NOTE-BY-NOTE ASSIGNMENT

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Molecular gastronomy

‘In 1988 Nicholas Kurti and Hervé This were preparing the first of a series of international workshops on the physical and chemical aspects of cooking’ (This, 2006, p. 1). Consequently, the term molecular gastronomy was born. Kurti felt the term was too narrow and did not fully describe the practice and so the term was changed to molecular and physical gastronomy. Kurti passed away in 1998, This reverted the term back to simply molecular gastronomy as he felt it was more concise and easier to use. The term was chosen to distinguish the practice from both food science and cooking, food science deals with composition and structure while cooking is a craft. Molecular gastronomy looks at a wide range of reactions that happen when food is cooked or eaten with other food (This, 2006). ‘Molecular gastronomy deals with culinary transformations and the sensory phenomena associated with eating’ (This, 2006, p. 3).

Although a relatively new discipline, the ingredients and techniques of molecular gastronomy have evolved rapidly to enable the creation of highly innovative dishes. As a result of this, molecular techniques and ingredients have become commonplace on many menus in high end restaurants (Burke, R., Kelly, A., This, H., 2016). Lersch (2018) explains that the term ‘molecular gastronomy’, should be kept for describing the scientific investigation of food, while chefs and cooks using its techniques and tools should use the term ‘molecular cooking’ or ‘molecular cuisine’ an application of molecular gastronomy. Another application of molecular gastronomy is ‘Note-by-Note cooking’.

Note-by-note cooking

In 1994 Hervé This was experimenting with paraethylphenol and noticed, adding it in small amounts to an ordinary whiskey transformed the flavour to that of a more expensive one. This prompted him to experiment with other compounds, hence the discovery of a method of producing foods from pure compounds, ‘Note-by-Note cooking’ (Hervé, 2014). Food may be produced by using pure compounds, either pure or mixtures, not the use of conventional ingredients like meat or vegetables. This method of cooking has been likened to creating electronic music using wavelengths rather than instruments. The chef has full control over the all aspects and is not bound to any rules with regard shape, colour or texture (Burke, et al., 2016). (Burke, R., Renaudin, O., Rigalut, Y., This, H., 2018) explain that there may be 10 billion people on Earth by 2050 and Note-by-note cooking can play an important role in the

fight against food and energy waste. For example, a wine reduction sauce requires energy to heat the pot for the sauce to reduce and the water contained evaporates. By using pure compounds there is no need to reduce the water or heat the sauce for so long reducing both water and energy waste (Hervé, 2014). 'Pierre Gagnaire was the first to create a note by note dish in 2009. Today, the restaurant Senses in Warsaw, directed by the Italian Chef Andrea Camastra is the first restaurant entirely devoted to note by note cuisine' (Iqemusu, 2017).

Dirac

AgroParis Tech (2016) explains, a dirac is an artificial meat created using compounds, it should contain a mix of water, protein and fat making it similar to the composition of meat. This is the basic requirement for a dirac from there, flavours, aromas, colours, vitamins and minerals can be added. Hervé This explains in this broadcast that he has provided the basics of this method of producing meat for chefs to build on. This could be the food of the future therefore, there are no limit to the possibilities for development.

Cocktail

Graham (2018) states the earliest definition of a cocktail is 'A stimulating liquor, composed of spirits of any kind, sugar, water, and bitters'. Furthermore, she suggests that the name may have originated from a rooster's tail (cocktail) being used to garnish drinks in the past, although its exact origin is not known. O'Neill (2010) suggests that mixology, the art of making cocktails, has experience a new lease of life due to some of the techniques borrowed from molecular gastronomy. The use of foams, spheres and gels are creating new texture and floavour sensations.

