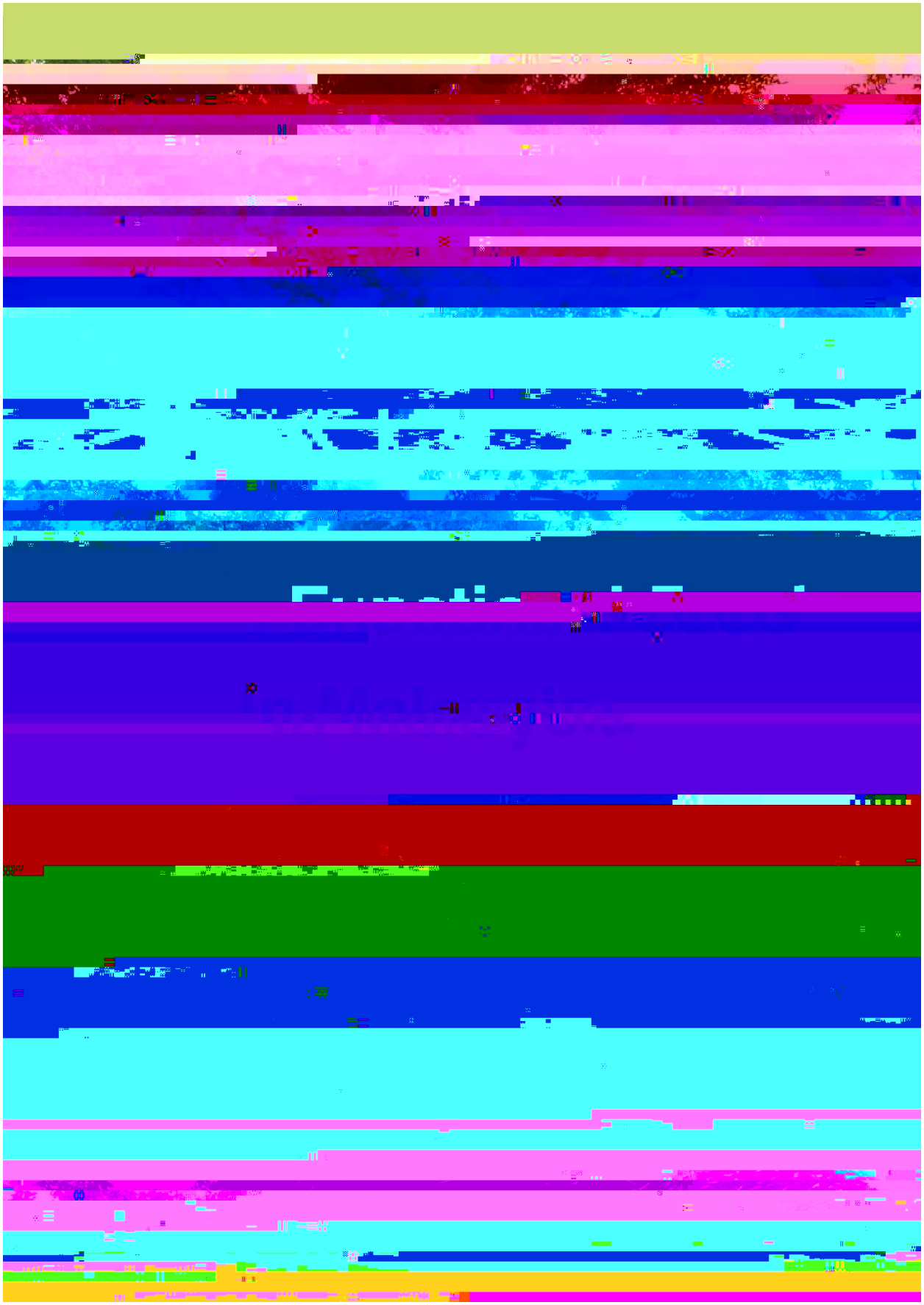

Functional food is a category of food that can enhance health status, which are not drugs,

Lim, C.S.Y and Devanti, P.V.P (2022). Introduction to functional foods, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978

Tee, E.S., Chen, J. and Ong, C.N. (2004). Functional foods in Asia: Current status and issues. p. 1 – 47. Singapore: International Life Science Institute (ILSI

In, L.L.A. (2022). Prebiotics, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 8-16.

