colleagues from Postcard Teas (<http://www.postcardteas.com>). They have created three variants of tea, powdered by means of slow stone millstones – green, black and oolong. Very slow (33 revolutions per minute – they can obviously listen to old vinyl records on the same millstones) to prevent the tea from heating up during grinding and to secure very fine grind. All three teas are blends. It took Postcard Teas specialists two years to implement this project. And given the performance of the millstones, there is nothing surprising.

The powdered tea leaves are used to prepare a beverage reminiscent of espresso in consistency. And then on its basis – several drinks, differing from each other by the ratio of tea and milk and mirroring the following coffee range: cortado, flat white, latte. Drinks made on the basis of the black tea blend taste like normal coffee cappuccino and can stand up to any amount of milk. Green ones are similar to matchachino. And Oolong ones are described by the authors as “the maltiest balance of tea and milk”. The whole line of powdered teas is served at London’s Prufrock Coffee cafe (<http://www.prufrockcoffee.com/>).

### Seven things that make green tea tasty

Source: <http://www.thealternativedaily.com/add-these-ingredients-to-green-tea/>

Following the link, you’ll find an easy and amusing, at first glance, article on how to make green tea taste better. Its authors proceed from the fact that green tea is useful, but not everyone likes it – and they suggest adding ginger, basil, mint, honey, lemon, cinnamon and coconut oil to it, so that one could finally “slurp it down” somehow. Let’s leave for a minute ironic remarks, something like “they simply need to learn how to choose decent tea and train their taste”, but speculate on the following instead.

There is a very large number of countries where tea culture is mostly or purely consumer-oriented. Tea comes to these countries in the form of a ready-to-brew product of very different quality – and, in most cases, in pure brewed form it does not fit into the mass tastes. Therefore, sugar, lemon, milk and all sorts of other things are added to it, turning even a most simple tea into a delicacy with gruff, but personal settings.

In fact, the mass consumer tea culture is constantly dealing with the question “how to make tea tasty?” For several centuries of its active existence, many tea traditions have offered their answers to this question, which are quite satisfactory for most consumers. Obvious examples of such traditional answers are tea with sugar and lemon in Russia and tea with sugar and milk in England. To a lesser extent, but still visible are attempts to answer this question through careful attention to the quality of tea. Despite the fact that it's not the easiest task to find a good and delicious tea, the very approach “a delicious drink can be prepared without any additives from good tea” is very simple and shifts the responsibility for the taste of the drink to the producer and the buyer. This is convenient, if you are just a discerning connoisseur. And it does not do any good, if you are going to use tea for professional purposes in a country with the consumer-type tea culture.

In order to professionally work with tea, you need to be able to make it tasty. Just tasty. Commercially tasty. Unconditionally tasty regardless of the quality and price of tea leaves. The abilities to brew pure tea leaves well and, if necessary, to convincingly tell about its merits are only a part of such mastery.

Which will never be complete without the ability to quickly collect a tea cocktail from improvised ingredients, find a matching snack for tea, replace alcohol with tea or offer additives for plain and “bitter” green tea so that the person who wants to drink it (for health benefits or something) does not have to force oneself into it drinking it.

Most of these solutions will work only once. The best ones will turn into micro-trends, which, by the way, will not last long either. Very few will create formats. Some of them will turn into money. And all of them, without exception, will become a source of invaluable experience.

## **120 pages, 40 Royal Tea Recipes**

Source: <https://www.royalcollection.org.uk/about/press-office/press-releases/royal-teas-seasonal-recipes-from-buckingham-palace#/>

Royal Collection Trust has released a recipe book Royal Teas: Seasonal recipes from Buckingham Palace. 120 colourful pages include 40 recipes created by the royal chef Mark Flanagan and royal pastry chef Kathryn Cuthbertson and selected in such a way that it would be possible to reproduce them outside the royal kitchen. Among others, the book gives the recipe of drop scones which Queen Elizabeth II cooked for President Eisenhower in 1959.

## **Tea and cucumber variations**

Cucumber's participation in tea composition has been legalized long ago in cosmetics industry (just google “tea and cucumber mask”, there are plenty of appetizing things), perfumery (Elizabeth Arden, Jo Malone) and in the British tea tradition, of course, where cucumber sandwiches are often included in the Afternoon Tea. But cucumbers as a fully valid ingredient of a tea-based drink is a relatively new phenomenon.

