

# An Evolutionary Perspective on Strengths, Fallacies, and Confusions in the Concept of Native Plants

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An important, but widely unappreciated, concept in evolutionary biology draws a clear and careful distinction between the historical origin and current utility of organic features. Feathers, for example, could not have originated for flight because five percent of a wing in the early intermediary stages between small running dinosaurs and birds could not have served any aerodynamic function (though feathers, derived from reptilian scales, provide important thermodynamic benefits right away). But feathers were later co-opted to keep birds aloft in a most exemplary fashion. In like manner, our large brains could not have evolved in order to permit modern descendants to read and write, though these much later functions now define an important part of modern utility.

Similarly, the later use of an argument, often in a context foreign or even opposite to the intent of originators, must be separated from the validity and purposes of initial formulations. Thus, for example, Darwin's theory of natural selection is not diminished because later racists and warmongers perverted the concept of a "struggle for existence" into a rationale for genocide. However, we must admit a crucial difference between the two cases: the origin and later use of a biological feature, and the origin and later use of an idea. The first case involves no conscious intent and cannot be submitted to any moral judgment. But ideas are developed by human beings for overt purposes, and we have some ethical responsibility for the consequences of our actions. An inventor may be fully exonerated for true perversions of his intent (Hitler's use of Darwin), but unfair extensions consistent with the logic of original purposes do entail some moral demerit (most academic racists of the nineteenth century did not envision or intend the Holocaust, but some of their ideas did fuel the "final solution").

I want to examine the concept of "native plants" within this framework, for this notion encompasses a remarkable mixture of sound biology, invalid ideas, false extensions, ethical implications, and political usages both intended and unanticipated. Clearly, Nazi ideologues provided the most chilling uses.<sup>1</sup> In advocating native plants along the *Reichsautobahnen*, Nazi architects of the Reich's motor highways explicitly compared their proposed restriction to Aryan purification of the people. By this procedure, Reinhold Tüxen hoped "to cleanse the German landscape of unharmonious foreign substance."<sup>2</sup> In 1942 a team of German botanists made the analogy explicit in calling for the extirpation of *Impatiens*

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*Grapevines (Vitus sp.) in northeastern Connecticut. This native is a commonplace of second-growth forest where its weight causes serious damage to its host trees.*

*parviflora*, a supposed interloper: "As with the fight against Bolshevism, our entire Occidental culture is at stake, so with the fight against this Mongolian invader, an essential element of this culture, namely, the beauty of our home forest, is at stake."<sup>3</sup>

At the other extreme of kindly romanticism, gentle arguments for native plants have stressed their natural "rightness" in maximally harmonious integration of organism and environment, a modern invocation of the old doctrine of *genius loci*. Consider a few examples from our generation:

Man makes mistakes; nature doesn't. Plants growing in their natural habitat look fit and therefore beautiful. In any undeveloped area you can find a miraculously appropriate assortment of plants, each one contributing to the overall appearance of a unified natural landscape. The balance is preserved by the ecological conditions of the place, and the introduction of an alien plant could destroy this balance.<sup>4</sup>

Evolution has produced a harmony that contrived gardens defy.<sup>5</sup>

Or this from President Clinton himself (though I doubt that he wrote the text personally), in a 1994 memorandum on "environmentally and economically beneficial practices on federal landscaped grounds": "The use of native plants not only protects our natural heritage and provides wildlife habitat, but also can reduce fertilizer, pesticide, and irrigation demands and their associated costs because native plants are suited to the local environment and climate."<sup>6</sup>

This general argument, of course, has a long pedigree, as well illustrated in Jens Jensen's remark in *Our Native Landscape*, published in his 1939 *Siftings*: "It is often remarked, 'native plants are coarse.' How humiliating to hear an American speak so of plants with which the Great Master has decorated his land! To me no plant is more refined than that which belongs. There is no comparison between native plants and those imported from foreign shores which are, and shall always remain so, novelties."<sup>7</sup>

