in the pungapung the crystals occur in the stems and leaves.

Application of the crystals to the skin produces a violent irritation which continues for a considerable period of time. This property is made use of in the Philippines for the protection of fish ponds against robbers. The crushed fruits of Cabo negro are scattered along the edges of the ponds, and make a very effective barrier against bare-footed intruders.

Many of these plants containing stinging crystals are used for food purposes. Prolonged boiling renders them harmless, and microscopic examination shows that the crystals have been destroyed. The irritation produced by the fresh material is very similar to that produced by the latex of the unripe papaya (*Carica papaya* L.), in which the active agent is the proteolytic enzyme papain. This affords a hint as to the reasons why irritation is produced by some plants with raphides, and not with others.

Four possibilities may be taken into account: (1) Irritation may be due to the mechanical action of the crystals; (2) It may be due to organic acids; (3) It may be due to an enzyme; or (4) It may be due to a combination of (1) and (2) or (1) and (3) or a combination of all three.

A strong infusion of the crushed tissue was filtered over a suction pump. The filtrate, though devoid of crystals, was found to produce irritation when left in contact with the skin, but its action was not nearly as violent as when the crystals were present. Scratching of the skin followed by application of the filtrate produced much more comparable results. The conclusion, therefore, is that the crystals are essential to the production of the full amount of irritation, but that the active agent which produces the effect after the first mechanical action of the raphides (which may be reproduced experimentally by pin pricking) is some substance associated with them. This is not an acid, as the liquid is slightly alkaline in the case of the palms and neutral in *Amorphophallus*. In *Laportea* and *Urtica* (*Urticaceae*) it has been shown that the irritation is due to formic acid, injected after the skin has been pierced by the siliceous trichomes. The mechanism in the cases of stinging hairs may, therefore, be compared to that of stinging crystals. Mechanical piercing is followed by the further action of an irritant. Bearing in mind the similarity in sensation produced by these crystals with that produced by the latex of the papaya, some confirmatory experiments were carried out with the result that conclusive proof was produced that the irritant was a proteolytic enzyme. Within little more than an hour cubes of hard-boiled white of egg were appreciably corroded when immersed in the juice. Ammonia and metallic salts (such as mercuric chloride) acting as enzyme inhibitors when added to the juice destroyed its irritating properties for the most part, though the annoying prickling of the raphides could still be felt.

The custom of boiling the tissues of plants containing stinging crystals before using them for food has two objects. First, heating with water dissolves the crystals, and second, the heat destroys the enzyme.

SUMMARY

The results go to show that in the case of plants with stinging crystals, the action consists of two distinct stages: (1) The mechanical action of the raphides in piercing the skin; (2) The entrance through the minute wounds of a proteolytic enzyme which is the cause of the greater part of the effect.

The removal of the crystals by filtration or the destruction of the enzyme will not eliminate all the irritating properties, but the two actions together are sufficient, and so the action must be regarded as being produced by combination of the two factors.

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THE WESTERN SOCIETY OF SOIL MANAGEMENT AND PLANT NUTRITION

THE Western Society of Soil Management and Plant Nutrition held its third annual meeting on June 24 and 25, commencing one day in advance of the regular session of the Pacific Division of the A. A. A. S. Twenty-five members attended and participated freely in the discussion of the papers.

Four half-day sessions and a business meeting were held and the following program was presented:

SOIL ALKALI AND SOIL ACIDITY

Replaceable bases in relation to soil acidity and the theory of replaceable bases: W. P. KELLEY.

The relation of certain alkali salts to the growth of plants: A. R. DAVIS and D. R. HOAGLAND.

Tolerance studies for alkali soils in Idaho: R. E. NEIDIG and H. P. MAGNUSON.

The injurious after-effects of sorghum: J. F. BREAZEALE.

THE SOIL SOLUTION

Nature and promise of the soil solution: J. S. BURD.

Secular and seasonal changes in the soil solution: J. S. BURD and J. C. MARTIN.

Some physiological aspects of soil solution investigations: D. R. HOAGLAND.

Soil structure and the soil solution: M. D. THOMAS.

Replaceable bases in relation to the soil solution: W. P. KELLEY.

PLANT NUTRITION

The stimulation effect of NaCl upon respiration and growth of wheat: A. R. DAVIS and L. J. TEAKLE.

The relation of potassium to the formation of diastase in wheat seedlings: A. R. DAVIS and J. L. DOUGHTY.

The growth of plants under controlled environments. I—Electric light as a source of illumination: A. R. DAVIS.

