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DIVISION OF FORESTRY.

FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

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All communications in regard to seed or trees should be addressed to David Haughs, Forest Nurseryman, Box 207, Honolulu, Hawaii.

RALPH S. HOSMER,
Superintendent of Forestry.

DIVISION OF ENTOMOLOGY.

To give information about insects free of charge is one of the duties of this Division and Hawaiian readers are hereby invited to make inquiry in person and by mail. In order to be able to advise intelligently or send the right kind of useful insects for relief we like and sometimes it is indispensable for us to see the insect suspected or caught in the act, also specimens of the injury. In a tin with a hole or two, or a wooden box specimens may be mailed at 3rd class rates. When specimens are not accompanied by letter *always* write your name and address in the upper left-hand corner of the package. Address all communications SUPERINTENDENT DIVISION OF ENTOMOLOGY, P. O. BOX 207, HONOLULU, HAWAII.

EDW. M. EHRHORN,
Superintendent.

THE HAWAIIAN

FORESTER & AGRICULTURIST

VOL. IX. MARCH, 1912. No. 3.

Another article of Professor McCaughey's series on Honolulu palms appears in this number.

Mr. Swezey's paper on insect parasitism, begun in this number, is interesting as well as instructive.

There is not a more interesting and important problem, if the subjugation of animal and plant distempers be excepted, pending in the Board of Agriculture and Forestry than that of the reclamation of Kahoolawe. Not only for the intrinsic profit of making the little island industrially productive, adding so much more to the limited area of arable land in the Territory, is the matter attractive, but the lessons of economical reclaiming and conserving that, with comparative cheapness and positive absence of appreciable risk of anything, may be learned from the experimentation necessary to the task will undoubtedly be of inestimable value in dealing with reclamation projects elsewhere in these islands. Mr. Hosmer's proposals in the matter in this number will be read with general interest.

Mr. Adams' plea for a secondary agricultural school is reprinted in this number from a daily newspaper. It is worthy both of study and preservation. The projected school of this character at Kahuku ought to be only the first of several in this Territory—one at least for each island being the minimum to work toward. There are two or three public and private schools in Hawaii which have for years been developing on the lines proposed, which bid far to attain to the standard contemplated for the Kahuku farm school. From all reports, in official periodicals and the news press, the Philippine Islands are forging ahead in agricultural instruction combined with other education, not only faster than Hawaii but bidding fair to establish models worth noticing by many states in the mother country. Teachers can not fail to be greatly helped in bending the pliant twig of youthful aspirations for life and livelihood on and from the soil by fully absorbing the sentiments and suggestions of Mr. Adams.

It is gratifying to note a fresh triumph of the new policy of marketing superintendency under the direction of Mr. Starrett. This is the development of an enthusiastic and productive interest in the growing of the Bermuda onion on the Island of Kauai. Some samples of the bulbs exhibited in town were a revelation to those seeing them. While the plans were all laid for making the Kauai output a new article of export to San Francisco for the off season in California, local dealers rose in arms so to speak and put a price on the onions for the local market which could not be rejected. So, while the home consumption keeps up with the supply, the growers are saved the ocean freight and all other attendant export risks upon their product.

Contributors, of whom the number is increasing in gratifying manner, may be implored to limit the length of their papers for this magazine. Its pages are restricted in number to fit the cost appropriation, and anyhow an article running beyond three or four pages must be interesting indeed not to be tedious to the average reader. It should also be known that the official matter, including that semi-officially requested insertion, nearly every month requires a large proportion of the available space. Since, too, the cause of agriculture in the schools has had the Forester made its organ, a problem of every month put up to the editor to solve is the due apportionment of space to the various subjects now germane to these pages. With the assistance of the president of the Board of Agriculture, however, it is hoped to effect a proper balance of all things before long. The growing importance of the Forester and Agriculturist, resulting from its widened scope, makes the necessity of its enlargement appear imminent. In the meantime the faculty of condensation should be exercised by all its contributors.

ROSELLE.

The roselle (*Hibiscus subdariffa*) which was introduced and distributed to a limited extent this spring by the Bureau, is making a most satisfactory growth at the experiment stations, and a good yield of fruit and seed for future distribution is expected.

The roselle is an annual related to the cotton and okra, and is probably the only plant in the world whose calyces are utilized for food. The plant flowers in October and the rapidly developing fleshy calyces are picked and used in making sauces, jellies, or jams, very similar in flavor to those made from the cranberry. A good wine is also made from the calyces. A very agreeable cooling drink may be made from the leaves and tender twigs, steeped in boiling water. In India the roselle is grown principally for its fiber.

The many useful qualities of the roselle and the ease with which it may be cultivated are sure to make it a favorite among all classes as soon as it becomes known in the Philippines.—*Philippine Agricultural Review.*

NOTES ON SOME HONOLULU PALMS—III.

VAUGHAN MACCAUGHEY—The College of Hawaii.

The Slender Fan-Palms—Thrinax.

Thrinax is a Greek word for fan. The palms of this genus are characterized by their fan-shaped leaves and slender trunks. There are nine or ten species of Thrinax, all confined naturally to the tropics of the New World. They are distributed from Southern Florida through the West Indies to the shores of Central America. They are now used as pot-plants and ornamentals in many parts of the world. The species that is common in the Honolulu region is the *Thrinax argentea*. Those grown in pots or tubs are young or stunted plants, and have little or no stem; those grown out of doors in the ground attain mature stature, with tall, slender trunks (see fig. 2).

The Thrinaxes are small palms, rarely over 15 to 20 feet in height. In the cultivated species there is but a single stem to a plant, the others either not developing or being pruned away. In the case of several of the wild forms, however, the palm sends up from the ground a number of stems, forming a clump or group. The lower portion of the trunk is marked by the ring-like scars left by the falling leaves; the upper portion is more or less clothed by the fringed leaf-sheaths. The rind, or outer layer of the stem is pale gray, almost as light in color as the rind of the royal palm. The wood is light and soft, with numerous small fibro-vascular bundles. The exterior of the stem is much harder than the spongy interior. According to Sargent, in the Southern States "the stems are used for the piles of small wharves and turtle crawls" (traps).

The leaves of Thrinax form a loose, graceful crown at the summit of the slender stem. The leaf-blade is orbicular. It is thick and firm in texture and is conspicuously folded or plaited, like a fan. The plaits or segments are separated near their ends, and the ends themselves are forked or split. The rind is either quite short or entirely lacking. At the center of the upper surface of the blade, above the point where the petiole is attached, is the conspicuous, elevated, concave ligule. While young it is lined with a silvery wool. This conical, pointed ligule is one of the characteristics of the Thrinaxes, distinguishing them from other palms.

The petioles are long, slender, and arched by the weight of the blade. In cross section a petiole is biconvex, and its margins are smooth. The leaves of palms are characterized by the peculiar and interesting sheaths that encompass the bases of the petioles. These sheaths are composed of stout, interlacing fibers, which form a coarse fabric-like material, and indeed are utilized as such by many semi-civilized peoples. The sheaths of the

FIG. 1.

