Brought Up "By Hand": Victorian Artificial Feeding Practices

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Artificial feeding became widespread in the 19th century in response to maternal illness and death, breast milk underproduction, sick and abandoned infants, institutionalized foundlings, the dying wet nursing profession, and the deprived infants of wet nurses. The decline of breastfeeding in the 1700s, industrialization, and migration catalyzed the rise of hand-feeding.

In Europe, breastfeeding decreased from 18 months in the early 1500s to 7 months in the late 1700s following an increase in artificial feeding.

Aimé-Jules Dalou, *Peasant Woman Nursing a Baby*: Victoria and Albert Museum

Semen is a "perfect venom" to milk and colostrum can kill!

In the 19th century, wet nurses were believed capable of transferring their undesirable traits to their charges and intercourse was thought to damage breast milk, which led breastfeeding mothers to abstain from sex until their babies were fully weaned and caused many frustrated husbands to discourage their wives from breastfeeding. Though discounted in the late 17th century by medical professionals, the commonly held belief that colostrum was deadly persisted throughout the 19th century to the detriment of many babies.

Timeline: Advances in Hand-feeding

- **1835** William Newton invented condensed milk using evaporation.
- **1838** Chemists including Justus Von Liebig pioneered chemical analysis of milk, which identified donkey and goat milk as most closely resembling human milk.
- **1841** Charles M. Windship patented the first glass feeding bottle and Charles Goodyear vulcanized natural rubber to improve its odour and malleability. The India rubber nipple was patented by Elijah Pratt in 1845.
- **1864** Pasteur developed pasteurization, which was applied to dairy in the 1870s to partially sterilize and preserve milk but not commercialized until 1890.
- **1865** Von Liebig patented formula in liquid and later powdered form.
- **1885** John B. Meyerling invented unsweetened condensed milk.
- **1892** An Australian pediatrician first described lead poisoning in children.

Industrial Revolution: Mass Migration and Manufacturing

90% of poor mothers and only 17% of wealthy mothers breastfed in Boston at the turn of the 19th century.

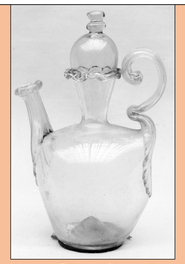
Intranational migration from rural to urban areas coincided with a decrease in rates of maternal breastfeeding in both developed and developing countries; industrialization, combined with safer milk substitutes, evolved feeding bottles, and greater access to iceboxes and certified milk reduced the need for breastfeeding and wet nurses.

Breast is Best... But Not "Ideal": Rise of Medicine and Science

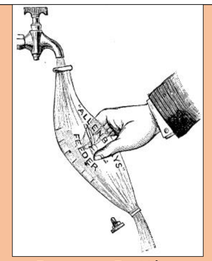
Thomas Rotch developed "percentage feeding" in the 1890s, which involved continually modifying the ratios of proteins, fats, and carbohydrates in cow's milk according to mathematical formulas. Such "scientific" feeding necessitated a high level of pediatric involvement to keep up with infants' individual and evolving nutritional needs.

In the 19th century, artificial feeding devices were unhygienic and contained unpasteurized, unrefrigerated, and adulterated animal milks. As a result, **only one out of eight hand-fed babies survived**.

Flat Boat Bottle
Early 1800s – 1950s
Infant's Feeding Bottle, England: Science Museum Group Collection Online



Biberon [Feeding Bottle]
Great Exhibition 1851
Biberon: The Met



Banana Bottle
1890s – 1960s
The 'Allenburys' Feeding-bottle for Infants: The Lancet

Upright Globular Feeder
13th – 19th centuries
Infant's Feeding Bottle: Science Museum Group Collection Online

Sick Syphon
17th – 19th centuries
William Rawlings, *Silver Sick Siphon, London, England*: Science Museum Group Collection Online

"Mamma" Bottle
Early 1860s – Early 1900s
Tomas Tomanek, *Corset-shaped Nursing Bottle*: Contemporary Pediatrics

Hugh Smith's 1777 Bubby-pot
18th – 19th centuries
Josiah Wedgwood and Sons Limited, *Bubby Pot for Infant Feeding*: Science Museum Group Collection Online

Pap Boat
17th – 19th centuries
Broadhead and Atkin, *Pap Boat*: Science Museum Group Collection Online

Mimi Foster, *The Alexandria*: Colorado Real Estate News

"Murder Bottle"
1868 – Early 1900s
S Maw, Son & Sons, *Glass Feeding Bottle*: Science Museum Group Collection Online

Hollow-Handled Spoon
1700s – Late 1800s
J and S Maw, *Medicine Spoon*: Science Museum Group Collection Online

Medical professionals of the pre-"scientific motherhood" era advocated that "breast is best", as artificial feeding was fraught with unsterilized and poisonous equipment.

Germ Theory

In the early 1860s, Pasteur experimentally identified microorganisms as the cause of infectious diseases and food spoilage and in 1864 he developed pasteurization in an effort to destroy the unwanted microorganisms interrupting wine fermentation. In the 1870s, Pasteur used this heating process to partially sterilize milk and prolong its freshness.

Vulcanization of Rubber

In 1841, American chemist Charles Goodyear vulcanized rubber by heating latex with sulfur, reducing its repulsive odour and susceptibility to hot water. Elijah Pratt patented the India rubber nipple four years later, which could be boiled and was thought to be more sanitary than previous teat materials, including cloth rags, linen, wash-leather (chamois), parchment, ivory, or heifer's teats stuffed with sponge or cotton waste to filter and regulate the flow of milk.

Resurgence of Glass

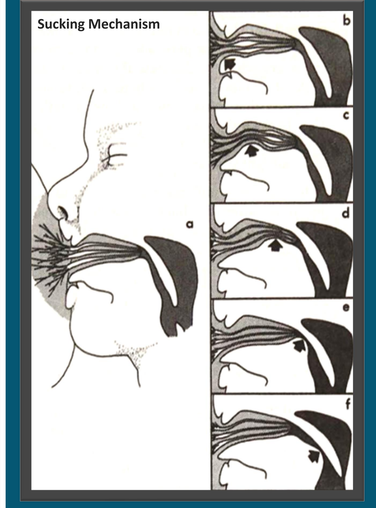
Roman-era baby bottles made of pale translucent green-brown glass date back to 500 C.E., however it was not until the late 1700s that glass was recognized as the best bottle material. In 1841, Charles M. Windship from Massachusetts patented the first glass feeding bottle in America which, combined with glass teats, improved the cleanliness of nursing bottles.

Modes of Feeding

Passive Feeding: Food is decanted into infant's mouth.

Active Feeding: Infant suckles from mouthpiece of feeding vessel.

Propulsion Feeding: Food is blown into infant's mouth.



Michael W. Woolridge, *Fig. 1: Complete 'Suck' Cycle*: Midwifery

Rooting reflex: infant turns and opens its mouth in direction of stimulation.

Sucking reflex: teat triggers sucking by stimulating infant's hard palate, which is more difficult with human teats than artificial teats.

Breastfeeding involves stripping as well as sucking, which can become the main mechanism by bottle-fed babies as rigid teat materials render stripping ineffective.

Lead Solder Poisoning

Thought to only afflict adults, lead poisoning was first described in children by an Australian pediatrician in 1892; but by then, many types of lead-soldered pewter vessels such pap boats, spoons, and upright, globular bottles had been in use from the 17th to 19th centuries. Milk breaks down and absorbs lead from solder as it becomes increasingly acidic. Before pasteurization, animal milk frequently soured while being transported from the countryside and would have become laden with lead once placed in a pewter device.

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