The significance of the temporary depletion of certain essential mineral constituents in the soil on plant growth: W. F. GERICKE.

Fertility experiments in Oregon: W. L. POWERS.

The moisture equivalent as influenced by the amount of soil in this determination: F. J. VEIHMEYER, O. W. ISRAELSEN and J. P. CONRAD.

Capillary potential measurements for the Greenville soil: CHESTER A. CHAMBERS and WILLARD GARDNER.

Routine testing of alkali soils in the laboratory (demonstration): P. L. HIBBARD.

The soil profile as a basis for soil classification: C. F. SHAW.

Some chemical effects of sulphuric acid on alkali soils: C. D. SAMUELS.

The officers for the ensuing year are: D. R. Hoagland, University of California, Berkeley, *president;* H. P. Magnuson, University of Idaho, Moscow, *vice-president;* M. D. Thomas, Utah Experiment Station, Logan, *secretary-treasurer.*

THE WESTERN BRANCH OF THE AMERICAN SOCIETY OF AGRONOMY

THE Western Branch of the American Society of Agronomy held its eighth annual meeting at the University of Wyoming at Laramie, Wyoming, on July 21, 22 and 23. About fifty agronomists were present, coming from twelve states and the U. S. Department of Agriculture.

The program was as follows:

"Address of Welcome." A. G. Crane, president of the University of Wyoming.

"Response." F. J. Sievers, president of the Western Branch of the Washington Experiment Station.

"Roll-call." Each man gave his name, position and a brief statement of his work.

Crop standardization and registration of seeds: A. G. OGAARD, extension agronomist, Montana State College.

Ladino clover seed production and its value as a pasture crop: R. L. SPANGLER, assistant agronomist, University of Idaho.

Some extension methods of field crops work: WALDO KIDDER, extension agronomist, Colorado Agricultural College.

Investigation of livestock losses on sweet clover pasture: CLYDE MCKEE, agronomist, Montana State College.

Problems in agronomy as they are related to the production of range and dairy livestock: O. S. FISHER, extension agronomist, U. S. Department of Agriculture.

The plan for the development of a regional program of extension work in farm crops: E. MERRITT, field agent, Extension Service, U. S. Department of Agriculture.

A comparative study of hardiness of wheats: JOHN H. MARTIN, agronomist, Western Wheat Investigations, U. S. Department of Agriculture.

Drill calibration and its relation to stand and yield of small grain: H. W. HULBERT, agronomist, University of Idaho.

Critical periods for irrigation of wheats: D. W. Robertson, assistant agronomist, Colorado Agricultural College.

The prevention of insect attack on stored grain by carbonate dust: W. W. MACKIE, assistant agronomist, University of California.

Predicting wheat yields: O. R. MATHEWS, assistant in dry land agriculture, U. S. Department of Agriculture, Newell, South Dakota.

Natural crossing of oats: F. A. COFFMAN, agronomist, Cereal Investigations, U. S. Department of Agriculture.

Relation of temperature and rainfall to date and rate of seeding: A. F. SWANSON, Hayes Experiment Station, Kansas.

Improving the quality of American-grown durum wheats: J. A. CLARK, agronomist, Western Wheat Investigation, U. S. Department of Agriculture.

The nitrogen problem from the Kansas point of view: P. L. GAINEY, soil bacteriologist, Kansas State Agricultural College.

The soil nitrate problem in Colorado: ALVIN KEZER, agronomist, Colorado Agricultural College.

The deleterious effect of sorghum in the soil on succeeding crops: R. S. HAWKINS, agronomist, University of Arizona.

The tillering of grain as related to the yield and rainfall: RALPH W. SMITH, assistant agronomist, Dickinson Substation, North Dakota.

Range losses on poisonous plants and their control: O. A. BEATH, chemist, University of Wyoming.

Outstanding weaknesses in agronomic investigational work: F. J. SIEVERS, agronomist, Washington State College.

At the business meeting Wednesday morning it was decided to hold the next meeting at Fort Collins, Colorado, either just before or just after the meeting of the Western Branch of the American Association for the Advancement of Science, at Boulder. Clyde McKee, of Montana, was elected president for the ensuing year and D. W. Pittman, of Utah, secretary, Alvin Kezer, of Colorado, being automatically the other member of the executive committee.

There was an inspection of the Wyoming State Experiment Station farm and its work on July 22, and on Wednesday afternoon the visitors were taken in cars on a trip to the Medicine Bow Mountains, after which a trout supper was enjoyed at Centennial. After the supper, remarks were made by Dr. H. L. Westover, Professor F. J. Sievers and President A. G. Crane.