These drinks are mostly made according to the perfumery principle and exploit of cucumbers' well-known freshness, rhyming it with the freshness of tea, either actual or nominal. And most often it is

assumed that such drinks will be consumed iced, as a refresher. In tea-cucumber marketing, analogies with SPA are often drawn.

As for the drinks themselves, here's what they look like.

Lemon-Kissed Cucumber, Good Earth (<https://www.goodearth.com/lemon-kissed-cucumber.html>). Two green teas (one of them being from Kanan Devan Hills Plantation), lemon peel, natural flavor, dried cucumber pieces. The producer recommends to serve and enjoy this tea iced, promising the ultimate refresher on a hot day.

Cucumber White, Tazo (<http://www.tazo.com/white-tea/cucumber-white>). White tea, lime peel, dandelion leaves, black darjeeling tea, cucumber, peppermint, lemon verbena, natural flavors, lime essence oil. Steeping guidelines suggest that this tea should be consumed hot.

White Cucumber, Adagio ([http://www.adagio.com/white/white\\_cucumber.html](http://www.adagio.com/white/white_cucumber.html)). White tea and natural cucumber flavor. Recommended to be served over ice; vegetal aroma and green melon finish to be expected.

Cucumber Mint, Teaforce (<https://www.teaforce.com/store/gourmet-tea/green-tea/cucumber-mint/>). Green tea, spearmint leaves, basil leaves, marigold flowers, natural blueberry and cucumber flavors. For iced teas. Expect to find invigorating cool notes of cucumber fruit and fresh mint, with the taste of sweet, succulent blueberries. Fair Trade, Kosher, ORAC and USDA Organic Certificates.

Cucumber Mint, Republic of Tea (<http://www.republicoftea.com/cucumber-mint-white-tea-bags/p/v20297/>). Fujian white tea, spearmint, natural cucumber and spearmint flavors. To be served over ice; refreshment and rejuvenation are forecasted.

Heath & Heather Organic Green Tea with Cucumber, Holland & Barrett (<http://www.hollandandbarrett.com/shop/product/heath-heather-organic-green-tea-with-cucumber-60021233>). Green tea, cucumber granules. Refreshing and well-being supporting.

Cucumber Melon, Culinary Teas (<https://culinaryteas.com/products/cucumber-melon>). Green tea, dried cucumber slices, natural flavors. It is promised to give you the feeling of a day at the Spa.

Of course, there are plenty of recipes of cucumber tea to make at home. The main idea, as a rule, is to take a liter of green tea, add slices of half a cucumber, lemon (which can be replaced with mint, melon and so on) and honey.

Particularly courageous people prepare matcha with cucumbers (<http://elitedaily.com/life/you-need-cucumber-matcha/1033854/>). They whisked it up in a reusable water bottle, added ice and two slices of cucumber and put it in the fridge. In 40 minutes they shook it and added more ice. The courageous people were satisfied with the result. The drink is said to curb hunger.

And on top of it all – kombucha made with Longjing tea, honey and fresh cucumbers.

<https://www.facebook.com/Thatsmybooch/photos/a.1950894528466709.1073741829.1950481885174640/1960760184146810/?type=3&theater>

Concluding this brief review, we want to note that all the teas mentioned do not imply the use sugar. If you want to add sugar into your cucumber tea, consider taking pickled cucumbers as an add-in. :)

### **The blondie! That's my jam! Wicked watermelon!**

Source: <https://www.facebook.com/theowlsbrew/>

A New York company Owl's Brew, making ready-made tea drinks for cocktails, has recently launched a line of tea beers. The owners of the company call their new product radlers (an old german term used for a mixture of beer with a soda drink, as a rule). Owl's Brew started experiments on tea&beer mixes with adding their tea brews into beer (you can find such recipes at

<http://www.theowlsbrew.com/recipes/>). And ended up in a new product line of three radlers: The Blondie (wheat beer with black tea, plus citrus juices and spices), That's My Jam (amber ale with Darjeeling tea, plus fruit juices, hibiscus flower and lemon peel) and Wicked Watermelon (wheat beer with white tea, plus fruit juices and spices).

By the way, mixing the drinks is not the only variant of developing the tea and beer theme. In Spring 2016, in Krakow, at the Tea Masters Cup Poland championship Piotr Mońka presented the beer brewed together with Darjeeling. It was good!

