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Cacao beans are packed with food to aid plant growth — which humans, in turn, can exploit.

PLANT SCIENCES

Seeds and civilizations

Sandra Knapp reviews a study of our symbiotic relationship with pips and pulses.

Once asked a school class whether anyone present had eaten a plant that day. There was a chorus of “No”, but when toast and cereal were mentioned, all heads began to nod. We sometimes forget humanity’s dependence on plants. Plants photosynthesize to provide oxygen, and their unborn offspring — contained in seeds — have supported the development of human civilizations. Biologist Thor Hanson’s *The Triumph of Seeds* relates that deep historical relationship.

This is a charming book, inspired by Hanson’s forays into seed identification and dispersal with his young, seed-obsessed son. Its interlocking stories are loosely arranged around the themes of feeding, reproduction, longevity, defence and dispersal. Many will be familiar narratives about plants that have changed the world — such as cacao, chillies, wheat and coffee — but Hanson’s twist of looking at human interactions with plants in their embryonic stage is new. Throughout, he scatters interviews and encounters with seed scientists and other biologists, such as Christina Walters of the US National Center

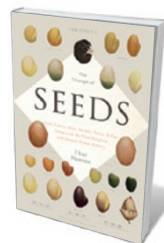
for Genetic Resources Preservation in Fort Collins, Colorado. All bring their enthusiasm for their research, and for plants in general, brilliantly to life.

In a seed, the embryo is packaged with food, as in a hen’s egg. Their high carbohydrate, protein and/or fat content makes seeds ideal for humans, but Hanson drills in the idea that those riches are not ‘for’ us. Yet our relationship with seeds is definitely two-way: we nurture wheat and rice, for instance, as much as they nurture us.

Hanson weaves in stories of seed scientists past to underline the long intimacy of the botanical and human. Soviet geneticist and seed

collector extraordinaire Nikolai Vavilov, for instance, saw that the hardy, resilient wild relatives of crop plants were key for cross-breeding; his work made the Soviet Union a leader in agricultural improvement, but he starved to death, imprisoned in a gulag for criticizing the pseudoscientific ideas of biologist Trofim Lysenko, who had Stalin’s support. And nineteenth-century US botanist William James Beal set up an experiment that is still running, burying bottles of sand and seeds in Michigan soil to test the seeds’ viability over time.

Hanson’s foray into the biology of chillies (fruits, and members of my favourite plant family: the Solanaceae, or nightshades) is a wonderful example of the perils of just-so stories. Simplification is a good first step, but in the end, nature is astoundingly complex. As Hanson reveals, the heat we feel when eating a chilli is not just the plant’s defence against mammalian predators; it is caused by a potent antimicrobial agent that protects the seeds from fungal attack. Fruits and other



The Triumph of Seeds: How Grains, Nuts, Kernels, Pulses, and Pips Conquered the Plant Kingdom and Shaped Human History
THOR HANSON
Basic: 2015.

plants are thus well armed, chemically as well as physically, to protect the next generation.

There is more to the ideal seed ‘packaging’, the fruit. Unripe fruit contains chemical compounds, such as tannins, that can taste bitter — a potent reminder to the predator to wait, because the seeds are ready for dispersal only when the fruit is ripe. And once animals (including us) eat them, the seeds get a free ride to a new habitat. This is all, in essence, plant behaviour — the botanical equivalent of chest-beating or protecting a child. However, it often passes us by because it occurs on a timescale different to that of animal movement or thought.

Hanson touches briefly on genetic engineering, but then limits his discourse to our social preoccupation with seeds. It is interesting that we seem to react more strongly to the genetic engineering of seeds than to that of humans; a comparison of these areas would contribute something new to the story.

I had other quibbles. There is a saying: “Knowledge is knowing that a tomato is a fruit, wisdom is not putting it in a fruit salad.” That underlines an important point: classification may seem pedantic, but it is key. Hanson largely abjures botanical terminology, and this is unfortunate. Part of the joy of plants is their extraordinary diversity and the mind-bending ways in which different parts of the organism serve different functions in the life cycle; conveying either demands some use of technical terms. Hanson also indulges in some slightly grating cultural parochialism. For example, chapter 3 is entitled “Sometimes you feel like a nut” — from an advertising ditty for the US chocolate bar Almond Joy. Even I, a transplanted North American, failed to get the reference straight away.

