The Big Picture versus Minutiae: Geophytes, Plant Foods, and Ancient Human Economies

Jon M. Erlandson, Kristina M. Gill, and Todd J. Braje

In a rejoinder to Gill et alia (2021), Martin (2022) accuses us of perpetuating misconceptions about human nutrition and erroneously describing geophytes as a dietary staple. We provide authoritative definitions for the terms "essential" and "dietary staple" to show that it is Martin who mischaracterizes and misunderstands the foundational role of geophytes and other plant foods to human diets and subsistence economies in Native North America outside of the Arctic. Recent data demonstrate that carbohydrate-rich geophytes were abundant, regularly utilized, and essential resources on the Northern Channel Islands, a dietary staple that was a rich source of calories and complemented the protein-rich shellfish and finfish that were also staple foods for the Island Chumash.

Keywords: geophytes, staple food, subsistence

En una réplica a Gill y colegas (2021), Martin (2022) nos acusa de perpetuar conceptos errados sobre la nutrición humana y de describir erróneamente los geófitos como un alimento básico en la dieta. Proporcionamos definiciones acreditadas de los términos "esencial" y "alimento básico" para demostrar que es Martin quien caracteriza erróneamente y malinterpreta el rol fundamental de los geófitos y otros alimentos vegetales en la dieta humana y en las economías de subsistencia de los nativos de Norteamérica fuera del Ártico. Los datos recientes demuestran que los geófitos ricos en carbohidratos eran recursos abundantes, utilizados regularmente y esenciales en las Channel Islands del Norte, constituyendo un alimento básico rico en calorías y que complementaba los mariscos y peces abundantes en proteínas que también eran alimentos básicos para los Chumash de las islas.

Palabras claves: geófitos, alimento básico, subsistencia

Gill et alia (2021) published evidence for human consumption of geophytes by Indigenous Northern Channel Island peoples approximately 11,500 years ago. This report —the earliest evidence of geophyte consumption in North America for now—followed several publications documenting heavy reliance on geophytes by Island Chumash peoples for 10,000 years (e.g., Gill 2015, 2016; Gill et al. 2019). Our archaeological data are buttressed by ethnohistorical accounts noting the importance of geophytes among Channel Islanders (Gill et al. 2021). Martin (2022) criticized us for supposedly misrepresenting the importance of carbohydrates as "essential" or "staple" foods for past Native American societies. Martin found nothing positive to say, focusing instead on narrow definitions of such terms. Our article was reviewed by six experts in addition to an editor (Lynn Gamble) who is an expert in Chumash archaeology, none of whom expressed the concerns raised by Martin.

Definitions

The authoritative Merriam-Webster Dictionary (2022a) defines "staple diet" as "the food or

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foods that a person or animal eats most often." On California's Northern Channel Islands, we have demonstrated that geophytes—especially Brodiaea-type corms such as blue dicks (*Dipterostemon capitatus*)—are phenomenally abundant, available for nearly year-round consumption, and edible raw or cooked. Ethnohistoric accounts are limited, but they suggest that these geophytes (often referred to as Indian potatoes) were important components of the Island Chumash diet. Experimental return rates show that large quantities of blue dicks corms can be harvested and processed quickly, with returns upward of 1,050 kcal per hour. And the carbonized remains of Brodiaea-type corms are ubiquitous in island shell middens, where they are usually the most abundant edible plant tissue (by weight) identified in island archaeobotanical assemblages. Geophytes are rich sources of carbohydrates and energy that complement the protein-rich shellfish and finfish that were also heavily used by Islanders. Martin makes the bizarre claim that "geophytes cannot be characterized as a dietary staple"—tell that to the roughly one million poor Irish people who died during the Irish Potato Famine of the mid-nineteenth century. We stand by our conclusion that geophytes were a staple food regularly eaten by the Island Chumash and their ancestors, potentially on a daily basis.

Martin (2022) also contests our use of the term "essential" to describe the role of geophytes in Channel Island economies. Merriam-Webster (2022b) defines the noun "essential" as "something necessary, indispensable, or unavoidable"; and the adjective as (1) something "of the utmost importance: basic, indespensible, necessary"; (2) "a substance that is not synthesized by the body in a quantity sufficient for normal health and growth and that must be obtained from the diet." Current ecological, experimental, ethnographic, and archaeological data all suggest that geophytes were a basic, necessary, and important part of Island Chumash diets. Humans do not synthesize carbohydrates naturally. Moreover, they must be obtained dietarily. Martin supports his claim that geophytes cannot be essential because there is no carbohydrate deficiency syndrome with an anecdotal story about an Arctic explorer who survived for years without consuming plant foods. We never claimed there was a carbohydrate deficiency syndrome, however, or that a person could not live without eating plant foods. Outside of the Arctic, nonetheless, how many human societies of the past 10,000 or more years—hunter-gatherer, agricultural, or our own—have not had plant-based staples that were among the most important and regularly eaten foods?

Stable Isotopes

Martin cites stable isotope data for the Chumash to argue that Islander diets consisted of roughly 80% shellfish and finfish. It has long been known, however, that human growth and development (including bone growth and remodeling) is fueled disproportionately (~75%) by the consumption of whole animal proteins where they are regularly available and that isotopic estimates of plant consumption for the Island Chumash underestimate the importance of plant foods. In the most recent and comprehensive study for the Santa Barbara Channel region, for instance, Fauvelle and Somerville (2021:46) concluded that "because the stable isotope values in bone collagen are heavily biased towards dietary protein sources, the consumption of low-protein plant food sources may be underrepresented."

Ultimately, one of our key points has been that the importance of geophytes and other plant foods in Island Chumash economies has been seriously underestimated (Gill 2015, 2016; Gill et al. 2019, 2021). Our data show that geophytes were regularly harvested and an essential complement to Island Chumash diets that also relied heavily on marine fish and shellfish rich in animal proteins but low in carbohydrates and fats. Without adequate fats or carbohydrates in the diet, however, relying solely on lean meats can lead to protein poisoning and starvation (Noli and Avery 1988; Speth 2010). Many Channel Island shell middens have faunal assemblages dominated by shellfish remains. For the occupants of such sites—especially during frequent high-wave events when marine resources were largely unavailable—geophytes were a staple that provided an economic foundation that helped support Island Chumash populations that were among the densest and most complex hunter-gatherer societies in human history.

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Conclusions

Archaeological evidence for the antiquity and dietary significance of geophyte consumption has expanded rapidly around the world. Geophytes were a dietary staple on the Northern Channel Islands, rich sources of carbohydrates and calories that helped sustain the Island Chumash and their ancestors for more than 11,000 years. By focusing on minutiae, Martin (2022) fabricated a "semantic dispute" and mischaracterized our research. To state that geophytes cannot serve as a dietary staple is nonsense and defies numerous well-known examples. Finally, in a discipline that has long underemphasized the study of plant remains, it seems odd for an archaeobotanist to argue against the importance of carbohydrate-rich plant foods to ancient human societies.

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