Palmettos have been described in a preceding article. Those of the Thrinaxes are bright mahogany red in color, and are covered with a thick, silvery wool, which masks the true color of the slender, matted fibers (see fig. 1). The sheaths are relatively large, and clasp the stem instead of hanging loose like those of the cocoanut.

FIG. 2.

The characteristics of the leaves of the various Thrinaxes may be used to identify them. The following key is given by Mr. Jared G. Smith, now of Kona, Hawaii, in Bailey's Cyclopedia of American Horticulture. Mr. Smith has made an exhaustive and technical study of the palms, and his articles have been the source of much of the data given in this non-technical series. Mr. Smith's key to the ornamental species of Thrinax has been slightly modified.

A. Under surface of leaves green.
  B. Ligule with a blunt appendage at the middle. *Thrinax radiata.*
  B.B. Ligule bluntly triangular. *T. Parvifolia.*
  B.B.B. Ligule inconspicuous, truncate. *T. Barbadensis.*
A.A. Under surface of leaves silvery.
  B. Leaf segments joined together at bases. *T. argentea.*
  B.B. Leaf segments joined together for about one-third their length. *T. excelsa.*
  B.B.B. Leaf segments joined together for about one-half their length. *T. multiflora.*

The flowering branches arise from among the leaf bases. They are long and slender, with numerous branchlets. The main axis of a flowering branch is clothed with thin, papery, tubular sheaths, split open along one side. The flowers themselves are small and are not brightly colored. The fruit is spherical, about the size of a pea, with a dark skin and juicy, bitter white flesh. The single central seed is thin shelled and brownish. Honolulu trees are commonly in fruit during April and May, the fruiting branches resembling gigantic clusters of small grapes (see figs. 1 and 2).

The Thrinaxes are widely used as pot or tub plants, and less commonly planted in the open. They grow somewhat slowly, but demand little care. Their graceful appearance and easy culture has given their great popularity, and *Thrinax argentea* is one of the more common of the small palms in the Honolulu region.

SUGAR, TEA AND COFFEE.

Some government statistics which have appeared recently throw light upon British tastes, and the extraordinary capacity of British stomachs in certain directions. Thus the amount of sugar we eat in one form or another is astounding. We import more than one-tenth of the world's production, which was estimated at 15,250,000 tons in 1910. Of the total product, more than half (8,600,000 tons) was cane sugar, and the rest beet. Of beet sugar, Germany produced 2,000,000 tons last year, and it is the semi-failure of the German crop that is mainly responsible for the sharp rise in prices. How serious this rise has been I may illustrate from the fact that it costs a laborer with sixteen shillings a week and a large family an additional sixpence a week. With sugar we naturally associate tea, and here again our consumption is enormous, amounting in 1910 to nearly 287,000,000 pounds. But why is coffee (the national drink of the United States) of so little account here? Our consumption of coffee last year was only just over 29,000,000 pounds, about one-tenth that of tea.—*Lucellum.*

RECENT INVESTIGATIONS IN INSECT PARASITISM.

By Otto H. Swezey.

(A paper read before the Agricultural Seminar, College of Hawaii, February 15, 1912.)

Insects as parasites have been known since the remotest times of human history. That insects, themselves, were parasitized by other insects was demonstrated in the later centuries, when close attention began to be given to biological studies. This gave rise to the familiar rhyme: "The little fleas which do us tease, have other fleas to bite 'em; and these in turn have littler ones, and so ad infinitum." Though not true of the flea, this idea is exemplified in many groups of insects that have been exhaustively studied in quite recent years.

At the first, let us ask, "What is meant by insect parasitism?" Parasitism has been defined as an association of two different animals, one, the parasite, living at the expense of the other, the host. Many of the parasites with which we are familiar do not kill the host outright, but live along with the latter continually, often for long periods of time, or acting only as an annoyance for shorter periods of time; as, for example, lice and fleas on our domestic animals.

On the other hand, when one insect parasitizes another insect, it usually results in the death of the host; as, for example, the Tachinid fly, which lays its eggs upon army worms and other caterpillars. When the egg hatches, the young maggot penetrates the body of the caterpillar, there living and growing by feeding on the juices and fat of the host, not attacking the vital organs till the young parasite nearly reaches its full growth. It finally does destroy sufficient of the vital organs as to result in the death of the caterpillar, which has all along been supplying the nutriment for its growth; then leaving the dead corpse of its host, enters the ground to finish its transformation to the adult stage.

A predaceous insect also causes the death of the insect on which it feeds, but it is a more sudden process; as, for example, when a ladybird beetle eats a plant-louse, it is a momentary affair. This illustrates the difference between insects that are parasites and those that are predators. However, the line between the two classes cannot be very accurately drawn. To illustrate: When the little Braconid fly stings and paralyzes a palm leaf-roller caterpillar, lays its eggs on the surface of the caterpillar, and these hatch and feed externally on the paralyzed caterpillar, in two or three days completing their growth, then spinning their silken cocoons on the leaf nearby, from which the adult insects emerge in about a week, we call this insect a parasite. But when

a certain black wasp catches these same caterpillars from the palm leaves, stings each one to paralyze it, and stores up half a dozen of them in a cell of its nest in which an egg has already been deposited, and the larva hatching from this egg eats all the caterpillars in a few days, we do not call the wasp a parasite; but speak of it as preying upon caterpillars. In each case, however, the caterpillar which is the victim is stung and paralyzed so that it remains in a living though inactive condition, until being eaten. In the case of the Braconid parasite, from one to twenty larvae occupy about three to four days in eating one caterpillar; while in the case of the wasp, its larva eats one or more per day of the paralyzed caterpillars stored in the cell for it. Apparently if one is a parasite, the other should be considered a parasite also. Neither of these quite answers to the condition of the definition of parasitism with which we started: that the host and parasite are *living* together, the latter at the expense of the former.

Among insects, parasitism is carried on in so many different ways that a general definition would have to be modified to fit many of the cases. This diversity is partially due to the transformations that insects pass through from the egg to maturity. Not so with all, but in general, from the egg hatches a larva, which may be a grub, maggot, caterpillar, etc., which eats and grows until attaining its normal size, then changes to the pupa stage, which is a quiescent stage externally, but very active internally, as many changes of structure take place, ressulting in the formation of the adult insect, which emerges from the pupa in due time.

Now about insects, there are certain families and groups that are always parasites on other insects. Some of them are parasitic in eggs of other insects; some are parasitic on the larvae; others parasitic on the pupae; and yet others parasitic on adult insects. All, however, resulting in the death of the host, at least in the great majority of cases. All of these are called primary parasites. Now some of these primary parasites may themselves be attacked by parasites, and these in turn may also be parasitized, all of which are called secondary or hyperparasites.

Each parasite has its own method of attacking the host and its own peculiar development; so much so, that there are about as many different methods as there are different species of parasites; but for the more closely related ones the habits are often very similar.

With all this diversity of habits, it is small wonder that the study of insect parasitism is so fascinating and that entomologists of modern times are giving so much attention to it. Many an entomologist has been content to sit in his study or laboratory and write descriptions and classify parasites without giving the least thought to their habits; but to most entomologists nowadays the study of the habits of these parasites is of far more

interest, each one being in a way an unknown problem to be solved; for, unless each one has been studied independently, its host, habits, etc., cannot be definitely known, although they may often be approximately predicted it the habits of those closely related are known. Many insect parasites have been accurately studied, but of the great majority there is yet much to be learned.

