

FARM AND ORCHARD

Notes and Instructions from Agricultural Colleges and Experiment Stations of Oregon and Washington, Specially Suitable to Pacific Coast Conditions

THE CHEMISTRY OF THE HOP.

By H. V. Tartar, Oregon Agricultural College.

The large amount of hops grown in this state makes the chemistry of the hop of interest both to the local experiment station chemist as well as to the hopgrower. The annual production of the hop crop of this state approximates 90,000 oases annually, while the total consumption of hops in the United States, according to one writer, amounts to 45,000,000 pounds. Again, in the adoption of proper standards for judging the quality of hops the chemical composition must be given considerable consideration. Since the cone is the portion of the plant used commercially, only this portion will be considered in what follows.

Many researches have been carried out by different chemists on the composition of the hop cone, the earliest investigations dating as far back as 1829. During recent years much work has been done on this subject and the results obtained have not been concordant in many instances. The different investigators seem to be agreed, however, that the principal constituents of the hop cone are a volatile oil, a wax, a hard resin, two soft bitter resins, an alkaloid and a tannin.

If hops are placed in a still with water and the mixture boiled, oil drops will be seen coming over with the distillate. As the process continues and a larger quantity of material collects it will be noted that it has a light green color. This oily hop and although it amounts to only one-half of 1 per cent, it is the constituent which gives to the hop its fragrant odor. It is a greenish, mobile liquid and is very aromatic. It is composed of three or four different bodies, some of which are known chemically as terpenes, being closely related in composition to ordinary turpentine.

A wax was isolated from the hop in 1862 by a German chemist. He found the substance to be a white, waxy material, closely allied in nature to beeswax and other waxes. An examination showed the hop wax to be a chemical compound, known as myricyl palmitate. The amount of this substance present in the hop amounts to approximately 0.40 per cent. It is a tasteless, inert substance which is apparently of no value in the practical uses of the hop.

From the investigations made it appears that there are three distinct resinous substances in the hop cone and for convenience two are designated as "soft resins," while the third is called the "hard resin." When the cone is extracted with ordinary ether, all three of these resins are dissolved. If the ether be evaporated from the extract obtained, however, and the resulting residue be treated with light petroleum spirit, only the soft resins pass into solution, while the hard resin is left behind as a light green amorphous residue.

The hard resin is almost tasteless. Chemical experiments indicate that it is probably a mixture of different substances and no definite results have been obtained as to its actual composition. So far as is known it has no value in the practical uses of the hop. The amount of hard resin seems to increase with the age of the hop and also with the use of high temperatures in drying.

For convenience the soft resins are designated as the "alpha" and the "beta." According to the present belief these substances are the constituents which impart to the hop cone the major part of its actual commercial value. Collectively they are known as the "hop bitter," or "bitter principle," and many consider the amount of soft resins as one of the prime factors in judging the quality of the hop. Analyses made in this laboratory show that Oregon hops contain from 13 to 18 per cent of these materials. In the pure state the soft resins are both crystalline substances, which, although only sparingly soluble in water, are readily soluble in alcohol. They impart to their solutions an intensely bitter taste. The "beta" resin is colorless, while the alpha is of a beautiful golden yellow color. When in solution both act as weak acids toward alkalies and for this reason they are often termed the "hop-bitter acids." They also possess certain definite antiseptic properties.

Hops have long been assumed to contain an alkaloid. A German chemist several years ago succeeded in isolating a substance giving the general reaction of an alkaloid. Subsequent investigators repeated this investigation with negative results. Recently, however, an alkaloid has been isolated which is said to closely resemble morphine in its properties. Practically nothing of a real definite nature is known regarding this substance and it is evidently present in very small quantity.

A tannin is present in the bracts and stems of the hop cone which can be extracted with hot water. When isolated it is a reddish brown powder possessing an astringent taste. What the actual value of the hop tannin is in the commercial uses of the hop is still an open question.

The preceding review is simply a

brief summary of the chemistry of the hop as obtained from a study of the literature on the subject. There is much regarding the chemical composition of the hop which is still in doubt and it affords a fruitful field to the agricultural chemist for further investigation. When the exact nature and value of the different constituents have been demonstrated by scientific means, then we will be better able to judge the real value of the hop and also suggest methods for improvement in its culture.

WILL SAVE STATE MORE MONEY.

Corvallis—Prediction is made by Prof. E. L. Potter of the animal husbandry department of the Oregon Agricultural College, who is also secretary of the new state stallion license board, that the operation of the new stallion law will save the horsemen of the state many thousands of dollars.

"If we had had the law before it would have saved some \$10,000 or \$15,000 to the horsemen of the state on the price of animals sold them as pure-bred under bogus certificates," said Professor Potter recently, discussing the results to be expected. "It is probable that \$1000 more was paid apiece for the dozen stallions with unsatisfactory pedigrees for whom we have received requests for licenses, than if a true statement of their breeding had been given at time of sale."