Yet the ease of transition between this benevolent version and dangerous *Volksist* nationalism may be discerned, and quite dramatically, in another statement from the same

Jens Jensen, but this time published in a German magazine in 1937:

The gardens that I created myself shall . . . be in harmony with their landscape environment and the racial characteristics of its inhabitants. They shall express the spirit of America and therefore shall be free of foreign character as far as possible. The Latin and the Oriental crept and creeps more and more over our land, coming from the South, which is settled by Latin people, and also from other centers of mixed masses of immigrants. The Germanic character of our cities and settlements was overgrown. . . . Latin spirit has spoiled a lot and still spoils things every day.<sup>8</sup>

How slippery the slope between *genius loci* (and respect for all the other spirits in their proper places as well) and "my *locus* is best, while others must be uprooted, either as threats or as unredeemable inferiors." How easy the fallacious transition between a biological argument and a political campaign.

When biologically based claims have such a range of political usages (however dubious, and however unfairly drawn some may be), it becomes particularly incumbent upon us to examine the scientific validity of the underlying arguments, if only to acquire weapons to guard against usages that properly inspire our ethical opposition (for if the biological bases are wrong, then we hold a direct weapon; and if they are right, then at least we understand the argument properly, and can accurately drive the wedge that always separates factual claims from ethical beliefs).

Any argument for preferring native plants must rest upon some construction of evolutionary theory—a difficult proposition (as we shall see) because evolution is so widely misconstrued and, when properly understood, so difficult to utilize for the defense of intrinsic native superiority. This difficulty did not exist in pre-Darwinian creationist biology, because the old paradigm of "natural theology" held that God displays both his existence and his attributes of benevolence and omniscience in the optimal design of organic form and the maximal harmony of local ecosystems (see William Paley for the classic statement in one of the most influential books ever written).<sup>9</sup> Native must therefore



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*Cortaderia jubata* (sawgrass), weedy South American cousin of the garden-variety pampas grass, has invaded the hills of north-coastal California.

be right and best because God made each creature for its proper place.

But evolutionary theory fractured this equation of existence with optimality by introducing the revolutionary idea that all anatomies and interactions arise as transient products of complex history, not as created optimalities. Evolutionary defenses of native plants rest upon two quite distinct aspects of the revolutionary paradigm that Darwin introduced. (I shall argue that neither provides an unambiguous rationale, and that many defenders of native plants have mixed up these two distinct arguments, therefore rendering their defense incoherent.)

### The Functional Argument Based on Adaptation

Popular impression regards Darwin's principle of natural selection as an optimizing force, leading to the same end of local perfection that God had supplied directly in older views of natural theology. If natural selection works for the best forms and most balanced interactions that could

possibly exist in any one spot, then native must be best for native has been honed to optimality in the refiner's fire of Darwinian competition. (In critiquing horticulturists for this misuse of natural selection, I am not singling out any group for an unusual or particularly naive misinterpretation. This misreading of natural selection is pervasive in our culture, and also records a primary fallacy of much professional thinking as well.<sup>10</sup>)

In *Siftings*, Jens Jensen expressed this common viewpoint with particular force:

There are trees that belong to low grounds and those that have adapted themselves to highlands. They always thrive best amid the conditions they have chosen for themselves through many years of selection and elimination. They tell us that they love to grow here, and only here will they speak in their fullest measure.<sup>11</sup>

I have often marvelled at the friendliness of certain plants for each other, which, through thousands of years of selection and elimination, have lived in harmonious relation.<sup>12</sup>