Aside from the scientific interest taken in them, their economic importance in keeping insect pests in check has been another reason why so much attention has been given to parasitic insects the past few years. Whenever investigations are made of insect pests, one feature of them is the study of parasites, to determine if there are any in connection with the pest, and if so, how effective they are. If none are found to be present, investigations are made to ascertain whether there may be parasites on the same pest elsewhere which might be secured for use in this particular case. Thus there has been a great deal done in the way of introducing parasites from another country, and even from the opposite side of the world. This has sometimes been accomplished successfully; but has often resulted in failure. There are, however, many important examples of the success of the project, with some of which you are all no doubt familiar.

Among the first of these introductions of beneficial insects from other parts of the world, was the introduction to California of the Australian ladybird beetle which destroys the cottony cushion scale. This was accomplished by Mr. Albert Koebele in 1889, and although ladybirds are not parasites, it is an example of the same class of work. Mr. Koebele did introduce a parasite at the same time, however, but it was the ladybird that was successful and effective against the scale insect.

A familiar instance of successful introduction of parasites is the introduction of egg-parasites for the sugar cane leaf-hopper in Hawaii. These parasites were introduced from Australia in 1904 by Dr. Perkins and Mr. Koebele. The results are too well known to need rehearsing at this time.

A striking example of unsuccessful attempts to introduce effective parasites, is that of Mr. Geo. Compere, who for several years sought many parts of the world for parasites of the Mediterranean fruitfly, to introduce into Western Australia. He finally secured several species of parasites in India, which were successfully introduced into Western Australia, and at first were reported as very satisfactory. More recent reports, however, are that the parasites have not proved effective.

Many more examples could be given of successful introduction of parasites, and unsuccessful attempts as well. Economic entomologists the world over are becoming more and more interested in this aspect of insect parasitism; and numerous are the experiments now going on in the attempt to find and introduce parasites from one part of the world to another to assist in the warfare against insect pests. There is hardly time to treat of all

of them. Probably such work is being carried on at the present time on by far the largest scale in connection with Gipsy Moth and Brown-tail Moth control work in New England. As is well known, the Gipsy Moth has been established nearly half a century in New England, starting from a suburb of Boston and spreading out in all directions, until it is now present in the eastern half of Massachusetts, the northeast corner of Rhode Island, a large portion of southeastern New Hampshire, the southwestern corner of Maine, and a few scattered places in central Massachusetts and in Connecticut. The caterpillars defoliate most kinds of forest, shade and orchard trees and shrubs, and have threatened the destruction of all such in that region. The Brown-tail Moth, another European pest, occupies the same region, and has a somewhat wider range of distribution. The two together form a very serious menace in that region, and to the whole of the country as well, for they are continually spreading in spite of strenuous efforts to keep them in check.

Six years ago, work was begun on the introduction of the European parasites of these pests. Investigation has shown that they have numerous parasites in their native habitat, and that they are usually kept under control by them. Hence, their introduction to America was started and was already being done on an extensive scale in 1906. Hundreds of boxes of parasite material have been imported each year since then, mostly from Germany, France and Austria, also a considerable from Japan. This material consisted of egg-masses, larvae, and pupae of the Gipsy Moth; and winter webs, larvae, and pupae of the Brown-tail Moth. The handling of such a large quantity of material required a large number of cages, and insectaries, as well as an appropriately equipped laboratory. This was established in 1907, at Melrose Highlands, Mass., a suburb north of Boston.

From all this material, large numbers of parasites bred out, consisting of quite a number of species, and attempts were made to establish them in favorable localities. Some have succeeded well, others fairly, and some have probably failed, though how many will not be known for a certainty till later on. The latest report on the work gives an indication of what can be expected, and it looks very encouraging for some of them.

When studied in their native countries, these moths were found to have parasites attacking them in all the younger stages; one or more attacking the eggs; many species attacking caterpillars; and several attacking the pupae of their hosts. Many of these have been reared at the laboratory; some of them for a number of generations, as well as breeding them out of imported material.

Of the egg-parasites of the Gipsy Moth, one from Japan (*Schedius*), was reared through ten generations in one year in the laboratory, and several hundred thousand liberated; but apparently it failed to become established, or at any rate, not so well as it was at first expected that it would. It bred during the

autumn on gipsy-moth eggs, but failed to survive the rigorous New England winter.

The other egg-parasite of the Gipsy Moth (*Anastatus*) occurs both in Europe and Japan. Many thousands of this parasite were reared from imported material, and colonized in several places. Later investigations of these colonies showed that the parasites had established in most of them, and were dispersing slowly, and that as high as 29 per cent. of gipsy-moth eggs were parasited in some instances. This parasite only attacks the eggs soon after they are deposited and before any embryonic development has taken place. Its life cycle was found to be perfectly correlated with that of the Gipsy Moth, producing one generation per year the same as the moth. The first-mentioned egg-parasite, however, produces several generations per year, and they only attack the eggs after the young caterpillar has become fully formed within the egg, living in and destroying this young caterpillar before it hatches. That is, it is an internal parasite of an unhatched caterpillar. It passes through one generation per month, but apparently does not hibernate in gipsy-moth eggs, and needs another host to carry it through the spring till the gipsy-moth eggs are deposited in mid-summer.

Of the parasites on caterpillars of the Gipsy moth, many have been introduced, both Hymenopterous and Dipterous. Most of the Hymenopterous parasites were not considered important; but one Braconid (*Apanteles*) gave great promise in the ease with which its cocoons could be transported, being successsfully carried from Japan in cold storage all the way. Many thousand were received alive, and from the adults emerging from them several colonies were established successfully. The adult of this parasite deposits its eggs (often many) inside a living caterpillar. When the young parasites are full grown, they emerge from the dead or dying caterpillar and spin their white silken cocoons in the immediate vicinity. Although so successfully established at first, yet the later reports are that this parasite can no more be found. They have hopes, however, that it will soon be found abundant; that it may have become widely scattered like some others that they have had, that seemed to be lost for a time on account of being so widely scattered that none could be found until they had increased greatly in numbers.

This species afforded opportunity for extensive investigations on hyperparasites. Thirty or more species of hyperparasites were reared from cocoons of this parasite imported from Japan. In shipments of cocoons of the same parasite from Russia, 20 to 25 species of hyperparasites were reared. After colonies of the parasite had become established, many of their cocoons were collected and these found to be highly parasitized. Eighteen species of American hyperparasites were found to attack this host, which has no doubt been a factor in its disappearance.

(*Conclusion next number.*)

A PLAN FOR A SECONDARY AGRICULTURAL SCHOOL.

Combining a broad view of education with a concrete idea of Hawaii's needs, Andrew Adams, manager of Kahuku plantation, made a notable address recently to the Territorial Teachers' Association. Mr. Adams was speaking on the plans for the secondary agricultural school at Kahuku, and made a forceful plea for a real trial of its merits. Mr. Adams' paper follows:

The Members of the Territorial Teachers' Association, Ladies and Gentlemen:

You have kindly permitted me to present to you the planters' point of view of the proposed establishment in Hawaii of a Secondary Agricultural School. I am credibly informed that Hawaiian planters are reputed to have evolved into autocrats of a sort. If this be so then it is possible that some of them, or of us rather, might be unwilling to delegate to me the authority to present the views of all. To avoid possible trouble therefore, permit me to slightly alter the title of my paper so as to limit my responsibility to presenting one planter's point of view.