Aim:

To create a dirac and cocktail only using compounds

Objectives:

- Research recipes that use compounds
- Research techniques for cooking with compounds
- Trial recipes
- Conduct sensory analysis on recipes
- Adjust recipes accordingly

Materials and methods

Equipment used

- Excalibur food dehydrator 4 tier – Model no:4400220G
- Thermomix food processor – Model no: TM31
- Hygi-Plas Easytemp food thermometer – Model no: 201709211536
- Isi Gourmet Whip siphon (0.5ltr)
- Kenex micro scale - ET 500
- 1ltr measuring jug
- 1ltr stainless steel saucepan
- Spatula
- Whisk

Dirac – 'Soyer'

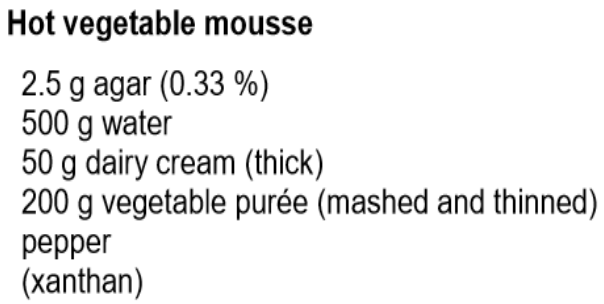

Figure 1. Base recipe for dirac (Lersch, 2014, p. 9)

This recipe gave a base to work from for the dirac, the recipe was adjusted as follows:

Pea protein purée

Ingredients

60g pea protein isolate (bulk powders)

250g water

Method

- Combine both the pea protein and water in the Thermomix or 60 seconds on speed 8
- Empty the mixture into a 1lt pot
- Cook on the lowest flame for 5mins – stir regularly using a rubber spatula – mix should bubble and thicken

Dirac – Hot vegetable mousse

Ingredients

3.5g agar (Texturas)

50g olive oil (Basso)

200g pea protein purée

5 drops smoky bacon flavour (Iqemusu, Sfumo) - maple lactone

0.25g Xanthan gum (En Place)

Method

- Add the agar to the heated pea protein puree and stir well
- Empty contents into a Thermomix and blend at speed 6 adding the olive oil gradually
- Finally add the flavouring and blend for a further 30 seconds
- Put mixture into a refrigerator to set (approx. 1 hour)
- When set remove and blend once more in a Thermomix until smooth and add xanthan
- In a sauce pan heat the purée to 70 °C and transfer into a 0.5ltr siphon with one charge of nitrous oxide
- Keep warm in a pot of hot water

Potato crisp

Ingredients

10g potato starch (La Rousse foods)

150ml water

2.5g black food colouring (Mallard Ferriére) - FD&C red 40, FD&C blue 1, FD&C yellow 5, phosphoric acid, water and sodium benzoate

1g table salt

4 drops mushroom flavour (Iqemusu, Chole) - oct-1-en-3-ol

Method

- Combine potato starch, water food colouring and salt in a 1ltr pot
- Heat over a medium flame and stir continuously with a rubber spatula
- The mixture will turn to a gel as when it is ready
- Then add the flavouring and mix thoroughly
- Spread 50g of the mixture over parchment paper using a pallet knife to a thickness of 5mm
- Place in a dehydrator at 64°C for 3 hours
- When totally dry, deep fry in oil at 180° for 30 seconds
- Remove and drain oil on blue roll

Cheese flavoured soil

Ingredients

10g olive oil

20g maltodextrin (Texturas)

10 drops camembert flavouring - diacetyl, 3-Methybutyrate, 1-octen-3-one

5g green powdered food colouring (Sugarflair Colours) -

FD&C yellow 5, FD&C blue 1, water, POV, propylene glycol

Method

- Combine all ingredients except the maltodextrin in a bowl and whisk
- Add the maltodextrin and continue to whisk lightly until light and fluffy

Assembly

- Spread soil across plate using a sieve
- Place potato crisp on top
- Discharge mousse from siphon into crisp

Cocktail – Irish Water (Whiskey sour)

Agar jelly

Ingredients

5 g agar (Texturas)

200g water

80 g sugar - sucrose

2.5g green powdered food colouring (Sugarflair Colours) - FD&C yellow 5, FD&C blue 1, water, POV, propylene glycol

Method

- Put agar, water and sugar in a pot
- Mix well and bring to a boil. Once it reaches boiling point, lower heat and simmer for 15 minutes till the mixture is somewhat clear.
- Add colouring and stir well. Put into a mould and set in the fridge. When it is set, grate it finely.

