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The Genetics of Date Palm Patenting

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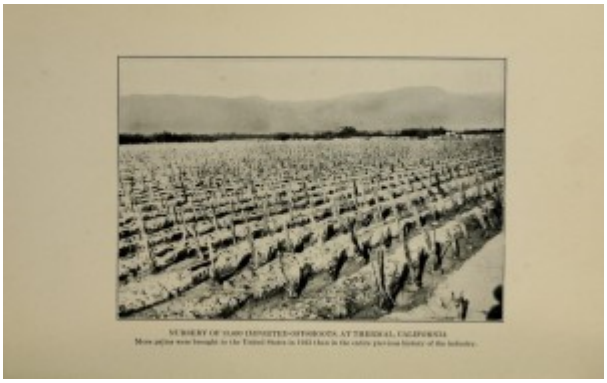

You're driving south out of Indio along the Grapefruit Boulevard towards Thermal and Mecca because their names sound promising. A parched desert plain extends to your left, leading up to the austere ridgelines of Joshua Tree National Park. A shimmering Salton Sea lies ahead.

An oasis of date palms emerges out of nowhere on your passenger side. You've just entered the Coachella Valley's epicenter of United States date production.

If you're savvy, you'll stop at the Oasis Date Gardens and head directly to the sampling room. And if you're lucky, a date variety you've never heard of before—the black eight ball—will send your taste buds into mild ecstasy. Alas, the 8-ball's appearance on the scene is too short (December/January) and its quantity too sparse to support a mail order business. You'll regret not buying more of this connoisseur's delicacy when you had the chance.

The crucial agri-processing issue confronting all date growers is one of *gender discrimination*. Recent published patent applications suggest the problem and solution, *e.g.*, "Genetics of Gender Discrimination in Date Palm,"[1] and "Molecular Markers and Methods for Early Sex Determination in Date Palms."[2] This article examines the patent eligibility issue generated by these patent applications in light of recent Supreme Court cases.

A Brief History of California Date Production

The date palm tree could not be a more storied. It became a sacred object of veneration for ancient Sumerians, Babylonians and

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Egyptians. “Vendors sold dates imported from North Africa at theaters in Athens and Rome during classical times.” [3]

Growing date palms, however, is a tricky, risky business. They thrive in arid, inhospitable environments—and almost nowhere else.

While date palms followed the usual Spanish conquest migration route into former Alta California by way of mission gardens, they failed to take hold. The “coastal climate was unsuitable for the production of sweet, ripe fruit.” [4]

The United States Department of Agriculture spearheaded early date palm productions efforts through state agriculture experimental stations funded under the Hatch Act of 1887. A vision of desert wasteland being "transformed into productive agricultural land was seductive" to many farmers.[5] In the late 19th century, prospective date growers found California's Coachella Valley and Arizona's Salt River Valley to be the most propitious regions in which to make the "deserts bloom" with date palm groves.

Paul Popenoe's *Date Growing in the Old World and the New* (1913) notes that the "Coachella Valley, with its slight rainfall, intense summer heat, and prevailing sandy soil exactly fulfills the conventional [date palm growing] requirements."[6]

Date palm plantings in the Coachella Valley now cover over 6,500 acres, produce over 40 million pounds of dates annually, and employ around 2500 people. The four primary varieties of dates grown in this area are the Deglet Noor (orig. Algeria), Medjool (orig. North Africa), Barhi (orig. Iraq) and Zahidi (orig. Iraq).[7]

Once highly productive, Arizona's date palm industry entered a quick decline after World War II. Land reimagined as "the Sunbelt" arrived; date orchards were bulldozed over to make way for housing developments. "By 1960 urban sprawl [had] destroyed many of Arizona's commercial date ranches."[8]

The Vexing Gender Discrimination Problem

"There are no easily distinguishable sex chromosomes in date palm, though there is some cytological evidence that they exist."[9] After planting, date palms need to mature for 5 to 8 years before they flower, at which point male and female trees can be distinguished. Only female date palms bear fruit.

Five to eight years of waiting around can be eternity for date palm growers—subject as they are to the fickle fates of sunk costs, weather, pests and disease. A recent patent application offers a solution:

In order to solve this problem, the identification of molecular markers allowing early determination of the sex of the date palm has been sought for decades. * * * * It is therefore important to develop new strategies for unambiguously selecting the female plants at a young age, and therefore to limit the plantation costs associated with the cultivation of the non-productive male plants. The early sex determination would also open up new perspectives for multiplying by seed the date palm genotypes, reintroducing biodiversity into palm groves and implementing genetic improvement programmes.[10]

Recent patent applicants claim to have invented methods for detecting the sex of a date palm through the use of "microsatellite markers." "The name 'satellite' refers to the early observation that centrifugation of genomic DNA in a test tube separates a prominent layer of bulk DNA from accompanying 'satellite' layers of repetitive DNA." They are "used in genetic linkage analysis/marker assisted selection to locate a gene or a mutation responsible for a given trait or disease."[11]

These genetic date palm applications will read like Greek to a layperson. They include reams of genomic sequence listings only understandable to one skilled in the relevant art.

Date Palm Patent Prosecution Challenges

These "early sex determination" patent applications are in the initial stages of U.S. national stage examinations. The only substantive USPTO office action to date has been to apply a "restriction" requirement with respect to the "Genetics of Gender Discrimination" patent application.