It is entirely possible that some of the views which I shall present to you will be a repetition of the views of the other speakers of the afternoon, with mere changes in the phraseology of expression. Such a repetition will but serve to emphasize the fact that the interests of the teacher and the agriculturist are not incompatible, but, broadly speaking, are identical. Intrusted to each are natural forces susceptible of development into great productivity, always provided there is present in the mind and soul of the pupil and in the soil of the field that subtle constructive element or force so necessary to development.

The "Old-Style."

Familiar to us all is the picture of the old time pedagogue who expressed himself best in what Shakespeare called "three-piled hyperboles, spruce affectation, figures pedantical." Perhaps more familiar to us here is the sight of the old style plantation overseer who happened along from the ships in the harbor to try his hand at cane cultivation. I am speaking of classes, not of individuals. The community has come to insist that only such as have a natural inclination and particular qualifications for the work shall preside at the teacher's desk in the class room. In the final analysis there is no real place in the fields for the individual who has no real love of it. He is deficient in the larger view.

What has this to do with the establishment in Hawaii of a Secondary Agricultural School? You are teachers and understand the meaning of and appreciate the necessity for the larger view. For in your work and mine, inspiring us to sustained effort for its accomplishment, is the knowledge of that insistent human need of

intelligent, sympathetic guidance towards ultimate happiness and the common weal. Does happiness, then, exist on the sugar plantations of Hawaii? Not necessarily nor solely. Neither is it distinctively urban. There are, however, greater possibilities of its attainment by the large majority in the field than in the office or the workshop, for the very simple reason that, generally speaking, life is more natural in the field than elsewhere. Yet for several generations the drift of population has been citywards.

Figures to Prove.

I quote from figures compiled by Mr. William H. Rossit. The population of the world increased from approximately one billion in 1800 to about one billion and a half in 1900. In France, in that hundred years, a group of specified cities increased in population four hundred per cent. while the rest of the nation, exclusive of these cities, increased little more than 20 per cent. In England the population of the cities in 1801 was 25 per cent. of the whole, while in 1900 it was more than 50 per cent. of the whole. In the United States the population in the cities increased 100 times during the century while the remainder of the country increased only eleven times.

These figures are of great significance. I am not certain that the cause underlying this drift citywards is so much desire for urban residence through the belief that it is more advantageous, as it is the failure of the country to meet the needs of its population. Another significant fact has been revealed by statistical research. A large percentage of urban residents are temperamentally unfit for city life. Education is not responsible for this unfitness, although we hear much in these days of the tendency of modern systems to educate the people away from the soil. The agriculturist has not altogether fulfilled his obligations. He has not helped enough to open up the larger view.

This larger view need not include the ability to properly scan a line of Homer, nor to correctly render kai gar when it appears in the text, although that ability need not in itself prevent a tilling of the soil. It does include, however, the right of the individual to have offered him the kind of education which will stimulate his imagination, train his hand and eye, increase his self-respect and enhance the market value of his labor.

At the Bottom.

Right here is one of the fundamentals of the proposal before us. It is not altogether the negative purpose of giving an agricultural training to only such youths as fail to come up to certain specified requirements in the curriculum. It includes the positive purpose of shaping natural tendencies toward agriculture, of engendering a belief in the dignity of labor in general and of till-

ing the soil in particular. This belief needs no elaborate declaration of my profound faith in it. It is as old as history can record. Many of the old classical writers have left us a heritage of practical every-day advice on farming along with their poetry or the details of their adventurous expeditions. Our good friend Xenophon, for instance, was not always marching up a hill or marching down again on the other side. He was oftener in the fields with his laborers and his horses and cattle, for he was a practical farmer who loved the soil and his work. He has not only told us of the dignity of it, but has left rules for planting and other field operations that are wholly applicable today. Think of Varro, who at eighty years of age wrote a treatise on agriculture that is a standard work in these times. None of them knew the science of agriculture, but they all had a good measure of common sense, and Huxley says that "science is organized common sense."

Plantation Usefulness.

The establishment of a Secondary Agricultural School in connection with a sugar plantation will make it possible for that plantation to increase its usefulness to the community. It is needless to say that the sugar industry is in no sense an eleemosynary institution. If it were, the best development of the Islands would not follow. No community prospers when it or any considerable section of it is coddled by the more influential interests. The proposers of this school ask no gifts or special favors for it. Prosperity is inevitable, however, when each individual member of the community has a means of enjoying his privileges and recognizes his responsibilities. We have not yet reached the state when this recognition is altogether spontaneous. Not all adults possess it. It would be strange indeed if an untutored boy with no experience were able to decide along what lines lay his own best development and through what channels he could best reach the realm of his highest usefulness. It is just here that such a school as it is now proposed to establish can serve its best purpose. Its pupils will be given instruction in what goes to make up the fundamentals of education. They will receive training in intensive agriculture. They will receive pay for their honest labor. In other words, they will immediately take their places as producers in the community and will share in the benefits of that production. An increase in the self-esteem of the individual boy will follow his realization of his own powers and possibilities as a producer. The mantle of the dignity of labor will fall upon him—his own intelligent labor co-operating with the scientific training which he is receiving.

"Back to the Soil."

Perhaps some one will say that I am an optimist, an enthusiast—that if there is all this dignity and inspiration attached to agricultural labor, why is it that the fields are not thickly populated—why are all these abandoned farms in New England? So I am an optimist—without cheerful optimism, what would be our state of mind in these days when there is such a tendency to muckraking and the pursuit of gold and of fashion? So I am an enthusiast. I have cause to be. There is too much evidence of a good percentage of splendid results having come from just such schools as the one which it is now proposed to establish here for me to expect anything less of this. My observation has been that most men have in them a love of the soil which would have held them had they been properly trained before other calls became strong. One reason why the call of the city is so often irresistible is that the untrained, poorly educated tiller of the soil sees before him nothing but long years of ceaseless, wearying toil with few diversions. Labor presents to him no aspect of dignity. He sees in it just plain, every-day hard work of the common or garden sort.

To the youth grounded in scientific agriculture are opened up long vistas of possibilities. One of these is the certain increase in value of his labor commensurate with his increased efficiency. Not the least of these is the positive knowledge that he is the possessor of trained faculties which are instrumental in producing two spears of grain where one grew before. He comprehends the scheme of creation. He has the larger view. No man can deprive him of his knowledge or his efficiency. He is of definite, increasing value to himself and to the community. He has no desire to gain the unnatural procession cityward. He will stay with the soil and prosperity.

How do I know this? Look at Denmark. Fifty years ago its rural districts were so depleted of population and its cities so congested, with the consequent increase in the number of unemployed and in crime that its internal revenues were at an alarmingly low ebb and its municipal police systems had the utmost difficulty in preserving order. A system of scientific agricultural training was instituted on the farms. Today Denmark is called England's dairy. It supplies that country not only with milk and cream and butter but with eggs as well.