Lemon Foam

Ingredients

200g water

3g soya lecithin (Texturas)

8 drops lemon flavour (MSK) – L-limonene, ascorbic acid, citric acid, malic acid

2g orange food colouring (Mallard Ferriére) - propylparaben, propylene glycol and water, along with FD&C yellow 5 (tartrazine) and FD&C red 40

Method

- Combine all ingredients in a Thermomix and blitz at speed 8 for 60 seconds
- A light foam will form on top this will be spooned onto the cocktail

'Whiskey'

200ml water

1.5g xanthan gum (En Place)

2g white food colouring (Mallard Ferriére)

12 drops rum flavouring (Mallard Ferriére)

10g sucrose

Method

- Add all ingredients to a pot except the food colouring
- Heat on a medium flame until all the sugar has dissolved then add the food colouring and chill

Assembly

- Put the grated jelly in to the bottom of a martini glass
- Add the 'whiskey' leaving 2cm space at the top
- Spoon the foam on top and serve

Results

The figure blow outlines the stages in making the potato crisp

Figure 2: Stages in making potato crisp

The figure below shows the siphoned Dirac and the assembled product

Figure 3: Dirac - assembled dish

The figure below shows the grated agar jelly and finished cocktail

Figure 4: Cocktail

Discussion and conclusion

Sensory analysis revealed the dish was acceptable by the respondents based on the scale of 1 to 5 no results were lower than 2.5 (see charts in log book – appendix 1). Using compounds to create a dish proved difficult. The potency of the flavourings varied therefore, required some adjusting to get correct. Using protein powders to build the dirac was a new challenge and as Note-by-note cooking is a relatively new discipline, it was hard to source recipes that used only compounds, particularly to construct a dirac. The process revealed the possibilities for creating and developing new foods using Note-by-note techniques and its benefits such as reducing waste and spoilage.

In producing the dish knowledge was gained about different compound ingredients and their function. Going forward it would be interesting to try different textures, flavours and explore other cooking methods.

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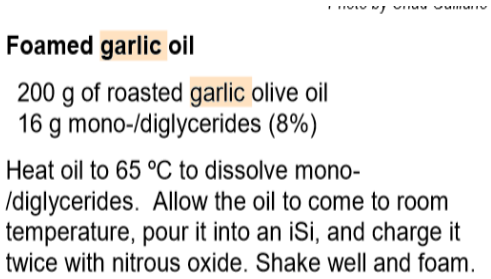
Appendices

Logbook

Week 1

Aim:

- Attempt Dirac and soil



Foamed garlic oil

200 g of roasted garlic olive oil
16 g mono-/diglycerides (8%)

Heat oil to 65 ºC to dissolve mono-/diglycerides. Allow the oil to come to room temperature, pour it into an iSi, and charge it twice with nitrous oxide. Shake well and foam.

This formed the basis for the recipe for the dirac a recipe taken from Khymos – Texture. A mix of 30g pea protein and 200g water was added to give it the basic components of meat, protein, water and fat. Unfortunately, the mixture split and would have been too thin to make a foam from.

Olive oil powder recipe	Additions to base recipe
80 g olive oil	2.5g green food colouring
25 g tapioca maltodextrin (24%)	3 drops of camembert flavour
3 g salt	

Outcome

This was another recipe from Khymos – Texture, it was a basic recipe for a maltodextrin powder, camembert flavour and green colouring was added to enhance it. The recipe mixture was a bit too thick therefore the amount of oil needed to be reduced. Furthermore, the flavour was weak this indicates that more flavouring should be added next time.