Lionel L. A., In

In, L.L.A. (2022). Prebiotics, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 8-16.

typically synthesized by the enzymatic activity of β-galactosidase on lactose in a reaction known as transgalactosylation. Health benefits of consuming GOS that have been reported includes alleviation of anxiety disorders, reduction of cancer risk, control of serum lipid and cholesterol levels, and inflammatory bowel disease (IBD) (van den Broek ***et al***, 2008). GOS has also been bestowed the Generally Recognized as Safe (GRAS) status by the

In, L.L.A. (2022). Prebiotics, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 8-16.

prebiotica

short-chain fatty acids, altered intestinal pH, biomarker modification, and immune system regulation. Collectively, these physiological changes results in improved bone mineral uptake and subsequent osteoblast activity.

In conclusion, it is evidently clear that various types of prebiotics are able to both directly and indirectly benefit human health through the prevention or control of numerous diseases when incorporated in our diet. It is also important to note that an appropriate and balanced daily uptake of prebiotics is equally crucial to attain an optimum impact on our gut microbiota. With so many sources and types of prebiotics being reported to date, it is now a lot easier to selectively incorporate these ingredients into the wide variety of local Malaysian cuisine. Current studies are now focused towards optimizing more balanced combinations of prebiotics and probiotics into Malaysian symbiotic foods to achieve new synergistic effects to further improve overall health. A deep dive into the roles that various gut probiotics play are discussed in the subsequent chapter.

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Ahmadi, S., Nagpal, R., Wang, S.,

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Swanson, K. S., Gibson, G. R., Hutkins, R., Reimer, R. A., Reid, G., Verbeke, K., Scott, K. P., Holscher, H. D., Azad, M. B., Delzenne, N. M., & Sanders, M. E. (2020). The International Scientific Association for Probiotics and Prebiotics (ISAPP) consensus statement on the definition and scope of synbiotics. ***Nature reviews. Gastroenterology & hepatology***, ***17***(11), 687–701. https://doi.org/10.1038/s41575-020-0344-2

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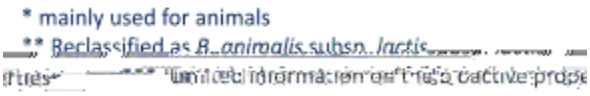
Loh, J

al., 2021). summarizes the major strains of probiotics that showed potential health benefits to humans.



Loh, J.Y. (2022). Probiotics, In: Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 17-31.

The probiotic mechanisms of action can be divided into several broad categories ( ):

-

Most LABs produce antimicrobial peptides (AMPs) such as nisin, bacteriocin, and organic acids. These AMPs show promising

Loh, J.Y. (2022). Probiotics, In: Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 17-31.

Akkermansia muciniphila	(-)	Reduces body fat, serum triglyceride, fasting glucose a-ûbes mosting gluc cells

Loh, J.Y. (2022). Probiotics, In: Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Publi

Loh, J.Y. (2022). Probiotics, In: Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 17-31.

Lactobacillus plantarum	(+)	Promotes cholesterol-lowering activity	Costabile et al. (2017); Behera et al. (2018)
Lactobacillus salivarius	(+)	Reduces pathogenicity of C. albicans by inhibiting the biofoffmo	

Loh, J.Y. (2022). Probiotics, In: Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 17-31.

Abbasiliasi, S., Tan, J.S., Bashokouh, F., Ibrahim, T.A.T., Mustafa, S., Vakhshiteh,

Celiberto, L.S., Bedani, R., Dejani, N.N., Ivo de Medeiros, A., Sampaio Zuanon, J.A., Spolidorio, L.C., Tallarico Adorno, M.A., Amancio Varesche, M.B., Carrilho Galvao, F., Valentini, S.R., Font de Valdez, G., Rossi, E.A. & Cavallini, D.C.U. (2017). Effect of a probiotic beverage consumption (Enterococcus faecium CRL 183 and Bifidobacterium longum ATCC 15707) in rats with chemically induced colitis. PLoS ONE, 12: e0175935. https://doi.org/10.1371/journal.pone.0175935

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can act as an antioxidant J

Lee, C.J., Chuo, K.M.J., Tung, S.E.H., Tan, C.H. (2022). Plant oil, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40/l

antioxidant balance (Marina et al., 2009). Rahim et al. (2021) studied on the neuroprotective potential of VCO against lipopolysaccharide-challenged rats which were fed with 1 to 10g/kg of VCO and were tested to a maze test. They concluded that the study demonstrated a memory enhancing and neuroprotective effects of VCO, which may benefit the cholinergic, antioxidant, anti-inflammatory and anti-amyloidogenic pathway.