Textile Schools.

Look at the textile schools of Austria. "These schools were originally founded for the purpose of reviving special home industries which had become almost extinct," says A. S. Levetus, "and to create superior workmen fully equipped not only in their own

particular lines of work, but also in lines allied to it—to give the pupils some interest in life in the world lying beyond the school. The broad general aim is to train the pupils for practical life and love of work." Recently the scope of the training has been enlarged. "The moral gain to the pupils of these schools," says Levetus again, "is infinitely higher than the material gain, for the students are brought into close contact with the world without, and life becomes a bigger thing to them." The larger view again. What is the practical result? Austria is today noted for the excellence of her textile fabrics and her people stay at home.

Then there is Tuskegee. Mr. John Graham Brooks tells the following story of one effort in that institution. To the professor of agriculture had come a lad whose attempts to meet even the lowest literary requirements of the school had failed. Could he be permitted to sit in the class for farming? Permission was granted. It was months before the instructor ever asked him a question. One day the boy came to the instructor and asked, in a shamefaced way, if the instructor would some time go out to see what he had tried to do. Out of objects that had been broken and thrown to the rubbish heap the boy had constructed a hot-house. From these piles of waste he had picked his glass, boards, roofing, window sash and piping. Empty tomato cans, old pails and abandoned lamps served him for furnace and heating tubes. He had invented cross-section boxes in which he could watch the root-development of the 40 to 50 thriving specimens in his different soil mixtures. The boy's work was so good that the instructor sometimes brought his plants and boxes into the classroom to show what experimental science could do to turn the whole state into a garden.

It is not to be expected that all the pupils of the proposed Agricultural School will be possessed of faculties for original research work. But every boy will have a hand held out to him in his search for that mythical secret of the soil. He will be taught practical, scientific agriculture.

Is it worth while establishing such a school? I say emphatically, yes—for I have enough faith in human nature to believe that a fair proportion of the pupils of the school will become valuable workmen, even had I no examples of the success of similar institutions. Every boy who leaves this school with a good record will find immediate employment on the plantations or allied industries if he so desires. The planters stand ready to further any practical effort such as the proposal before us.

I may have wandered a little far afield. But, you see, there is the larger view.

I thank you for your attention.

RECLAMATION OF KAHOOLAWE.

At the meeting of the Board of Agriculture and Forestry held on February 12, 1912, the Superintendent of Forestry read the following report containing suggestions as to a method of starting the work of reclaiming the Island of Kahoolawe. No definite action was taken thereon at the time, but the members of the Board expressed themselves as in favor of the general plan outlined. The paper reads as follows:

Honolulu, February 9, 1912.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry.

GENTLEMEN:—I have the honor to submit as follows a report outlining a plan for starting the reclamation of the Island of Kahoolawe, which I recommend be approved by the board and put into operation:

As pointed out in my report on the setting apart of Kahoolawe as a forest reserve, dated June 23, 1910 (Hawaiian Forester and Agriculturist, September, 1910, Volume VIII, No. 9, pages 264-267), the main object of that action was to place the island under the control of the department of the local government best equipped to accomplish its reclamation.

To bring Kahoolawe back to a productive condition will require considerable time and carefully directed effort. It is not the purpose of the present report to request any cash outlay for this work, but rather to suggest a plan whereby, under a system of licenses, the portion of the island that is now productive—the pili grass country along the lee coast—can be made to yield an increasing revenue that may be used for the gradual improvement of the remainder of the island.

The value of the pili grass section rests largely in the fact that algaroba trees are gradually coming up all over it. In time as the forest spreads it will be of much more value, for stock feed, for honey rights and for wood. The feed furnished by the algaroba beans and the pili grass is sufficient to carry a limited number of horses, provided they can get water. With some slight repairs the cisterns and the wells already on the island can be put into shape to supply enough water for from 100 to 150 head. By the construction of additional cisterns the number of head for which there is dry feed could probably be doubled. By licensing the use of this section for some such limited number of horses, for a short term of years, under definite restrictions, not only will algaroba seed be spread more rapidly over the land, but in addition some revenue can later be got which could be used in the inauguration of other lines of reclamation.

An extension of time has recently been granted Mr. Eben P. Low, whose lease of Kahoolawe expired December 31, 1911, to rid the island of the animals now remaining thereon.

Following the removal of all sheep and goats from Kahoolawe, the next most important thing is to encourage the spread of the algaroba forest. Under all the circumstances I believe that for Kahoolawe the most effective available way of accomplishing this end is by such a method as that just suggested.

Mr. Low has figured the matter out carefully and believes that by using hardy Hawaiian mares, accustomed to a rough range, he could successfully raise a strain of mule colts sufficiently good to meet a certain demand in the local market. He estimates that he could sell his colts for enough to justify him in making the repairs that are needed to put the wells and cisterns into shape and in complying with the requirements as to reclamation that would be demanded by the government. That the matter may be brought to a head, Mr. Low has made application that such a license be granted him and has submitted a prospectus showing how he would operate the business.

The question before the board is twofold: First, as to policy; second, as to details in the matter of requirements, were such a license granted.

As to policy: As a forest reserve Kahoolawe is unique. The island was so set apart that it might come under the control of the Board of Agriculture and Forestry, as being the territorial department best equipped to effect its reclamation. When, eventually, it is again rendered productive, the idea is to take the greater portion of the island out of the reserve and use it as may then seem best, under such restrictions as may be necessary, for various forms of agriculture. This being so, a radically different method of treatment from that followed in most of the Hawaiian forest reserves is not only permissible, but essential. There is no money in sight for such work as the reclamation of Kahoolawe, and even if there were it is doubtful, in view of the pressing needs of many of our native forest areas, if it would be wise so to use any large sums for this purpose. By such an arrangement as is here proposed this obstacle is overcome, the island being made to pay for itself, and to increase in value as it does so. With the fulfillment of the conditions made on the part of the board, I can not see, even if the licensee should be unsuccessful in carrying out all his plans, how the government could suffer, for whatever had been accomplished would be all to the good of the island. For these reasons I believe the board would be quite justified in granting a license of the character proposed.

As to terms: Any license to pasture horses on Kahoolawe should contain the following provisions:

A.—Regulation of the license:

(1) The number of head should be limited so as not to exceed at the start one hundred mares.

(2) The period of the license should be for five years, with the privilege of an extension, with a revised schedule of payments, for five years more.

(3) The government should reserve the right to grant, either to the original licensee or to others, additional licenses for the apiary privileges, for the keeping of pigs, or for any other uses not inconsistent with the horse pasturing license, for each of which additional compensation should be demanded.

(4) The cutting of algaroba trees for export to other parts of the Territory should be tabu, except as special rights were granted, for additional compensation, to the original licensee or to others.

(5) It should be required that reasonable care be exercised not to misuse or injure existing houses and other improvements and that all new permanent improvements should become the property of the government upon the termination of the license.

B.—Reclamation provisions:

(6) The licensee should be required to take all reasonable measures to police the island and prevent injury to government property through trespass by fishermen and others.