Plan for next week:

- Research more recipes for dirac (foams)
- Enquire about the use of the 3D printer to make pot for dirac

Week 2

Aim:

- Attempt new dirac recipe

Pea protein purée recipe

Ingredients

60g pea protein isolate (bulk powders)

300g water

Dirac – Hot vegetable mousse recipe

Ingredients

2.5g agar

50g olive oil

200g pea protein purée

3 drops smoky bacon flavour

0.25g Xanthan gum

Stages of making the dirac

Outcome

This recipe worked much better, it was taken from the same source but used agar. The original recipe used cream and vegetable purée, these were substituted for olive oil and a purée made from pea protein. This meant the recipe only used compounds. The flavour was mild so more would be required for the next attempt and the texture was slightly grainy and viscosity too thin. The 3D was not working properly at this stage, so it was decided to abandon this idea for the pot and try something else.

Plans for next week:

- Adjust flavour and consistency of both dirac and soil
- Trial recipe for potato

Week 3

Aims:

- Adjust recipe for dirac and soil
- Trial potato crisp
- Perform sensory analysis

Pea protein purée (Adjusted recipe)

Ingredients

60g pea protein isolate (bulk powders)

250g water

Dirac – Hot vegetable mousse (Adjusted recipe)

Ingredients

3.5g agar

50g olive oil

200g pea protein purée

5 drops smoky bacon flavour

0.25g Xanthan gum

Potato crisp – adjusted from (Teoh, 2018)

Ingredients

10g potato starch

150ml water

2.5g black food colouring

1g table salt

4 drops mushroom flavour

Cheese flavoured soil

Ingredients

10g olive oil

20g maltodextrin

10 drops camembert flavouring

5g green powdered food colouring

Outcome

All the adjusted recipes were satisfactory. Sensory analysis was conducted on both the dirac and soil. The crisp needed to be dehydrated for 3 hours an this was not possible in the class time therefore, it was brought home and finished outside of class time.