## Index

- Aged people, 24
- Allergy, 25
- Army, 18
- Art, 39
- Arteries, 28
- Ascorbic acid, 21
- Assam, 12, 17, 43
- Atherosclerosis, 29
- Australia, 8, 12, 16, 24
- Austria, 16
- Automation, 34, 35
- Bangladesh, 12
- Belarus, 38
- Black tea, 28
- Brazil, 26
- Bubble tea, 42
- Cafes, bars, restaurants, 6, 7, 8, 9, 38, 39, 40, 41, 42, 43, 44, 52, 53, 55
- Caffeine, 15, 16, 18, 21, 23, 25, 26, 31, 33
- Canada, 8, 16, 31, 43
- Cancer, 23
- Caries, 27
- Catechins, 10, 21, 23, 25, 33
- Chickens, 22
- China, 7, 10, 13, 15, 17, 18, 19, 20, 21, 24, 25, 28, 30, 34, 35, 36, 41
- Cognitive disorders, 28
- Cold tea, 6, 9, 38, 41
- Counterfeits, 17, 33, 34
- Darjeeling, 17, 43
- Diabetes, 30
- DNA, 14, 16, 20
- EGCG, 10, 15, 24, 25, 30, 31
- Elephants, 12
- Endurance, 17
- Eyes, 30
- Fish, 13, 27
- Frailty, 24
- GABA-tea, 29
- Gastronomy, 38, 42, 43
- Germany, 23
- Green tea, 10, 12, 17, 22, 24, 25, 26, 27, 28, 30, 34, 52
- Green tea leafhoppers, 36
- Guinea pigs, 17
- Hong Kong, 38, 41
- Hypertension, 28
- India, 7, 12, 15, 17, 27, 43
- Iran, 13, 22, 27
- Ireland, 16
- Israel, 30
- Japan, 14, 15, 25, 29, 33, 36, 44, 47, 48, 49
- Kenya, 13, 14, 41
- Kombucha, 8
- Leopards, 12
- Lipid metabolism, 27
- Malaysia, 7
- Men, 18
- Mice, 17, 25, 26, 29, 30
- Microorganisms, 19, 47, 48, 49
- Monkeys, 12
- Muscle regeneration, 25
- Nails, 12
- Netherlands, 26, 40
- New Zealand, 16
- Norway, 26
- Oolong, 14, 19, 28, 29, 33, 34, 35
- Oolonghomobisflavan, 29
- Osteoporosis, 24
- Overweight, 24, 26
- Pangolins, 12
- Periodontal disease, 27
- Pigs, 30
- Polyphenols, 13, 31
- Portugal, 5
- Post-fermented tea, 15, 19, 47, 48, 49
- Pregnancy, 26
- Pu-erh tea, 19, 24
- Russia, 5, 41
- Samovar, 41
- Selenium, 13
- Sleep, 31
- South Korea, 16, 25, 30
- Spain, 5
- Specialities, 10, 15, 45, 47, 48, 49
- Spectrometers, 17, 34
- Sri Lanka, 39
- Stress, 25, 31
- Stroke, 29
- Sweden, 16
- Taiwan, 5, 7, 14, 24, 33, 36
- Tea and beer, 55
- Tea and cheese, 7, 40
- Tea and health, 16, 17, 23, 24, 25, 26, 27, 28, 29, 30, 31
- Tea and milk, 7, 15
- Tea and salt, 28
- Tea and wine, 5, 42, 43
- Tea bags, 42
- Tea books, 53
- Tea brewing, 14, 21
- Tea chemistry, 10, 15, 18, 19, 21, 34, 35
- Tea competitions, 33, 43
- Tea consumption, 14, 16, 18, 51
- Tea diet, 22, 24, 26
- Tea festivals, 38, 45
- Tea gifts, 40
- Tea growing, 10, 14, 33, 34, 36, 40, 45
- Tea machines, 5, 42
- Tea pests, 34, 36
- Tea powder, 27, 30
- Tea producing, 10, 35, 45, 47, 48, 49
- Tea recipes, 41, 42, 52, 53
- Tea seeds, 33
- Tea taste and aroma, 19, 21, 35
- Tea tasting, 13
- Tea trading, 40, 41, 43, 53
- Teapots, 14
- Theanine, 10, 21, 25
- Turkey, 33
- Uganda, 12
- UK, 7, 9, 16, 39, 40, 43, 45, 51, 52, 53
- Ukraine, 45
- USA, 5, 6, 7, 8, 13, 16, 18, 23, 24, 28, 31, 38, 39, 40, 42, 52, 55
- Vietnam, 7, 33
- Water for tea, 15, 21
- White tea, 21
- Women, 14, 16, 18, 26
- Yellow tea, 35