(7) Provide at least one laborer to work under the direction of the licensee's foreman, in accordance with an outline of instructions to be drawn up by the territorial forester, to collect and feed algaroba beans to the horses at designated places, to collect the seed-impregnated manure at these spots and carrying it with pack animals, systematically to place it at strategic points along all the gulches, so that the spread of the algaroba forest may be hastened in the places where it is most needed. Later, were additional laborers employed, they should put in part of their time on other planting work, as of trees and soil-binding plants on the upland, coconuts along the shore, etc.

(8) Have his employees read the four rain gauges now installed on Kahoolawe and make and transmit to the territorial forester such other meteorological observations and records as may from time to time be required.

(9) Have his employes assist, as far as they reasonably can, such agents of the Board of Agriculture and Forestry as may visit the island, especially by allowing them the use of horses and by providing them accommodations at their camps.

(10) Use every reasonable endeavor to rid the island of any sheep and goats that may have escaped at the time of the drives.

(11) Later, at the expiration of the five years term, it will probably be found advisable to require the construction of fences to shut off the pili grass area from the upper lands, on parts of which by then some of the native grasses will probably have re-established themselves. A provision covering such work could

well be inserted when the schedule of payments came to be adjusted at that time. For the present it is not necessary that such fences be built, but it would be a good plan if the licensee were required, upon request, to fence in small plots at such points on the mountain as might be designated by the forester for experimental planting. It could be specified that not more than a stated length of fence, say 1500 feet, would be required in any one year.

It is, of course, necessary that a responsible person be secured as licensee. For several reasons Mr. Low seems to be as satisfactory a man to take charge of this work as the Board is likely to secure. Having had experience with Kahoolawe, he knows the difficulties that must be met. He is already equipped with boats whereby the island can be reached. And he has a liking for Kahoolawe that causes him to regard such a proposition as the present in the same light as another man might look upon some other avocation.

Believing, then, that the government stands to gain from whatever reclamation work is done on Kahoolawe and that the program here proposed is one that will work out satisfactorily in practise, I recommend that the Board approve it and authorize the issuance of a license containing the provisions suggested.

Very respectfully,

RALPH S. HOSMER,
Superintendent of Forestry.

A METHOD OF TAPPING THE CEARA RUBBER TREE.

The Agricultural Journal of the Mozambique Company, Vol. I., p. 49, describes a mode of tapping the Ceara rubber tree (*Manihot Glaziovii*), which is known as the Lewa method, as follows:

The tree is fit for tapping when the rough and papery outer bark has been removed. If this has not been recently done, the surface may contain dirt conveyed up the tree by little ants, so it is therefore advisable for the tapper to carry a stiff scrubbing brush for the purpose of cleaning the surface. The portion of the tree to be tapped is then painted over with a weak acid solution—acetic, citric, carbolic or fluoric acid. The juice of citrus fruits, such as limes, lemons or oranges, or seeds of the baobab tree soaked in water, will also serve the purpose; but clean solutions only should be employed, and absolute cleanliness practised throughout. In the portion to be tapped, almost point-like incisions should be made, and the latex oozes out and flows down and coagulates in thin ribbons on the bark. These incisions should be made 4 inches apart, as each incision drains the latex

from 1 to 2 inches in every direction from the wound. An ordinary pruning knife is suitable, but every care must be taken that the incisions do not reach the canbium layer; a very narrow chisel or a flattened bradawl will also serve the purpose; but it is better to use a knife with a guard, to prevent the incisions from being made too deep. If the latex does not coagulate quickly, the acid solution is not strong enough. In damp weather the acid will be required to be stronger than in cold weather. The requisite strength will soon be found from experience.

Formerly, when the system was first started in German East Africa, the rubber was rolled off the tree into round balls. It followed, of course, that particles of bark and dirt became mixed with the rubber, and the product was consequently of poor quality. Latterly, however, this method has been improved upon, and instead of the rubber being rolled into a ball, it is now rolled off from the tree onto a small wooden roller in such a way as to form a sheet when cut from the roller lengthways. The latter method is a great advance on the method of collecting in the form of balls, as the tapper can from time to time dip the roller into a pail of water and wash off particles of bark and dirt, and subsequently put the sheet through a water.

The tapper should be provided with a rough scrubbing brush, acid, and a small hand whitewash brush, for applying the acid, a wooden roller about 6 inches long by 2½ inches in diameter, and a pail or calabash of clean water. In addition to the tapper it is advisable to have a second boy to follow him to collect the rubber, for if too many trees are tapped at a time the rubber from the first trees will not be so easy to roll off. When rolling the ribbons off they should be distributed over the roller as evenly as possible. It is desirable that the sheets should not be too thick, so the rubber should be removed at intervals according to the desired thickness. The size of the sheets would vary, of course, according to the size of the roller used. It is desirable that the sheets should be of uniform thickness and size, so the rollers should be all the same size. The rubber should not be exposed to light more than is possible, so whenever the roller is not in use it should be kept in a pail of water, and the sheets that have been collected should also be kept in water and brought in from the plantation twice a day, after the morning and evening tapping.

It is stated that further experimentation is necessary before a definite opinion as to the merits of this method can be expressed.

THE SMOKE CURE FOR RUBBER.

Little is known in Java about the cure of latex by smoking, this being the primitive method adopted nearly a century ago by the Amazon Indians and still survives, in the treatment of wild-grown Hard Para. Dr. K. Goeter, writing to the Sumatra

Post, explains the Brazilian treatment of the latex, and goes on to say: "It is, however, most noticeable and, according to the experience of Trillat and other investigators, that wood smoke contains another substance (besides creosote) having strong conserving properties, namely, formaldehyde, which, dissolved in water, is the formaline or formal of commerce. It was therefore thought probable that this stuff would be found in small quantities in smoked rubber. This was, indeed, found to be so. With the help of various sensitive reactions, I could undoubtedly show the presence of formaldehyde in smoked rubber sheets so that by reason of this result it may be taken that the conserving work of smoke on rubber must at least be partly attributed to the presence of formaldehyde in the smoke. In the development of smoke, it would be well to bear this in mind, by endeavoring to get a smoke that is as rich as possible in formaldehyde. Now it has been found that organic substances, for instance, sugar, will, through incomplete combustion, produce more formaldehyde when they are placed in contact with metals. From this we may also conclude that smouldering wood in contact with a metal, such as iron, will give a smoke with a higher percentage of formaldehyde than when that contact with a metal does not exist. The wood must smoulder; therefore, it must burn without flame, and this is only attained by limiting the admission of air. If there is too much air, less smoke is obtained and more fuel is used up; so that it is less economical from two points of view. It might be well also for planters to bear in mind that in smoke a poisonous gas, the well-known carbonicoxida is formed, of which the relative quantity increases under the last-named conditions. From a hygienic point of view, the health of the coolies working continually in an atmosphere of smoke should be considered. Whether smoking has a direct influence on the physical properties, for instance, on the elasticity of the product, I should not dare at present to decide. As a fact, it can only be said now that smoked rubber keeps better and is not so liable to mould as unsmoked rubber. As a rule, a higher price is paid for smoked rubber on this account."

CULTURAL DIRECTIONS FOR PAPAYA.

By P. J. Wester, Horticulturist.