The incoherencies of this superficially attractive notion may be noted in the forthcoming admission, in a work of our own generation, that natural does not always mean lovely. Natural selection does not preferentially lead to plants that humans happen to regard as attractive. Nor do natural systems always yield rich associations of numerous, well-balanced species. Plants that we label "weeds" will dominate in many circumstances, however transiently (where "transient" can mean more than a human lifetime on the natural time scales of botanical succession). Such weeds are often no less "native"—in the sense of evolving indigenously—than plants of much more restricted habitat and geography. Moreover, weeds often form virtual monocultures, choking out more diverse assemblages than human intervention could maintain. C. A. Smyser et al. admit all this, but do not seem to grasp the logical threat thus entailed against an equation of "natural" with "right" or "preferable": "You may have heard of homeowners who simply stopped mowing or weeding and now call their landscapes "natural." The truth is that these so-called no-work, natural gardens will be long dominated by exotic weed species, most of which are pests and look downright ugly. Eventually, in 50 to 100 years, native plants will establish themselves and begin to create an attractive environment."<sup>13</sup> But not all "weed" species can be called "exotic" in the sense of being artificially imported from other geographic areas. Weeds can be indigenous too, though their geographic ranges tend to be large, and their means of natural transport well developed.

The evolutionary fallacy in equating native with best adapted may be simply stated by specifying the essence of natural selection as a causal principle. As Darwin recognized so clearly, natural selection produces adaptation to changing local environments—and that is all. The Darwinian mechanism includes no concept of general progress or universal betterment. The "struggle for existence" can only yield local appropriateness. Moreover, and even more important for debates about superiority of native plants, natural selection is only a "better than" principle, not an optimizing device. That

is, natural selection can only transcend the local standard and cannot operate toward universal "improvement"—for once a species prevails over others at a location, no pressure of natural selection need arise to promote further adaptation. (Competition within species will continue to eliminate truly defective individuals and may promote some refinement by selection of fortuitous variants with still more advantageous traits, but the great majority of successful species are highly stable in form and behavior over long periods of geological time—not because they are optimal, but because they are locally prevalent.)

For this reason, many native plants, evolved by natural selection as adaptive to their regions, fare poorly against introduced species that never experienced the local habitat. If natural selection produced optimality, this most common situation could never arise, for native forms would be "best" and would prevail in any competition against intruders. But most Australian marsupials succumb to placentals imported from other continents, despite tens of millions of years of isolation, during which the Australian natives should have attained irreplaceable incumbency, if natural selection worked for optimality rather than merely getting by. And *Homo sapiens*, after arising in Africa, seems able to prevail in any exotic bit of real estate, almost anywhere in the world!

Thus the first-order rationale for preferring native plants—that, as locally evolved, they are best adapted—cannot be sustained. I strongly suspect that a large majority of well-adapted natives could be supplanted by some exotic form that has never experienced the immediate habitat. In Darwinian terms, this exotic would be better adapted than the native—though we may well, on defensible aesthetic or even ethical grounds, prefer the natives (for nature's factuality can never enjoin our moral decisions).

We may, I think, grant only one limited point from evolutionary biology on the subject of adaptation in native plants. At least we do know that well-established natives are adequately adapted, and we can observe their empirical balances with other local species. We cannot know what an exotic species will do—and many, and tragic, are the stories of exotics imported for a

restricted and benevolent reason that then grew like kudzu to everyone's disgust and detriment. We also know that natives grow appropriately—though not necessarily optimally—in their environment, while exotics may not fit without massive human “reconstruction” of habitat, an intervention that many ecologically minded people deplore. I confess that nothing strikes me as so vulgar or inappropriate as a bright green lawn in front of a mansion in the Arizona desert, sucking up precious water that already must be imported from elsewhere. A preference for natives does foster humility and does counteract human arrogance (always a good thing to do)—for such preference does provide the only sure protection against our profound ignorance of consequences when we import exotics. But the standard argument—that natives should be preferred as best adapted—is simply false within Darwinian theory.

### The Geographic Argument Based on Appropriate Place

This argument is harder to formulate, and less clearly linked to a Darwinian postulate, but somehow seems even more deeply embedded (as a fallacy) into the conventional argument for preferring native plants. This argument holds that plants occupy their natural geographic ranges for reasons of maximal appropriateness. Why, after all, would a plant live only in this-or-that region of 500 square kilometers unless this domain acted as its “natural” home—the place where it, uniquely, and no other species, fits best. Smyser et al., for example, write: “In any area there is always a type of vegetation that would exist without being planted or protected. This native vegetation consists of specific groups of plants that adapted to specific environmental conditions.”<sup>14</sup> But the deepest principle of evolutionary biology—the construction of all current biological phenomena as outcomes of contingent history, rather than optimally manufactured situations—exposes this belief as nonsense.