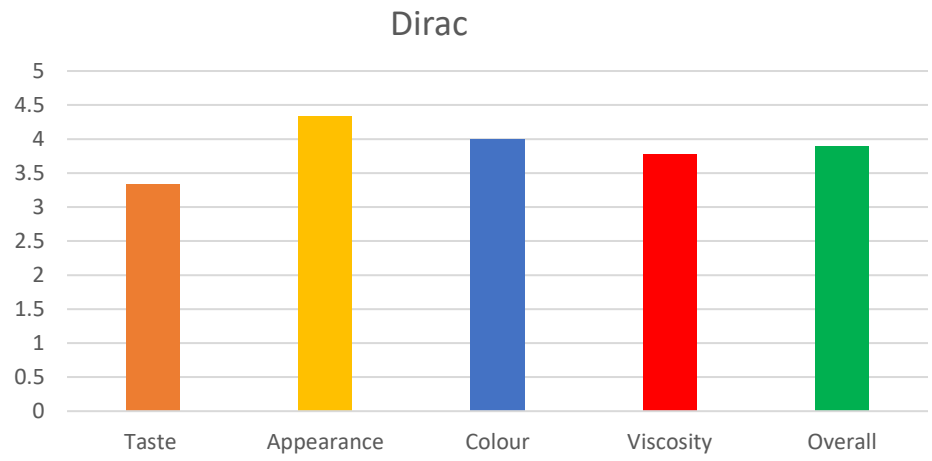


Figure 5: Sensory analysis results for dirac

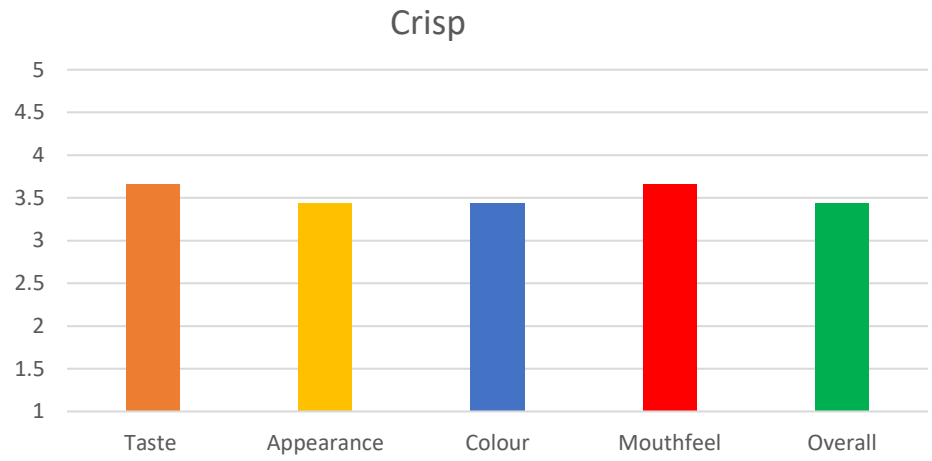


Figure 6: Sensory analysis results for crisp

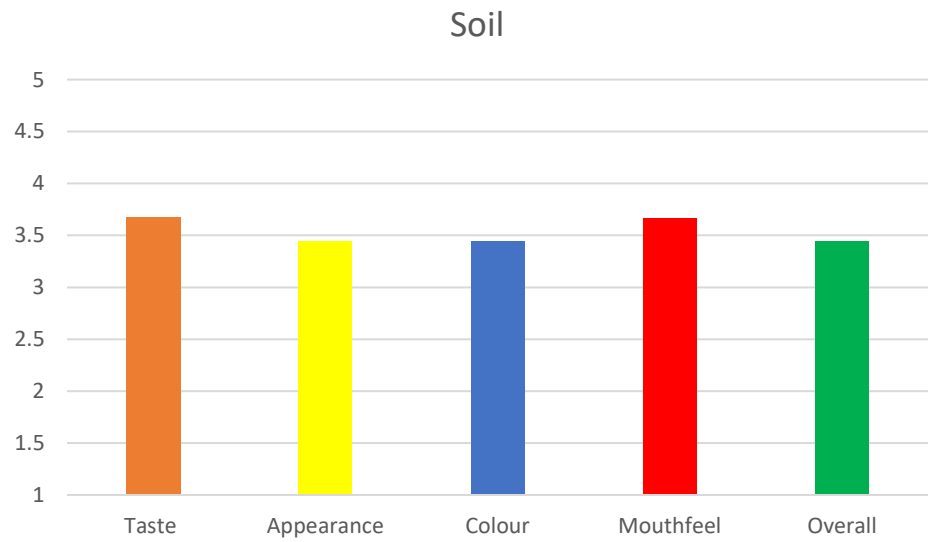


Figure 7: Sensory analysis results for soil

Plan for next week

- Prepare dirac and crisp
- Attempt cocktail

Week 4

Aims:

- Preparation of dirac and crisp for next week
- Attempt cocktail and perform sensory analysis

Cocktail – Irish Water (Whiskey sour)

Agar jelly ingredients

5 g agar

200g water

80 g sugar

2.5g green powdered food colouring

Lemon foam ingredients

200g water

3g soya lecithin

8 drops lemon flavour

1g orange food colouring

‘Whiskey’ ingredients

200ml water

1.5g xanthan gum

2g white food colouring

8 drops rum flavouring

20g sucrose

First attempt at presenting cocktail

Outcome

Preparation of dirac and crisp for next week were successful. The jelly and the foam were taken from Khymos – Texture and worked in terms of texture and appearance although, the foam was a little light in colour. The flavour was slightly overpowered by the amount of sugar and presentation could be better.

Plan for final week

- Adjust cocktail recipe
- Make soil
- Cook crisp
- Reheat dirac

Week 5

Aims:

- Finish cocktail
- Present final dishes

All final recipes are printed in report.

Outcome

Both the cocktail and dirac were presented successfully.