The Philippines Bureau of Agriculture has issued the following directions for growing pawpaws which should prove of interest and be useful to Ceylon residents, says the *Tropical Agriculturist.* There are not nearly enough pawpaws grown in Ceylon.

Seed Bed.—The seed bed should be prepared by thoroughly pulverizing the soil by spading or hoeing the ground well, and

the clearing away of all weeds and trash. Sow the seed thinly, about one to two centimeters apart, and cover the seed not more than one centimeter with soil, then water the bed thoroughly. In the dry season it is well to make the seed bed where it is shaded from the hot midday rays of the sun, under a tree; or, it may be shaded by the erection of a small bamboo frame on the top of which are placed grass or palm leaves. If the seed is planted during the rainy season a shed of palm leaves should always be put up over the seed bed to protect the seed from being washed out and the plants from being beaten down by the heavy rains.

TRANSPLANTING.—When the plants have attained a height of about seven to ten centimeters, they are ready to be transplanted to the place where they are intended to grow.

Unless the transplanting has been preceded by a good rain, the plants should be thoroughly watered before they are removed from the seed bed. In order to reduce the evaporation of water from the plants until they are well established in their new quarters, about three-fourths of the leafblades should be trimmed off.

In transplanting, take up the plants with so large a ball of earth that as few roots are cut or disturbed as possible. Do not set out the young plant deeper in the new place than it grew in the nursery; firm the soil well around the roots, making a slight depression around the plant; water thoroughly.

In order to protect the tender plant from the sun until it is established, it is well to place around it a few leafy twigs at the time of planting. It is well to set out three plants to each and as the plants grow up and fruit to dig out the males or the two poorest fruiting plants.

If the plants can not be set out in the field at the time indicated, transplant them from the seed bed to a nursery, setting out the plants about 20 to 30 centimeters apart in rows a meter apart, or more, to suit the convenience of the planter. While the best plan is to set out the plants in the field before they are more than 30 centimeters tall, the plants may be transplanted to the field from the nursery with safety after they are more than 1.5 meters high, *provided that all except young and tender leafblades are removed, leaving the entire petiole, or leafstalk, attached to the plant;* if the petiole be cut close to the main stem, decay rapidly enters it. If the entire petiole is left it withers and drops and a good leaf scar has formed before the fungi have had time to work their way from the petiole into the stem of the plant.

TREATMENT OF OLD PLANTS.—When a plant has grown so tall that it is difficult to gather the fruit, which also at this time grows small, cut off the trunk about 75 centimeters above the ground. A number of buds will then sprout, from the stump, and will form several trunks that will bear fruit like the mother plant in a short time. These sprouts, except two or three, should be cut

off, for if all are permitted to grow the fruit produced will be small.

SEED SELECTION.—Seed should be saved from the best fruits only. By this is meant not so much a *large* fruit as one that is sweet and well flavored, with a small seed cavity and few seeds; oblong fruit should be preferred to roundish ones in saving seed, as they grow on plants having both stamens and pistils in the same flower and these being, very largely, self-pollinated, the seeds produced from such flowers are more likely to reproduce their kind than the seed from roundish, melonshaped fruits, which mostly grow on female plants.

All male plants should be destroyed wherever they appear, as not only are they unproductive but by their pollen being carried to the fruiting plants they tend to produce degenerate plants when these are grown from the seed produced on plants growing in the vicinity of the male plants.

There is no need to fear that the other plants will not fruit if the male papayas are destroyed, for the reason that there are always plants about having *perfect* flowers and which provide sufficient pollen for the fructification of the female plants. This applies particularly to the Hawaiian papaya.

GENERAL REMARKS.—The papaya is very impatient of water standing around the roots and should be planted only on well-drained land; being easily injured by strong winds, it should be planted in sheltered situations. Keep the land clean of weeds and the plants well mulched.

THE EFFECT OF THE SUN IN THE TROPICS ON ANIMALS AND MAN.

BY HANS ARON,

(Professor of Physiology in the University of Manila.)

The rays emitted by the sun may be divided into three groups: (a) the ultra-red or heat rays; (b) the visible or light rays; (c) the ultra-violet or actinic rays. Freer, Bacon, and Gibbs have investigated the solar spectrum in Manila, and find that its range on the ultra-violet side is not greater than in northern regions, but its chemical activity in July as gauged by its action on oxalic acid and uranyl nitrate is from five to twenty times greater than in Chicago.

Many observers have ascribed the peculiar effects of the tropical sun to the action of the actinic and light rays on the human body. The negative results of the experiments on the American troops in Manila with orange-red colored clothing as well as numerous observations made in the tropics by Aron have convinced him that actinic theory cannot be maintained.

In order to determine the effect of the sun's heat rays in Manila, Aron made a number of experiments, some of which are quoted below.

One thermometer was placed in the rectum of a dead dog, and another under its skin, and the body suspended in the sun. The thermometer placed under the skin very soon registered a temperature of 46°C., while the one in the rectum showed a gradual rise due to absorption of heat. A living body absorbs heat in the same way, but a rise in the body temperature is prevented by the physiological mechanism for increasing the loss of heat.

A dog kept exposed to tropical sunshine soon suffers from acute discomfort, and its rectal temperature is found to rise from 38°C to 39°C.; a thermometer placed under its skin, however, shows a rise to 40°C. or higher. Rabbits placed under similar conditions show a greater rise of temperature, the thermometer placed under the skin recording as much as 46°C., but when these temperatures are reached the animals soon die.

The most instructive experiments were those conducted on monkeys (*Macacus philip.*, Geoff.). When a strong and healthy monkey is placed, so that it is continuously exposed to the sunshine, its temperature rapidly rises, and seventy to eighty minutes' exposure, even between 8 and 9 a. m. in December or January, is sufficient to kill it. If protected from the direct rays of the sun, it can be kept in the same place for any length of time without suffering any injury.

Normally the rectal temperature of the monkey is 0.5° to 1°C. higher than its subcutaneous temperature. When exposed to the sun's rays the body temperature rapidly rises, but the subcutaneous temperature is always 1° to 2°C. above that of the rectum. The immediate effect of shaving a monkey is to reduce its temperature generally, but the effect is more marked on the subcutaneous temperature. When shaved monkeys were exposed to direct rays of the sun, the rise in temperature and subsequent death took place more rapidly than in similar animals whose hair had not been removed.

That the animals exposed to the sun's rays died as a direct result of hyperpyrexia is shown by the following experiments. Monkeys were exposed to the sun's rays as in the previous experiments, but by means of fans a strong current of air was directed on to the animal's body. In spite of several hours' exposure under these conditions the rise in body temperature was only slight, and the animals remained healthy. A control animal exposed within a few yards of the first one, but not artificially cooled, died of hyperpyrexia in fifty-eight minutes.

In another experiment the body of a monkey was placed in a wooden box with perforated walls, which was again placed inside a larger one, leaving an air space between the two, so that

its head was exposed to the sun's rays, but its body was thoroughly protected by the ventilated air space and walls of the boxes. The monkey was kept in this position and exposed to the sun's rays from early morning till night without any rise of body temperature taking place, or any signs of interference with its health. The same animal was exposed under similar conditions to direct sun's rays for altogether fifty-four hours within a period of twelve days, and apparently suffered no damage. During this period temperatures taken in the hair on the animal's head were frequently found to register as high as 47°C.