VCO is rich in tocopherols and tocotrienols, which are powerful antioxidants. These phytonutrients act as a scavenger to damaging oxygen free radicals. In general, physical exercise will increase oxygen intake due to increase metabolism which causes fatigue and injuries to the muscle. Oxidative stress may occur when skeletal muscle contracts, which can lead to high reactive oxygen species (Sinaga et al., 2021). Sinaga et al. (2021) studied the potential of virgin coconut oil in reducing creatine kinase levels in non-athlete students. The study was divided into two groups; one with 15 ml dose of VCO and the other was given a plalVCO

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SFAs: saturated fatty acids; MUFAs: monounsaturated fatty acids; PUFAs: polyunsaturated fatty acids; EPA: eicosapentaenoic acid; DP

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Amminger, G.P., Schäfer, M.R., Papageorgiou, K., Klier, C.M., Cotton, S.M.,

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carbohydrates, and 1.1-4.6 g of fibre per 100 g of these

Kong I. and Pui, L.P. (2022). Fruits, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 51-63.

(2016) also produced cempedak-pineapple juice, and the shelf life of the juice was compared to pineapple and pineapple-papaya juice. When stored at -5 °C, cempedak-pineapple juice has a longer shelf life (197.85 days) than pineapple (156.85 days) and pineapple-papaya juice (172.39 days).

Dahlan (2019) produced cempedak jam to compare the effect of ripening methods on the beta-carotene content of the jam. The study discovered that cempedak jam made from traditionally ripened cempedak contains more beta-carotene (0.42) than jam made from

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	Synbiotic yoghurt
	Probiotic candidate (as food ingredient)
	Carbonated drink
Jackfruit	Jelly candy
	Jam
	Jelly
	Wine
Cempedak	Juice
	Jam
	c[illegible]a

Miranti. (2020). Effect of temperature and duration of drying on the quality of jackfruit jelly candy. ***AGRILAND Jurnal Ilmu Pertanian, 8(1),*** 116-120.

Mirfat, A.H.S., Razali, M., Salma, I., & Umi Kalsum, H.Z. (2015). Antioxidant and nutritional values of selected under-utilised ***Mangifera*** Species in Malaysia. ***Indian Journal of Plant Genetic Resources, 28(1),*** 72-79. 10.5958/0976-1926.2015.00010.8

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beverage through fermentation with the Kombucha consortium. ***Biocatalysis and Agricultural Biotechnology***

Chan H.K. (2022). Seed, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 64-71.

presents the scientific name, the common uses, and the geographic regions of both the durian and rambutans seeds. Comparing with durian seed, rambutan seed has industrial application apart from being eaten and it has ethnomedical values (Palanisamy et al., 20lues

Chan H.K. (2022). Seed, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 64-71.

Chan H.K. (2022). Seed, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 64-71.

Bioactive compound/mode	Enzyme beta-galactosidase	Inhibition

Cha

Chan H.K. (2022). Seed, In Functional Foods in Malaysia, Ed.

Tan,

Tan, Y.H. & Wong, K. H. (2022). Mushroom, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 72-83.

Termitomyces hemii (Cendawan busut) and ***Agaricus subrufescens*** (himematsutake) ( ).

Mushrooms are considered as gourmet cuisine globally and widely appreciated for centuries due to its texture, unique umami taste (Manzi et al 2001), high nutritional benefit, and therapeutic capacity. Mushrooms contain high moisture (80-90% of fresh weight), varying amounts of carbohydrates (35-70%), proteins (15-34.7%), nucleic acids (3-8%), lipids (10%, mainly oleic acid, linoleic acid and phytosterol), minerals (6-10.9%, potassium, magnesium

Tan, Y.H. & Wong, K. H. (2022). Mushroom, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 72-83.

In modern day, people are more aware what goes into their stomach and wary of medicines side effects. Mushro

Tan, Y.H. & Wong, K. H. (2022). Mushroom, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7,

Tan, Y.H. & Wong, K. H. (2022). Mushroom, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 72-83.

Cordyceps militaris	Cordycepin (3'-deoxyadenosine)	Amelioration of depression-like behaviour in chronic unpredictable mild stress-induced behavioural deficits (in vivo) Promotion of rapid antidepressant effect and enhanœan

Tan, Y.H. & Wong, K. H. (2022). Mushroom, In Functional Foods in Malaysia, Ed. Tan, C.H. e ISBN 978-967-2782-40-7, Published in Malaysia, pp. 72-83.

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Eric Wei Chiang Chan

Spices have a long history in human civilization and have been the cause for exploration, trade and war. While there is no strict definition of a spice, the general classification is that it is included in food for flavour and fragrance rather than nutrition, and that it is often applied in a dried form (Balasasirekha 2014). Some exclude the

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serious conditions. Some inflammatory compounds with spices such as the salicylate derivatives like aspirin can reduce cardiovascular risk (Ekinci et al. 2011).

