

Insects: future sources of protein?

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It is estimated that by 2050 we will need 50% more food to enable human survival worldwide. This is an enormous challenge because our current model, based on intensive livestock farming, is increasingly being blamed for its devastating effects on the climate and our ecosystem. Is it possible that alternative protein sources which are energy-efficient and produce few pollutants, such as insects, could provide a useful solution?

INSECT CONSUMPTION

Despite being practically non-existent within the wealthier nations, the use of insects for food (entomophagy) is a very common practice worldwide, with no less than 2 billion people consuming them regularly. These dining habits are not actually so shocking when one considers that insects have long been part of the diet for mammals: a recent analysis showed that the earliest eutherians (placental mammals), which appeared following the extinction of the dinosaurs during the Cretaceous period, already had genes coding for enzymes (chitinases) which are specialized for digesting the insect exoskeleton, rich in chitin¹. A bit closer to us, it has been known for a long time that, despite being vegetarian, the great apes (with whom we share 98% of our genes) consume a wide variety of insects (termites, ants, bees), larvae and worms.

One interesting particularity about insects is that they contain much vitamin B12, an essential vitamin found exclusively in products of animal origin (the content of B12 in some insects is up to 10 times higher than in beef). One might certainly think that this consumption of insects would have contributed to ensuring an adequate supply of vitamin B12 during the first steps in the evolution of the human species, before meat became part of our diet. This could also serve as an interesting source of B12 for vegans who do not consume anything from animal sources and who are thus at risk of developing a deficiency in B12. Unfortunately, a recent study reported that vegans are generally as highly resistant to consuming insects as are omnivores and vegetarians², and these individuals should thus turn to vitamin supplements to obtain an adequate supply of B12.

NUTRITIOUS AND GOOD FOR THE COLON!

Aside from vitamin B12, studies which have examined the nutritional content of insects have shown that they have some advantages over the meats that are currently consumed by the population³. For example, compared to beef, pork or chicken, insects generally have a similar content of calories, proteins and calcium, iron and of vitamins A, C and B2 (riboflavin). In certain species, such as the mopane worm (a cousin to the silkworm which is considered a delicacy in South Africa), the content of protein can even reach 35 g per 100 g, nearly twice the quantity found in beef.



Insects also contain a great deal of fibre and a recent study suggested that this fibre content could positively influence the health of the colon⁴. In this study, the volunteers (20 individuals per group) consumed for 14 days a breakfast composed of a muffin and chocolate milk containing (or lacking) 25 g of cricket powder, after which blood and stool samples were taken for analysis. The researchers found that consumption of the cricket powder led to a large increase (6-fold) in the levels of the probiotic bacterium *Bifidobacterium animalis* within the colon and was also associated with a reduction in the blood levels of TNF- α , an inflammatory molecule. It thus seems that consumption of cricket can be beneficial for the intestinal microbiome and reduce systematic inflammation, two positive effects for the health.

There evidently exist important cultural barriers to the consumption of intact insects or larvae. However, several products based on ground-up insects (pasta and granola bars, amongst others) have begun to be seen and it is likely that these foods will be easier to integrate into our daily eating habits. One thing that is certain is that it is now clearly established that we must definitely reduce the consumption of red meats if we hope to limit the environmental degradation which results from livestock farming. While not being the only factor which can contribute to this reduction in damage, the production of insects certainly represents an interesting alternative due to its low cost, high levels of nutrients and low ecological footprint.

- (1) Emerling CA et al. Chitinase genes (CHIAs) provide genomic footprints of a post-Cretaceous dietary radiation in placental mammals. *Sci Adv.* 2018; 4: eaar6478.
- (2) Elorinne A et al. Insect consumption attitudes among vegans, non-vegan vegetarians, and omnivores. *Nutrients*, 2019 11(2). pii: E292. doi: 10.3390/nu11020292.
- (3) Voelker R. Can insects compete with beef, poultry as nutritional powerhouses? *JAMA*, published online January 16 2019.
- (4) Stull VJ et al. Impact of edible cricket consumption on gut microbiota in healthy adults, a double-blind, randomized crossover trial. *Sci. Rep.* 2018; 8: 10762.