"We have thus far had applications from about 400 stallion owners, which is probably not much over half the number of stallions owned at present in Oregon. The greater number have come from Walla Walla county, though many have come in from Marion, Douglas, Baker, and other parts of the state. We take these applications as an evidence of good faith on the part of the breeders, and they will not, of course, be prevented from using their stallions between the filling of the application and the issuance of the license. The heavy correspondence regarding applications, and the work of classifying and fitting them, occupies us at present, but when that is done we will begin issuing the licenses."

"Besides correcting the present practice of some horsemen of selling and using stallions having bogus pedigrees, the new law will do much to raise the standard of soundness, and thus improve the stock of the future. The future saving to horsemen of Oregon on these two points will be more than the entire cost of inspection and registration, to say nothing of the prevention of the use of stallions as 'sound,' which have diseases or constitutional weaknesses liable to affect the offspring."

SAVE YOUR RADISHES AND ONIONS.

Corvallis — "Carbolic acid emulsion is used to destroy the eggs and young maggots which infest radishes, onions and similar garden crops, and occasionally for other insects," is a statement of H. F. Wilson, entomologist at the Oregon Agricultural College, who is about to publish a useful bulletin on the protection of the garden from pests.

"To make such an emulsion, dissolve a pound of hard soap in a gallon of boiling water, add a pint of crude carbolic acid, and churn (preferably with a handpump) until the mixture is a creamy white. This forms a stock which may be diluted by adding thirty times as much water as stock. It should be applied to the surface of the ground about the plants."

FASHION HINTS



This suit of dark blue soft-finished serge has all the newest touches without being tryingly extreme. The coat is short without being "bobby," and the skirt is narrow, though far from suggesting the "hobble"

NOTED MAN PASSES

Higginson Was Historian, Author, Clergyman and Soldier.

Famous American Who Was Active in Many Lines Leaves Enduring Works to Perpetuate His Name.

Cambridge, Mass.—In the death of Col. Thomas Wentworth Higginson, which took place here in his 87th year, there passes one of the country's most noted men. Historian, author, clergyman, soldier and abolitionist, he was active in many lines and leaves enduring works to perpetuate his name.

Col. Higginson was a student under Longfellow, a neighbor of Oliver Wendell Holmes, a college mate of Edward Everett Hale and friend of Emerson, Whittier and Longfellow. As essayist, historian, biographer and writer for the young, he made for himself an unusual place in American literature. Though the author of a volume of verse, he never claimed place as a poet, modestly entitling this work "Such as They Are."

Col. Higginson was born in Cambridge, Mass., in 1823 and graduated from Harvard in 1841. In 1847 he graduated from the Divinity school in Cambridge and the same year was ordained pastor of the First Congregational Church at Newburyport, Mass. He left this church in 1850 because of the unpopularity of his anti-slavery teachings, and in the same year stood unsuccessfully as the Free Soil candidate for congress. He then became pastor of a church in Worcester, Mass., from 1852 to 1858. Leaving his charge in the latter year he devoted himself to literature and to anti-slavery agitation. For his part in the attempted rescue of Anthony Burns, a famous incident in the anti-slavery days, he was indicted for murder, together with Theodore Parker, Wendell Phillips and others, but



Col. Higginson.

was released on account of a flaw in the legal papers. He also took part in organizing parties of free-state emigrants to Kansas in 1856 and served as brigadier general in James H. Lane's forces in that state organized to drive out the Missouri invaders.

Mr. Higginson was made captain in the Forty-first Massachusetts regiment in 1862; in the same year he was made colonel of a regiment of colored troops, the First South Carolina Volunteers, afterward known as the Thirty-third United States Colored Troops, the first regiment of freed slaves mustered into service. Col. Higginson saw considerable active service in the war. He took and

THE ELECTRICAL HEN NEXT

Simple Device Attached to an Incubator Gives Astonishing Results to a Washington Farmer.

Tacoma, Wash.—Sixty-nine healthy chicks from a setting of 73 eggs have just been hatched by electricity on J. Don Alexander's ranch at Reilmeter's Station, Wash. The initial test was so successful that 1,300 eggs will be placed in the incubators as soon as the apparatus can be installed. The equipment, which is not patented, can be attached to any oil-burning incubator at an expense of less than one dollar.

Construction of the electrically operated incubator is simple. Mr. Alexander took the lamps from the oil-burning machines and wound German silver wire around the frames above the egg trays, connecting the coils with an incandescent light circuit. This is made through a contact device consisting of a piece of iron fixed on the regulator arm to dip into a small cup filled with mercury.