Anti-tyrosinase compounds can prevent browning in food and also the skin if applied topically (Chan et al. 2015). Tyrosinase is an enzyme involved in the production of melanin and can also oxidize phenols in food to produce a brown pigment. Hence, in food tyrosinase is often referred to as polyphenol oxidase.

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Chandran, Asveene & Gunasekaran, Baskaran

Currently, there is an increase in the interest towards functional foods in developed economics since people are looking for safer way to improve general health and living. The demands for health enhancing foods are growing because more Malaysians are exposed to various health threats (Lau et al. 2012).

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It is also known as Sweet Flag or ***Acorus calamus*** belonging to Araceae (Adoraceae) family ( ). The members of the family are rhizomatous or tuberous herbs. It is a perennial herb which is commonly found on the banks of streams and in damp marshy places with creeping and extensively branched, aromatic rhizome, cylindrical, up to 2.5 brownish-brown to light brown externally and white internally. The leave, root and stem are the parts that commonly used (Chandra and Prasad 2017).

Jeranga has the constituents namely alkaloids, flavonoids, gums, lecithin mucilage, phenolic, quassive, steroidins, sugars, oils,

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Lidah Buaya	Used to treat diabetes and angina pectoris via consumption of 100 mg of fresh inner gel each day or 1 tablespoon twice daily. A dose of 25–50 ml of 95% aloe inner gel is recommended 3 times daily for the treatment of ulcerative colitis and irritable bowel syndrome. Aids in treating constipation, gastrointestinal disorders, and for immune system deficiencies. Its juice has cooling properties, is anabolic in action which guards against fever, skin diseases, burns, ulcers and boils eruptions.	(Grundmann 2012), (Radha and Laxmipriya 2015),
Pegaga	Maintain youthful skin quality by increasing collagen and fibronectin production. Journal of Alzheimer's Disease reported that it improves cognitive functions by enhancing the activity of a pathway associated with long-term memory formation. Lowers inflammation in the system and boosts energy levels by flushing out the toxins. Maintains the delicate balance of fluids in the body. The tea acts as an antioxidant by protecting the body's cells against many chronic diseases including obesity, diabetes, heart disease and arthritis. Acts as an appetizer since the salads are eaten together with main meals. Drink as thirst quenching or cooling drink to reduce the inner heat which assists in healing and curing of aphthous ulcers.	(Ng 2019), (Bylka et al. 2013)

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Tongkat Ali	Root extracts used to reduce blood pressure, fevers and fatigue. Regular intake of root extracts enhances the testosterone levels. Enhance the muscle mass and strength in those who involved in body building. Root extract restores energy and vitality, enhance blood flow, acts as herbal ingredient for women after child birth. The leaves used to cure malaria, ulcers, prevent gum diseases and as a treatment for

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Li

Kappaphycus and ***Eucheuma*** are also used to make soaps, shampoos, desserts, jams, and noodles (Phang, Yeong, Lim, Nor, & Gan, 2010).

Apart from being consume as traditional food or medicine, seaweed has other commercial value in the food industry. For example, alginic acid derived from seaweed has thickening and stabilising properties, which is ideal for making syrups, ice creams, sauces, juices, shakes, sweets, and bakery products. In additional, there are seven different types of carrageenas found in seaweed containing the sulfated galactose unit, three of which are economically exploited. Carrageenas is a coarse thickening agent that is used to make pizzas, desserts, gels and canned foods. It is also used as a preservative or additive agent, and carrageenas additives are commonly labelled as E407. Agaropectin and agarose, which are galactopyranose polymers, make up the majority of seaweed, also commercially used as a gelling agent, primarily in canned goods, sweets, and pie fillings, label as E406 in the food industry (Nakhate & van der Meer, 2021). shows the common Malaysian seaweeds used as human foods.

Chlorophyta (Green Algae)	Caulerpa species Bryopsis pennata Codium species	fresh vegetable or salads
Phaeophyceae (Brown Algae)	Sargassum species Turbinaria species	Used to cook in a traditional Chinese herba soup which has the function to “cool” the body system
	Padina species Lobophora variegate Dictyota species	Alginate from brown algae has thickening agent, gelling agent, stabiliser and emulsifier properties to be used for making frozen food, ice creams, instant food drinks
Rhodophyta (Red Algae)	Eucheuma species Kappaphycus species	Edible as salads. Carrageenan extraction from the seaweeds, as a coarse thickening agent that is used to make pizzas, desserts, jams, gels and canned foods.
	Kappaphycus alvarezii Eucheuma denticulatum	Sold as "sea bird's nest" with qualities similar to valuable bird's nest
	Corallina (Amphiroa)	Vermicide to fed the kids

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