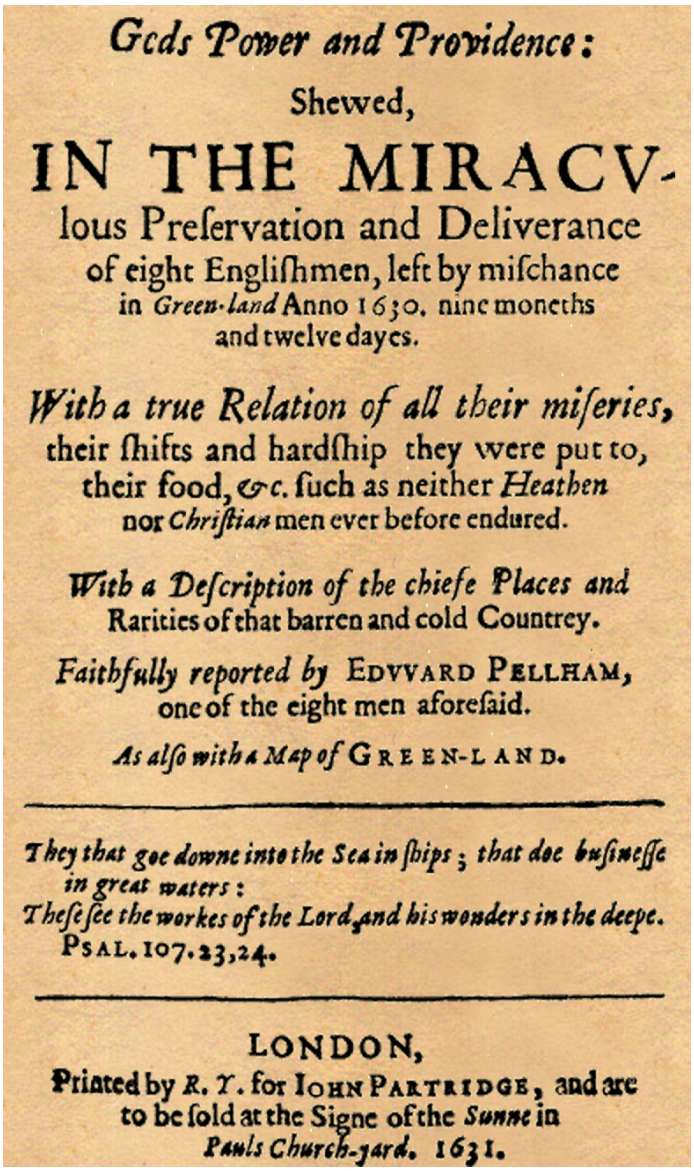
Vitamin A, safe and riskier sources

We've all been told by our parents to eat our carrots so we can see in the dark. When I Googled the origin of this cliché, the first hit was Ken Jennings' book *Because I Said So!* He found no popular association between carrots and eyesight until the link was discovered by scientists in the 1920s … and exploited by British WWII propaganda to explain the Allies' bombing accuracy, which was, of course, due to radar! In fact, it's only a half correlation because, while poor vision can be caused by lack of vitamin A, normal vision cannot be improved by excess of the same.

As you may well have guessed, vitamin A was the first vitamin to be isolated. In 1912 English biochemist Frederick Gowland Hopkins postulated the existence of an "accessory food factor" (later renamed "vitamin") from an experiment in which groups of rats were fed on an energy-adequate diet plus or minus milk – only the milk group thrived. This fundamental nutrient present in milk he called vitamin A. Hopkins received the 1929 Nobel prize in Physiology for Medicine for this work – jointly with Christiaan Eijkman who postulated the existence of vitamin B from his work on chickens fed on white or brown rice. During the food shortages of WWI, Hopkins found margarine to be lacking in vitamins A and D compared to butter, and fortification began in 1926. Interestingly, he discovered in 1907 the association between oxygen depletion, lactic acid build-up and the stitch. And bonus trivia, one of his daughters married the play-write JB Priestly.

Back to the topic at hand, in 1914 Elmer McCollum (an American biochemist) isolated the health-boosting factor in milk by dissolving it in ether, giving substance to Hopkins' hypothesis. McCollum was dubbed Dr Vitamin in the 1950s and his motto "Eat what you want after you have eaten what you should" is a good one for today!



Gods Power and Providence:

Shewed,

IN THE MIRACV-

lous Preſervation and Deliverance

of eight Engliſhmen, left by miſchance

in Green-land Anno 1630. nine moneths

and twelve dayes.

With a true Relation of all their miſeries,

their ſhifts and hardſhip they were put to,

their food, &c. ſuch as neither Heathen

nor Chriſtian men ever before endured.

