BOTANY

Our Imported Weeds

"A Classic of Science"

The Great American Botanist Discusses Reasons Why Plants Become Weeds And How They Migrate Westward

PERTINACITY AND PREDOMINANCE OF WEEDS; by Asa Gray. In the American Journal of Science and Arts, 3rd series, Vol. XVIII. New Haven: J. D. & E. S. Dana, 1879. *This is an exact reprint of extracts from the original publication.*

A WEED is defined by the dictionaries to be "Any useless or troublesome plant." "Every plant which grows in a field other than that of which the seed has been (intentionally) sown by the husbandman is a weed," says the Penny Cyclopaedia, as cited in Worcester's Dictionary. The Treasury of Botany defines it as "Any plant which obtrusively occupies cultivated or dressed ground, to the exclusion or injury of some particular crop intended to be grown. Thus, even the most useful plants may become weeds if they appear out of their proper place. The term is sometimes applied to any insignificant-looking or unprofitable plants which grow profusely in a state of nature; also to any noxious or useless plant." We may for present purposes consider weeds to be plants which tend to take prevalent possession of soil used for man's purposes, irrespective of his will; and, in accordance with usage, we may restrict the term to herbs. This excludes predominant indigenous plants occupying ground in a state of nature. Such become weeds when they conspicuously intrude into cultivated fields, meadows, pastures, or the ground around buildings. Many are unattractive, but not a few are ornamental; many are injurious, but some are truly useful. White Clover is an instance of the latter. Bur Clover (*Medicago denticulata*) is in California very valuable as food for cattle and sheep, and very injurious by the damage which the burs cause to wool. In the United States, and perhaps in most parts of the world, a large majority of the weeds are introduced plants, brought into the country directly or indirectly by man. Some—such as Dandelion, Yarrow, and probably the common Plantain and the common Purslane—are importations as weeds, although the species naturally occupy some part of the country.

Why weeds are so pertinacious and aggressive, is too large and loose a question: for any herb whatever when successfully aggressive becomes a weed; and the reasons of predominance may be almost as diverse as the weeds themselves. But we may enquire whether weeds have any common characteristics which may give them advantage, and why the greater part of the weeds of the United States and probably of similar temperate countries, should be foreigners.

As to the second question, this is strikingly the case throughout the Atlantic side of temperate North America, in which the weeds have mainly come from Europe; but it is not so, or hardly so, west of the Mississippi in the region of prairies and plains. So that the answer we are accustomed to give must be to a great extent the true one, namely, that, as the district here in which weeds from the Old World prevail was naturally forest-clad, there were few of its native herbs which, if they could bear the exposure at all, were capable of competition on cleared land with emigrants from the Old World. It may be said that these same European weeds, here prepotent, had survived and adapted themselves to the change from forest to clear land in Europe, and therefore our forest-bred herbs might have done the same thing here. But in the first place the change must have been far more sudden here than in Europe; and in the next place, we suppose that most of the herbs in question never were indigenous to the originally forest-covered regions of the Old World; but rather, as western and northern Europe became agricultural and pastoral, these plants came with the husbandmen and the flocks, or followed them, from the woodless or sparsely wooded regions farther east where they originated. This, however, will not hold for some of them, such as Dandelion, Yarrow, and Ox-eye Daisy. It may be said that our weeds might have come to a considerable extent from the bordering more open districts on the west and south. But there was little opportunity until recently, as the settlement of the country began on the eastern border; yet a certain number of our weeds appear to have been thus derived: for instance, *Mollugo verticillata, Erigeron Canadense, Xanthium, Ambrosia artemisiifolia, Verbena hastata, V. urticifolia,* etc., *Veronica peregrina, Solanum Carolinense,* various species of *Amaranthus* and *Euphorbia, Panicum capillare,* etc. Of late, and in consequence of increased communication with the Mississippi region and beyond —especially by rail-roads—other plants are coming in to the Eastern States as weeds, step by step, by somewhat rapid strides; such as *Dysodia chrysanthemoides, Matricaria discoidea, Artemisia biennis.* Fifty years ago *Rudbeckia hirta,* which flourished from the Alleghanies westward, was unknown east. Now, since twenty years, it is an abundant and conspicuous weed in grass-fields throughout the Eastern States, having been accidentally disseminated with Red-clover seed from the Western States. (*Next Page*)

Wild Flower Preservation Society

A NATURALIZED AMERICAN

Veronica officinalis, a weed as much at home now on this continent as in its native Europe

There are also native American weeds, doubtless indigenous to the region, such as *Asclepias Cornuti, Antennaria margaritacea* and *A. plantaginifolia,* and in enriched soils *Phytolacca decandra,* which have apparently become strongly aggressive under changed conditions. These are some of the instances which may show that predominance is not in consequence of change of country and introduction to new soil.