When the temperature in the incu-

ator rises to 103 degrees, the natural matching point, the iron arm is lifted automatically, shutting off the current until there is a fall of one fourth degree.

Born Minus Arms and Legs.
York, Pa.—A girl born to Mr. and Mrs. Robert McClure in Dillsburg has no arms nor legs. The child is healthy, but there is no sign of any leg, and stumps about one inch long are where the arms should be.

Woman Blinded by Stove Polish.
Pottsville, Pa.—Mrs. Irvin Eisenhauer is in a serious condition as the result of an explosion of stove polish. She was rendered blind and her face and head were badly burned by the burning fluid.

Pretty Girls Shine Shoes.
St. Louis, Mo.—Two comely young women are employed in a shoe shining parlor here, and are wielding the brush with a great deal of ardor. They do not confine their endeavors to women customers, either.



Ruined Temple of Thebes.

her great temple was her chief glory. The glory of that which was Thebes are the ruins of that temple, erected for the worship of Ammon, the Unrevealed, holder of the Sceptre of Power and the Cross of Love, late the Zeus of Greece and the Jupiter of Rome. What is left of it is colossal; what it must have been in its full magnificence many have sought to imagine; that which exists is but a tenth part of that which has perished.

The encircling wall of raw bricks, some parts of which are still visible, enclosed a space of over 320 acres. The first entrance, from the interior of which this photograph was taken, is about 367 feet wide and about 136 feet in height. It stands before the large court shown in the foreground. On either side of this are columns; then comes the great colonnade hall, its entrance guarded on the right by a stone Pharaoh. In the inner court stands an obelisk of Thothmes I. The huge doorways leading from court to court are particularly fine. The temple was one of the wonders of the ancient world.

Man and Woman in Egg Duel.

Parkersburg, W. Va.—Because J. N. Smith, a grocer, did not wait upon her as promptly as she thought he should, a woman customer picked up an egg and hurled it at him. It struck him in the left eye. A shower of sickly yellow liquid daubed the grocer's face. Infuriated, Smith, it is said, dived into the egg basket with both hands and hurled eggs, good, bad and indifferent, at her. The merchant stopped throwing when the supply was exhausted. The woman fled after every egg had hit her.

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GOOD? SURE IT IS

It's Good when the stomach is bad.

It's Good when the bowels are clogged.

It's Good when the liver is inactive.

It's Good in any malarial disorder.

HOSTETTER'S STOMACH BITTERS

AVOID SUBSTITUTES.
TRY A BOTTLE TODAY.

Some Bad Examples.

We have all heard of the butcher who was a vegetarian, of the barber who never shaved, of the shoemaker who let his children go barefoot, but here is a new one. A delegate to the late convention of the laundresses at Lawrence wore a celluloid collar.—Lawrence Gazette.

WOMEN MAY AVOID OPERATIONS

By taking Lydia E. Pinkham's Vegetable Compound

The following letter from Mrs. Orville Rock will prove how unwise it is for women to submit to the dangers of a surgical operation when it may be avoided by taking Lydia E. Pinkham's Vegetable Compound. She was four weeks in the hospital and came home suffering worse than before.

Here is her own statement.

Paw Paw, Mich.—"Two years ago I suffered very severely with a displacement. I could not be on my feet for a long time. My physician treated me for seven months without much relief and at last sent me to Ann Arbor for an operation. I was there four weeks and came home suffering worse than before. My mother advised me to try Lydia E. Pinkham's Vegetable Compound, and I did. Today I am well and strong and do all my own housework. I owe my health to Lydia E. Pinkham's Vegetable Compound and advise my friends who are afflicted with any female complaint to try it."—Mrs. ORVILLE ROCK, R. R. No. 5, Paw Paw, Michigan.

If you are ill do not drag along until an operation is necessary, but at once take Lydia E. Pinkham's Vegetable Compound.

For thirty years it has been the standard remedy for women's ills, and has positively restored the health of thousands of women. Why don't you try it?

Aeroplanes in Hindu Mythology.

Hindu belief and lore alike strongly hold that aerial navigation is not the new thing that it is claimed to be in Europe. It is said that aeroplanes of some sort or other were the conveyances ordinarily used by the Devas (heavenly beings) of Hindu mythology.

Fine Care Fine Hair

It's fine care that makes fine hair! Use Ayer's Hair Vigor, new improved formula, systematically, conscientiously, and you will get results. We know it stops falling hair, cures dandruff, and is a most elegant dressing. Entirely new. New bottle. New contents.

Does not change the color of the hair.

Formula with each bottle. Show it to your doctor. Ask him about it. Then do as he says.

Ayer's Hair Vigor, as now made from our new improved formula, is the latest, most scientific, and in every way the very best hair preparation ever placed upon the market. For falling hair and dandruff it is the one great medicine.

Made by the J. C. Ayer Co., Lowell, Mass.