With a Deſcription of the chiefe Places and

Rarities of that barren and cold Countrey.

Faithfully reported by EDVVARD PELLHAM,

one of the eight men aforeſaid.

As alſo with a Map of GREEN-LAND.

They that goe downe into the Sea in ſhips; that doe buſineſſe

in great waters:

Theſe ſee the workes of the Lord, and his wonders in the deepe.

PSAL. 107. 23, 24.

LONDON,

Printed by R. Y. for IOHN PARTRIDGE, and are

to be ſold at the Signe of the Sunne in

Pauls Church-yard. 1631.

Vitamin A comes from two sources: **retinoids** (the fatty form of the vitamin), found in liver, fish-liver oils and butter. Eating too much of these foods can actually cause vitamin A toxicity. Conversely the body synthesises as much or as little vitamin A as it needs from vegetable sources – the **carotenoids**, carrots, broccoli, sweet potato and dark green leafy vegetables. So these "pro-vitamin" sources are altogether a safer bet.

One of the earliest accounts of vitamin A toxicity comes from Edward Pellham, an English whaler who in 1630 became stranded with seven other sailors on Spitzbergen when the mother ship was unable to come ashore due to ice. Conditions were truly grim. They didn't see the sun for 14 weeks and had one meal a day, apart from Wednesdays and Fridays when they chewed on mouldy whale bones. In February when the sun returned they killed a polar bear and ate its liver along with the meat. Pellham reports "our very skinnes peeled off". Fortunately they were rescued later in the spring and returned home (unsurprisingly) full of "pious gratitude".

Pellham's account of over-wintering on Spitzbergen during which the party over-dosed on vitamin A from eating polar bear liver.

The liver stores 80% of the body's vitamin A and species that live in polar regions have a higher tolerance for the vitamin (presumably so they have better night vision during their annual four months of darkness?). During the 1911–14 Australian Antarctic Expedition, Mawson, Mertz and Ninnis embarked on a surveying trip. Ninnis and his sledge fell down a crevasse, leaving the remaining two short on rations. They were forced to eat their huskies (again including the liver). Metz became increasingly weak and died, Mawson reporting that the skin was coming off his legs. Mawson was eventually rescued the following season, having found a food-depot dubbed Aladdin's Cave before overwintering at the expedition base at Cape Denison.

Pregnant women should not take vitamin A supplements nor eat liver, and children should not be given supplements of this vitamin. Cod liver oil capsules contain high levels should not be taken with supplements that include vitamin A (Seven Seas' capsules have a reduced level of vitamin A, and are safer for those taking with a multivitamin). One symptom of vitamin A poisoning is altered bone turnover leading to fractures. It's unusual to be able to overdose on a vitamin, but this is partly because it's stored in the body's fat layer (along with D, E, and K) and not peed out, as happens with excess B & C.

As a species, James Neel's **thrifty genotype hypothesis** states we are hardwired to overeat high-energy foods, as an adaptation to the 'boom' and 'bust' of surplus and scarcity during our evolution. But with fruit and veg, the programming is a little different. Babies who are not yet mobile can be coaxed to eat all their veggies but when they learn to crawl and walk, they become more selective. Parents tend to project fussiness onto their offspring at this point ("he used to be so good"), but researchers claim that *neophobia* or fear of new foods is an evolutionary defence to prevent the newly-mobile infant from guzzling some exciting-looking poisonous plant! Evolutionary psychologists talk of the **omnivore's dilemma**: try new food and risk danger or reject new food and miss out on a valuable food source? It seems that the latter option is, sadly, more advantageous – as borne out by the fact that we often crave familiar tastes when we go abroad (I didn't say anything about McDonald's)!

Night vision relies on the 120 million rods in each of your retinas. They contain a pigment called rhodopsin which is synthesised from vitamin A. Zinc (found in wheatgerm and other seeds) and iron are also important for tip-top vision.

If you were reading this hoping to boost your potential in night orienteering, I have a useful carat of non-nutritional advice for you – get a torch! Poor night vision *is* one of the first symptoms of vitamin A deficiency but carrots alone will not lead you to that elusive checkpoint!

Sources

Can eating carrots improve your eyesight? http://www.abc.net.au/health/talkinghealth/factbuster/stories/2008/03/19/2176569.htm

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Stranded in Spitzbergen. Edward Pellham's 1631 account taken form the website of the Mariner's Museum and Park, Virginia, at: http://ageofex.marinersmuseum.org/?type=webpage&id=54

Illustration: http://www.psymon.com/incunabula/curiosities/pellham.html (title page only)