Organisms do not necessarily, or even generally, inhabit the geographic area best suited to their attributes. Since organisms (and their areas of habitation) are products of a history laced with chaos, contingency, and genuine random-

ness, current patterns (although workable, or they would not exist) will rarely express anything close to an optimum, or even a “best possible on this earth now”—whereas the earlier notion of natural theology, with direct creation of best solutions, and no appreciable history thereafter (or ever), could have validated an idea of native as best. Consequently, although native plants must be adequate for their environments, evolutionary theory grants us no license for viewing them as the best-adapted inhabitants conceivable, or even as the best available among all species on the planet.

An enormous literature in evolutionary biology documents the various, and often peculiar, mechanisms whereby organisms achieve fortuitous transport as species spread to regions beyond their initial point of origin. Darwin himself took particular interest in this subject. During the 1850s, in the years just before publication of the *Origin of Species* in 1859, Darwin wrote several papers on the survival of seeds in salt water (how long would they float without sinking? would they still germinate after such a long bath?). He determined that many seeds could survive long enough to reach distant continents by floating across oceans—and that patterns of colonization therefore reflect historical accidents of available pathways, and not a set of optimal environments.

Darwin then studied a large range of “rarely efficient” means of transport beyond simple floating on the waves: for example, natural rafts of intertwined logs (often found floating in the ocean hundreds of miles from river mouths), mud caked on birds' feet, residence in the gut of birds with later passage in feces (Darwin and others studied, and often affirmed, the power of seeds to germinate after passage through an intestinal tract). In his usually thorough and obsessive way, Darwin assiduously collected information and found more than enough means of fortuitous transport. He wrote to a sailor who had been shipwrecked on Kerguelen Island to find out if he remembered any seeds or plants growing from driftwood on the beach. He asked an inhabitant of Hudson Bay if seeds might be carried on ice floes. He studied the contents of ducks' stomachs. He was delighted to receive in the mail a pair of partridges' feet



*Eucalyptus globulus* is an important source of fuel and building material in the altiplano of South America, where in some cases it is the sole tree. This native of Tasmania and Victoria selfsows and has naturalized throughout the area.

caked with mud; he rooted through bird droppings. He even followed a suggestion of his eight-year-old son that they float a dead and well-fed bird. Darwin wrote in a letter that "a pigeon has floated for 30 days in salt water with seeds in crop and they have grown splendidly." In the end, Darwin found more than enough mechanisms to move his viable seeds.

"Natives," in short, are the species that happened to find their way (or evolve *in situ*), not the best conceivable for a spot. As with the first argument about adaptation, the proof that current incumbency as "native" does not imply superiority against potential competitors exists in abundance among hundreds of imported interlopers that have displaced natives throughout the world: eucalyptus in California, kudzu in the American southeast, rabbits and other placental mammals in Australia, and humans just about everywhere.

"Natives" are only those organisms that first happened to gain and keep a footing. We rightly decry the elitist and parochial claims of Ameri-

can northeast WASPs to the title of native, but (however "politically incorrect" the point), the fashionable status of "Indians" (so-called by Columbus' error) as "Native Americans" makes just as little sense in biological terms. "Native Americans" arrived in a geological yesterday, some 20,000 years ago (perhaps a bit earlier), on the geographic fortuity of a pathway across the Bering Strait. They were no more intrinsically suited to New World real estate than any other people. They just happened to arrive first.