A portion of the proceeds from the book will be shared with worthy seed-related endeavours. Among them are the Millennium Seed Bank at the UK Royal Botanic Gardens, Kew, which is tasked with preserving plant genetic diversity; and the Crop Trust in Bonn, Germany, which runs projects such as the Svalbard Global Seed Vault to conserve crop diversity. But seed banking, however laudable, cannot on its own sustain a dynamic planet. That requires a change in how humans see the rest of life. *The Triumph of Seeds* will engender thoughtful consideration of our joint future. ■

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THEATRE

Performing rituals

Emily A. Holmes commends a theatrical meditation on obsessive–compulsive disorder.

A small grey room. Three bare light bulbs. White boxes of letters. A woman calmly relates a clinical checklist. *This Room* is an autobiographical one-woman play about obsessive–compulsive disorder (OCD), written and performed by Laura Jane Dean and part-supported by the Wellcome Trust.

OCD affects 1–2% of UK and US people, and can devastate lives. As the play’s scientific adviser, neuroscientist Trevor Robbins, told me: “Sufferers can spend half their waking hours performing a useless activity, such as compulsively washing their hands, confined to their home.”

Unwanted thoughts, images or urges dog the mind, causing anxiety, disgust or unease — for Dean, a fear of hanging herself in her sleep. Over and over, people with OCD perform behaviours or mental acts to relieve, temporarily, these negative feelings. Dean describes checking repeatedly for stockings, belts, scarfs — objects associated with hanging. The ritual used to take two hours every night. *This Room* is an affecting, sobering account of a life shaped by, yet transcending, a mental-health condition and treatment.

Dean reels off a reckoning. “Cognitive Behavioural Therapy (CBT): 18 in-depth questionnaires, 24 hours of therapy, 1 Clinical Psychologist, 31 behavioural experiments, 56 hours of homework, 501 days (and counting) since discharge.” This echo of compulsive counting frames a space in which therapy becomes possible. To her surprise, Dean’s symptoms improved — as they do for the majority of people with OCD who participate in CBT, an evidence-based treatment. Dean stopped her bedtime rituals.

She underwent a technique called graded exposure and response prevention. In one riveting scene, she faces her worst fears (standing on chairs placing stockings around her neck) and lets her obsessive thoughts (of hanging) occur, but without trying to neutralize them with compulsions (the checking). Crucially, this happens not on a couch in a clinic, but in Dean’s bedroom, with her therapist. The episode movingly captures the bravery of the

This Room
LAURA JANE DEAN
Battersea Arts Centre,
London.
27–28 Feb 2015.



Playwright Laura Jane Dean.

patient and the skill of the therapist.

This Room is a reflection on identity and mental illness. Dean describes her ambivalence towards removing all symptoms, and how she feels when new ones emerge. “I want it to be easier, not easy,” she says. CBT aims not to erase all traces of OCD, but to change patterns of thought and behaviour. OCD can come and go; so does treatment.

Dean wants to know more about how OCD and therapy work. As I wrote last year, that understanding will require collaboration across many domains — from learning, habits and behaviours to emotions and cognition (see E. A. Holmes *et al.* *Nature* 511, 287–289; 2014).

Robbins reflects: “Laura has interacted with our researchers studying OCD to bring their findings into register with her subjective experience.” Having talked to her extensively, he feels “even more convinced” that researchers should bring together psychological and neuroscientific experiences to improve treatments.

Dean puts this call to action centre stage by drawing us into her mental world. At the play’s end, she leaves a chart showing that her symptoms got better. I count: 24 hours of therapy is equivalent to 12 nights’ worth of compulsive checking. It seems a good investment. I leave with a renewed appreciation of the courage involved in shedding a deeply held fear and quite literally breaking the habits of a lifetime. ■

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