In many cases it is easy to explain why a plant, once introduced, should take a strong and persistent hold and spread rapidly. In others we discern nothing in the plant itself which should give it advantage. *Lespedeza striata* is a small and insignificant annual, with no obvious provision for dissemination. It is a native of China and Japan. In some unexplained way it reached Alabama and Georgia and was first noticed about thirty-five years ago; it has spread rapidly since, especially over old fields and along road-sides, and it is now very abundant up to Virginia and Tennessee, throughout the middle and upper districts, reaching even to the summits of the mountains of moderate elevation. In the absence of better food it is greedily eaten by cattle and sheep. The voiding by them of undigested seeds must be the means of dissemination; but one cannot well understand why it should spread so widely and rapidly, and take such complete possession of the ground. It is one of the few weeds which are accounted a blessing.

Lespedeza, the "weed which is accounted a blessing," has persisted and spread since Gray's time, and has recently been recognized as an important food plant for cattle in the South. Through the work of research botanists this drought- and flood-resistant forage crop is now becoming available to farmers, who are clamoring for its seed.

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The gem stone alexandrite, named for Alexander II, was prized by Russians because its changing colors—green in daylight, red in artificial light—were the national colors.

There are 150 million acres of National Forest land in this country and 17 million acres of forest land owned or managed by states, counties, and municipalities.

Spectral analysis makes it possible to identify constituents of materials, even detecting copper, silver, and other metals in quantities as small as one-millionth of one per cent.

PHYSIOLOGY

Sympathin, New Hormone and Stimulant, Found To Be Twins

ONE OF THE newest hormones, sympathin by name, is twins, it appears from the report of Prof. Walter B. Cannon, Harvard Medical School, to the National Academy of Sciences. Prof. Cannon explained before the Academy that he has just found there are really two sympathins, I and E.

Sympathin, discovered by Prof. Cannon and associates two years ago, is a hormone produced by smooth muscle. This is the kind of muscle, found in the blood vessels, digestive tract and elsewhere, that contracts involuntarily.

Sympathin is very much like epinephrine, more familiarly known as adrenalin, or adrenin, which is produced by the important adrenal glands. Both substances, for example, quicken the heart beat, cause a rise in blood pressure, and, in the cat, cause increased flow of saliva.

But sympathin is not the same as epinephrine, Prof. Cannon's latest studies show. Furthermore, the sympathin twins are produced at different times by the smooth muscle and have opposite effects on the body.

Sympathin E is produced when smooth muscle is made to contract, and has an exciting, stimulating effect on muscle elsewhere, quickens the heart beat, for instance. Sympathin I is produced when smooth muscle is made to relax and has only an inhibiting, relaxing effect on muscle in other parts of the body.

In a recent discussion, Prof. Cannon said that the discovery of the sympathin twins suggested that epinephrine might be modified chemically so as to use it in a discriminative way. For example, epinephrine or adrenin E, if made, could be used to stimulate the heart, raise blood pressure, etc., without checking or stopping the digestive process. Adrenin I could be used to relax spasms of the gastro-intestinal tract, for example, without raising the blood pressure or increasing the blood sugar. This would increase the usefulness of an already valuable medical aid.

Science News Letter, April 29, 1933

SEISMOLOGY

Death-Dealing Quake Was Not A Major Disturbance

THE RECENT California earthquake (March 10) was not a major shock and its energy was far less than that of the Nevada shock of November 20 to 21 last year, Harry O. Wood and C. F. Richter, seismologists of the Pasadena Seismological Laboratory, have concluded as the result of a preliminary but detailed study of the earthquake.

In magnitude and intensity of local shaking, the March 10 shock probably did not exceed and may even have been less than the Santa Barbara earthquake of June 29, 1925. The greater extent of property damage and loss of life, about 120 persons, in the recent shock is attributable, the seismologists conclude, to the more thickly settled character of the strongly shaken area.

"The intensity of the main earthquake probably nowhere exceeded VIII on the modified Mercalli scale of 1931," the seismologists report. An earthquake of intensity VIII causes slight damage in specially designed structures, partial collapse of substantial buildings and great damage in poorly constructed buildings. Chimneys, monuments, columns and walls fall, heavy furniture is overturned, and even persons driving motor cars are disturbed.

"Apparently stronger shaking at certain points where considerable destruction occurred was very probably due to the water-soaked alluvial character of the ground," the report states. "Damage was most extensive at Long Beach, which happened to be the largest center of population near the origin. At all points, spectacular (*Turn to Page* 269)