

“Space Cookbook: Mission to the Future”

Envisioning a twenty-fourth-century cookbook for space is an opportunity that invites both realistic and futuristic musings. Such a recipe manual informed by historical, cultural, social, dietary, and even personal tastes in the kitchen offers human contemplations reflective of the times. According to the renowned cookbook researcher and educator Barbara Ketchum Wheaton, a cookbook can tell a comprehensive story of the people cooking and eating food within a particular socio-cultural context (Mac Con Iomaire). This is evident in cookbook examples about space food in nonfictional and fictional contexts where insights about people, characters, and societies are interspersed among the recipes (i.e., *The Astronaut’s Cookbook: Tales, Recipes, and More* [2010]; *Star Wars Galaxy’s Edge: The Official Black Spire Outpost Cookbook* [2019]; *Star Trek Cookbook* [1999]; *A Science Fiction Cookbook: And Guide to Edible Niceties* [2014]). Centering speculations about the future around space food provides the potential for present-day humans to develop their arguments, awareness, and prognostications of food innovations for future deep-space navigations and speculative possibilities.

From a reality-based perspective, one could begin from an examination of astronauts’ and cosmonauts’ early food experiences and continue on to the more recent culinary endeavors on the International Space Station (ISS), where food menus are based on diverse environmental, dietary, personal, and cultural needs and requirements. While space travel began with easy to eat, crumb-free edibles packaged in cube, tube, and bar form that required no kitchen to prepare (e.g., Yuri Gagarin’s beef and liver tube paste or the Apollo astronauts’ bacon bars and peanut butter cookie cubes), the food options have expanded to include a variety of packaged, shelf-stable, freeze-dried, and thermostabilized retort pouches, in addition to the periodic fresh food deliveries (Bendix). The standard food supply prepared

by US and Russia is also accompanied by bonus food allowed for each person (Mars "Space Station 20th"). For example, Canadian astronaut David Saint-Jacques requested a version of his "wife's con caribou chili recipe" (Canadian Space Agency). French astronaut Thomas Pesquet had recipes of Beef Bourguignon and other dishes specially prepared by French chefs (Chang). Japanese astronaut Kimiya Yui had Japanese-style food modified for space that included soy sauce ramen (Japan Aerospace Exploration Agency). South Korean astronaut Yi So-yeun (2008) had space-engineered kimchi (The Kitchen Sisters).

As longer space voyages are anticipated and menu fatigue remains a concern, continuing efforts to develop diverse food options seem a necessary component for future space travel and recipe development (Mars, "How Does Spaceflight Change Food Appeal?"). Currently, the Veggie edible plant grow chamber is used on the ISS to grow fresh fruit and vegetables aeroponically (Scoles). Novel ingredients, food not consumed extensively by humans, and advanced food technology may offer additional food options (Hendrich). Cultivated cow muscle tissue has already been produced in a 3-D bioprinter on the ISS, yielding a steak that was not eaten in space but did offer new possibilities for alternative protein sources (Gohd). Algae grown in space could offer forms of protein, fiber, carbohydrates, and the ability to increase oxygen in the atmosphere as well as shield from radiation (Beall). Natural food packaging might become a food source if there were a way to use engineered seaweed or pectin that did not impede shelf life or food safety requirements (Yerramathi et al). A single-cell protein, called "air protein," made in a bioreactor tank with only CO₂, H₂O, electricity, and microbes could potentially enrich flour-based products, though it has yet to be tested in space (Solar Foods). And with the genetic modification capabilities of CRISPR technology, even the potential to harvest ourselves or alter human metabolic systems is foreseeable in that future space kitchen lab.

From an sf perspective, alternative food options and ways of preparing food could become more innovative and surprising. In Rachel K. Jones's story "The Greatest One-Star Restaurant in the Whole Quadrant" (2017), harvested robot meat is the alternative protein. Robots are constructed with organs, skin, muscle, and tissues to perform human-like functions (i.e., lungs and sensory nerves for flavor detection, increased brain neural matter for mental capacity). In the story, a group of rogue robots mistakenly hijacks a food dispensary spaceship and needs to prepare food for humans to avoid unwanted attention. Aware of human preference for "edible organic compounds" mixed or cooked, the robot named Engineer creates recipes considered palatable to humans based on chemoreceptor reports from the robot named Jukebox. Dishes such as Salisbury steak with fungi sauce and meat cannoli with cilantro ganache are prepared with their robot meat, hydroponic plants, and fungi grown in the ventilation system.

While edible robot meat might seem a stretch of the imagination for an alternative food source, the role of robots and computer systems in the kitchen is increasing. For example, IBM's Watson computer can imagine recipes based on various data inputs (Best). Sensory analysis devices such as Sensigent's "Cyrano Electronic Nose" can detect flavor molecules (Sensigent). A BeeHex 3D food printer can prepare a meal (Wolf). And "The Deep Space Food Kitchen Challenge" is encouraging more novel food-tech development for space and earth (Deep Space Food Challenge).

Whatever the future holds for human space travel, survival will depend on continued innovative thinking around food. If speculative fiction is a guide, then if/as humans go farther in space it may well be that dietary preferences will change too. In Sylvia Spruck Wrigley's story "Vintage Millennial Cookery InfoManual by the Geusian Ladies' Society" (2013), for example, organic ingredients are met with extreme disgust by a group trying to recreate pre-twenty-fourth-century Earth dinner parties on their spaceship. Molecular gastronomy techniques (i.e., injectables, infusions,

solutions, suspensions, and doses) and chemical compounds (i.e., d-Limone, Xanthrine powder, galactan) are de rigueur for satiating one's appetite here, while organic ingredients such as honey are thought offensive as a form of "insect excrement" and "bee vomit." Such speculative thinking around outer-space foodways of the future might also offer inspiration for more present-day innovations on Earth.

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