Some observations were then made as to the effect of sun's rays on the human skin. White and dark brown skins were selected and their normal temperature carefully determined; this varied between 32.5°C. and 33.5°C. There was no constant difference between the two colors. When exposed to the sun the skin temperatures rapidly rose to 36.5°C. or 37°C.; on continuing the exposure there was no further rise of temperature, but on the contrary a gradual fall of 0.5°C. to 1°C. was observed. The fall usually began with the appearance of diaphoresis. The fall was more rapid and greater when active exercise was being taken and there was copious perspiration. If the man had been working hard and perspiring freely before being exposed to the sun's rays, there was only a slight rise of the skin temperature. Dark skins did not, so far as the experiment went, show quite so much rise of temperature as white ones. A possible explanation may be that the dark skin absorbs more heat rays at first, but in consequence the sweat glands come into action sooner, and so prevent the temperature from rising as high as in the case of white skins.

Although the effect of the sun's heat on the human body is neutralized by physiological action, this makes certain demands on the human organism. This is shown by one set of observations, in which persons lightly clad were kept at rest but exposed to the sun's rays; the result of this exposure was to increase the pulse-rate by 8 to 12 beats, and the volume of respiration by 23 per cent. Under similar conditions a Philippine weighing 57 kg. lost weight to the extent of 280 grm. in one hour, although no allowance was made for the perspiration absorbed by his clothes.

When active exercise is being taken the heat produced by muscular action added to that absorbed from the sun's rays may produce a condition of collapse.

BLIGHT-RESISTANT COFFEES.

Since the advent of the coffee blight (*Hemileia vastatrix*) into the Philippines some twenty-five or thirty years ago, it has been practically impossible to raise even a fair crop of coffee below 2000 feet elevation. This blight destroyed the coffee industry not only in the Philippines but in Java, Ceylon and the Malay Peninsula at about the same time that it reached this Archipelago.

An attempt is being made now by several of the old coffee countries to discover or create one or more varieties of coffee which will be resistant to this fungus, and it is believed there is some hope in some of the new hybrids of robusta coffee (*Coffea robusta*). This Bureau now has growing at the Lamao experiment station a considerable quantity of this coffee, and a little later seed will be distributed to any one who wishes to experiment with the variety. However, like several of the non-commercial coffees this robusta does not have a first-class flavor, though it is in some respects better than that of either Liberian (*C. liberica*) or the Inhambane coffee of Mozambique. Another trouble with the new coffees is that they are for the most part very weak in caffein, the active principal of the beverage—some of them possessing no stimulating qualities whatever.—*Philippine Agricultural Review.*

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J. C. Fitzgerald, *Deputy Territorial Veterinarian for Maui.*
A. R. Glaisyer, *Deputy Territorial Veterinarian for Kauai.*

CLERICAL STAFF

Geo. R. Clark, *Secretary to the Board.*
Mrs. C. L. Seybolt, *Clerk.*
Miss Anna K. Harrison, *Librarian.*
Daniel Logan, *Editor of the "Forester."*

PUBLICATIONS FOR DISTRIBUTION.

Any one or all of the publications listed below (except those marked *) will be sent to residents of this Territory, free, upon application to Mailing Clerk, P. O. Box 207, Honolulu.

BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.
Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.
* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.
Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.
Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.
Fourth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1907; 202 pp.; 7 plates.
Fifth Report of the Board of Commissioners of Agriculture and Forestry, for the calendar year ending December 31, 1908; 218 pp.; 34 plates.
Report of the Board of Commissioners of Agriculture and Forestry, for the biennial period ending December 31, 1910; 240 pp.; 45 plates.
"Notice to Importers," by H. E. Cooper; 4 pp.; 1903.
"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

"Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.
"Law and Regulations, Importation and Inspection of Honey Bees and Honey." General Circular No. 3; 7 pp.; 1908.

"The Hawaiian Forester and Agriculturist," a monthly magazine. Vols. I to VII; 1904-1910. To be obtained from the Hawaiian Gazette Co., Honolulu. Price $1 a year.

DIVISION OF FORESTRY.

* "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.
* "Suggestions in Regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.
"An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.
"Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.
* "Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.
"Instructions for Planting Forest, Shade and Ornamental Trees." Press Bulletin No. 5; 7 pp.; 1909.
"Na Hoakaka no ke Kanu Ana i na Laau Malumalu ame na Laau Hoohiwahiwa." Press Bulletin No. 6; 8 pp.; 1909.
"Eucalyptus Culture in Hawaii," by Louis Margolin. Bulletin No. 1; 88 pp.; 12 plates; 1911.
Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.
* Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.
Report of the Division of Forestry, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 70 pp.
Report of the Division of Forestry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 85 pp.
Report of the Division of Forestry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 86 pp.; 22 plates.

DIVISION ON ENTOMOLOGY.

"The Leaf-Hopper of the Sugar Cane," by R. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.
** "A Catalogue of the Hemipterous Family Aleyrodidae," by G. W. Kirkaldy, and "Aleyrodidae of Hawaii and Fiji with Descriptions of New Species," by Jacob Kotinsky. Bulletin No. 2; 102 pp.; 1 plate; 1907.
* "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by R. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.
"A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.
"The Japanese Beetle Fungus," by Jacob Kotinsky and Bro. M. Newell. Circular No. 2; 4 pp., cut; 1905.
Rule VII: "Concerning the Prevention of Distribution of the Mediterranean Fruit Fly"; unnumbered leaflet; 1910.
Rule VIII: "Concerning the Importation of all Banana Fruit, Banana Shoots or Plants"; unnumbered leaflet; 1911.
Report of the Division of Entomology, for the year ending December 31, 1905. Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.
Report of the Division of Entomology, for the year ending December 31, 1906. Reprint from Third Report of the Board; 25 pp.; 7 text figures.
Report of the Division of Entomology, for the year ending December 31, 1907. Reprint from Fourth Report of the Board; 18 pp.; 1 plate.
Report of the Division of Entomology, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 26 pp.; 2 plates.
Report of the Division of Entomology, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 70 pp.; 10 plates.

DIVISION OF ANIMAL INDUSTRY.

* "Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.
* "Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.
* "Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.
* "To Amend Rule 1, Inspection of Imported Live Stock." Rule 4; 1 p.; 1907.
* "Quarantine of Horse Stock from California." Rule 8; 1 p.; 1908.
"Rules and Regulations, Inspection and Testing of Live Stock." Rules and Laws; 11 pp.; unnumbered pamphlet; Revised 1910.
Report of the Division of Animal Industry, for the year ending December 31, 1905 Reprint from Second Report of the Board; 62 pp.
Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.
Report of the Division of Animal Industry, for the year ending December 31, 1907. Reprint from the Fourth Report of the Board; 104 pp.; 6 plates.
Report of the Division of Animal Industry, for the year ending December 31, 1908. Reprint from Fifth Report of the Board; 44 pp.
Report of the Division of Animal Industry, for the biennial period ending December 31, 1910. Reprint from Report of the Board; 59 pp.; 13 plates.

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* Out of print.