Because that patent application recites various "method" and "testing kit"[12] claims, the patent examiner is requiring the applicant to select a particular invention based on the following reasoning:

[The groups of alleged claims] lack unity of invention even though the inventions of these groups require the technical identification of the gender of a date palm plant using the DNA of the plant, this technical feature is not a special technical feature as it does not define a contribution over the prior art in view of Younis, et al, Research Journal of Biological Sciences, (2008) . . . . [That reference teaches] that they identified nucleic acid markers . . . that are used for the identification of the gender of a date palm . . . .[13]

Both of these patent applications claim priority to Patent Cooperation Treaty patent filings in 2012 and 2013. They will be subject to more exacting scrutiny of their patent eligibility under the rules set forth in two leading Supreme Court cases, *Mayo Collaborative Services v. Prometheus Laboratories* and *Ass'n for Molecular Pathology v. Myriad Genetics.*[14]

Mayo states the analytical test applied to patent applications premised on DNA-related discoveries:

If a law of nature is not patentable, then neither is a process reciting a law of nature, unless that process has additional features that provide practical assurance that the process is more than a drafting effort designed to monopolize the law of nature itself. A patent, for example, could not simply recite a law of nature and then add the instruction, "apply the law."[15]

In the *Myriad* case, the Supreme Court held that the patentee, Myriad Genetics, could not surmount this patent eligibility rule when it discovered the "precise location and sequence of two human genes, mutations of which can substantially increase the risks of breast and ovarian cancer."[16] A key passage explains the high court's reasoning:

Indeed, Myriad's patent descriptions highlight the problem with its claims. * * * Myriad found the location of the gene associated with increased risk of breast cancer and identified mutations of that gene that increase the risk. In subsequent language Myriad explains that the location of the gene was unknown until Myriad found it among the approximately eight million nucleotide pairs contained in a subpart of chromosome 17. * * * Many of Myriad's patent descriptions simply detail the "iterative process" by which Myriad narrowed the possible locations for the gene sequences it sought. Myriad seeks to import these extensive research efforts into the 101 patent-eligibility inquiry. But extensive effort alone is insufficient to satisfy the demands of 101.[17]

Whether the date palm patent applicants can clear the Supreme Court's patent eligibility hurdle applicable to laws of nature and natural phenomenon is too early to tell—just like the date palms seedlings whose gender is impossible to determine for five to eight years. You can expect a give-and-take between the USPTO patent examiner and the patent applicants as they seek to claim a *patentable application* of a law of nature that "may well be deserving of patent protection."[18]

In the meantime, if you're visiting Palm Springs, you just might want to drive your rental car down Grapefruit Boulevard until you see a desert oasis blooming with date palms. There might even be a lucky 8-ball in your future.

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[1] "Genetics of Gender Discrimination in Date Palm," U.S. Patent Appl. No. 14/008,012 (published on 7/24/14).

[2] "Molecular Markers and Methods for Early Sex Determination in Date Palms," U.S. Patent Appl. No. 14/415,071 (published on 6/18/15).

[3] W. Dunmire, *Gardens of New Spain – How Mediterranean Plants and Foods Changed America* (2004), p. 306.

[4] *Id.*

[5] *See* M. McCarthy, "Date Palms in the Desert: Reimaging and Cooperating with Nature in Arid Arizona," 1 *Arizona Journal of Interdisciplinary Studies* 39 (Spring 2012), available online at https://journals.uair.arizona.edu/index.php/azjis/article/view/16003.

[6] This important historical archive is available online at https://archive.org/details/dategrowinginold00poperich. Paul Popenoe would become better known as America's founding practitioner of marriage counseling. His father, Frederick, was an early pioneer in the avocado industry. Early in his life, Paul "worked briefly as an agricultural explorer collecting date specimens in Western Asia Northern Africa for his father's nursery in California, along with his younger brother Wilson Popenoe, a horticulturist. These travels received considerable support and interest from the U.S. Department of Agriculture." *See* https://en.wikipedia.org/wiki/Paul_Popenoe. The photograph accompanying the *Earth and Table* website version of this article is taken from Popenoe's book and shows the first large-scale planting of date palms in the Coachella Valley in 1913.

[7] *See* http://www.seecalifornia.com/farms/california-dates.html. The origins of these date varieties is provided by *The Brooks and Olmo Register of Fruit & Nut Varieties* (3rd ed. 1997). There are numerous variant spellings of the listed dated varieties.

[8] *See* fn. 5.

[9] *See* fn. 1.

[10] *See* fn. 2.

[11] *See* https://en.wikipedia.org/wiki/Microsatellite.

[12] *See*, *e.g.*, U.S. Patent App. No. 14/008,012, Claim 34: "A kit for selecting a male or female date palm plant prior to flowering, said kit comprising; primers or probes for detecting in a date palm plant, tissue, germplasm, or seed (i) a genotype that identifies the plant, tissue, germplasm, or seed as male or female, or (ii) a molecular marker in linkage disequilibrium with the genotype and instructions for using the primers or probes for detecting the genotype or the molecular marker."

[13] USPTO Office Action, p. 4 (filed 12/11/15).

[14] *Mayo Collaborative Servs. v. Prometheus Labs., Inc.,* 566 U.S. ___, 132 S.Ct. 1289, 1294, 182 L.Ed.2d 321 (2012); and *Ass'n for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. ___, 133 S.Ct. 2107, 186 L.Ed.2d 124 (2013).

[15] *Mayo* slip op., at 8-9.

[16] *Myriad* slip op, at 1.

[17] *Id.*, at 13-14 (record citations and footnotes omitted).

[18] *Mayo* slip op., at 2.