In this context, the only conceivable rationale for the moral or practical superiority of "natives" (read first-comers) must lie in a romanticized notion that old inhabitants learn to live in ecological harmony with surroundings, while later interlopers tend to be exploiters. But this notion, however popular among "new agers," must be dismissed as romantic drivel. People are people, whatever their technological status; some learn to live harmoniously for their own good, and others do not to their own detriment or destruction. Preindustrial

people have been just as rapacious (though not so quickly perhaps, for lack of tools) as the worst modern clear-cutters. The Maori people of New Zealand wiped out a rich fauna of some twenty moa species within a few hundred years. The “native” Polynesians of Easter Island wiped out everything edible or usable (and, in the end, had no logs to build boats or to raise their famous statues), and finally turned to self-destruction.

In summary of my entire argument from evolutionary theory, “native” plants cannot be deemed biologically best in any justifiable way (note that I am emphatically not speaking about ethical or aesthetic preference, for science cannot adjudicate these considerations). “Natives” are only the plants that happened to arrive first and be able to flourish (the evolutionary argument based on geography and history), while their capacity for flourishing only indicates a status as “better than” others available, not as optimal or globally “best suited” (the evolutionary argument based on adaptation and natural selection).

Speaking biologically, the only general defense that I can concoct for natives—and I regard this argument as no mean thing—lies in protection thus afforded against our overweening arrogance. At least we know what natives will do in an unchanged habitat, for they have generally been present for a long time and have therefore stabilized and adapted. We never know for sure what an imported interloper will do, and our consciously planted exotics have “escaped” to disastrous spread and extirpation of natives (the kudzu model) as often as they have supplied the intended horticultural or agricultural benefits.

As a final ethical point (and I raise this issue as a concerned human being, not as a scientist, for my profession can offer no direct moral insight), I do understand the appeal of the ethical argument that we should leave nature alone and preserve as much as we can of what existed and developed before our very recent geological appearance. Like all evolutionary biologists, I treasure nature’s bounteous diversity of species (the thought of half a million described species of beetles—and many more yet undescribed—fills me with an awe that can only be called reverent). And I do understand that much of this

variety lies in geographic diversity (different organisms evolved in similar habitats in many places on our planet, as a result of limits and accidents of access). I would certainly be horrified to watch the botanical equivalent of McDonalds’ uniform architecture and cuisine wiping out every local diner in America. Cherishing native plants does allow us to defend and preserve a maximal amount of local variety.

But we must also acknowledge that strict “nativism” has an ethical downside inherent in the notion that “natural” must be right and best, for such an attitude easily slides to the Philistinism of denying any role to human intelligence and good taste, thence to the foolish romanticism of viewing all that humans might accomplish in nature as “bad” (and how then must we judge Frederick Law Olmsted’s Central Park), and even (in an ugly perversion)—but realized in our time by Nazi invocation of nativist doctrine—to the claim that my “native” is best and yours only fit for extirpation.

The defense against all these misuses, from mild to virulent, lies in a profoundly humanistic notion as old as Plato, one that we often advance in sheepish apology but should rather honor and cherish: the idea that “art” must be defined as the caring, tasteful, and intelligent *modification* of nature for respectful human utility. If we can practice this art in partnership with nature, rather than by exploitation (and if we also set aside large areas for rigidly minimal disturbance, so that we never forget, and may continue to enjoy, what nature accomplished during nearly all of her history without us), then we may achieve optimal balance.

People of goodwill may differ on the best botanical way to capture the “spirit of democracy”—from one end of maximal “respect” for nature by using only her unadorned and locally indigenous (“native”) products, to the other of maximal use of human intelligence and aesthetic feeling in sensitive and “respectful” mixing of natives and exotics, just as our human populations have so benefited from imported diversity. Jens Jensen extolled the first view: “When we are willing to give each plant a chance fully to develop its beauty, so as to give us all it possesses without any interference, then, and only then, shall we enjoy ideal land-

scapes made by man. Is not this the true spirit of democracy? Can a democrat cripple and misuse a plant for the sake of show and pretense?"<sup>15</sup>

But is all cultivation—hedgerows? topiary?—crippling and misuse? The loaded nature of ethical language lies exposed herein. Let us consider, in closing, another and opposite definition of democracy that certainly has the sanction of ancient usage. J. Wolschke-Bulmahn and G. Gröning cite a stirring and poignant argument made by Rudolf Borchardt, a Jew who later died trying to escape the Nazis, against the nativist doctrine as perverted by Nazi horticulturists: "If this kind of garden-owning barbarian became the rule, then neither a gillyflower nor a rosemary, neither a peach-tree nor a myrtle sapling nor a tea-rose would ever have crossed the Alps. Gardens connect people, times and latitudes. If these barbarians ruled, the great historic process of acclimatization would never have begun and today we would horticulturally still subsist on acorns. . . . The garden of humanity is a huge democracy."<sup>16</sup>

I cannot state a preference in this wide sweep of opinions, from pure hands-off romanticism to thorough overmanagement (though I trust that most of us would condemn both extremes). Absolute answers to such ethical and aesthetic questions do not exist in any case. But we will not achieve clarity on this issue if we advocate a knee-jerk equation of "native" with morally best, and fail to recognize the ethical power of a contrary view, supporting a sensitive cultivation of all plants, whatever their geographic origin, that can enhance nature and bring both delight and utility to humans. Is it more "democratic" only to respect organisms in their natural places (how, then, could any non-African human respect himself), or shall we persevere in the great experiment of harmonious and mutually reinforcing geographic proximity—as the prophet Isaiah sought in his wondrous vision of a place where the wolf might dwell with the lamb and such non-natives as the calf and the lion might feed together—where "they shall not hurt nor destroy in all my holy mountain."

#### Endnotes

<sup>1</sup> J. Wolschke-Bulmahn and G. Gröning, "The Ideology of the Nature Garden. Nationalistic Trends in Garden Design in Germany During the Early Twentieth

Century," *Journal of Garden History* (1992) 12(1): 73–80; G. Gröning and J. Wolschke-Bulmahn, "Some Notes on the Mania for Native Plants in Germany," *Landscape Journal* (1992) 11(2): 116–126, J. Wolschke-Bulmahn, "Political Landscapes and Technology: Nazi Germany and the Landscape Design of the *Reichsautobahnen* (Reich Motor Highways)," *Selected CELA Annual Conference Papers Nature and Technology*, Iowa State University, 9–12 September 1995, vol. 7.

<sup>2</sup> Quoted in Wolschke-Bulmahn, "Political Landscapes," from a 1939 article.

<sup>3</sup> Quoted in Gröning and Wolschke-Bulmahn, "Native Plants."

<sup>4</sup> C. A. Smyser et al., *Nature's Design A Practical Guide to Natural Landscaping*, Emmaus, PA., 1982, xi.

<sup>5</sup> K. Druse and M. Roach, *The Natural Habitat Garden*, New York, 1994, viii.

<sup>6</sup> President William J. Clinton, *Memorandum for the Heads of Executive Departments and Agencies*, Office of the Press Secretary, 26 April 1994.

<sup>7</sup> J. Jensen, *Siftings. The Major Portion of "The Clearing," and Collected Writings*, Chicago, 1956, 45.

<sup>8</sup> Quoted in Wolschke-Bulmahn, "Political Landscapes," 13.

<sup>9</sup> W. Paley, *Natural Theology*, London, 1802.

<sup>10</sup> See S. J. Gould and R. C. Lewontin, "The Spandrels of San Marco and the Panglossian Paradigm: A Critique of the Adaptationist Programme," *Proceedings of the Royal Society of London B* (1979) 205: 581–198; see S. J. Gould, "Exaptation: A Crucial Tool for an Evolutionary Psychology," *Journal of Social Issues* (1991) 47(3): 43–65.

<sup>11</sup> Jensen, *Siftings*, 47.

<sup>12</sup> *Ibid.*, 59.

<sup>13</sup> Smyser et al., *Nature's Design*, vii.

<sup>14</sup> *Ibid.*, xi.

<sup>15</sup> Jensen, *Siftings*, 46.

<sup>16</sup> Wolschke-Bulmahn and Gröning, "The Ideology of the Nature Garden," 80.

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