SCIENCE:

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Attention is called to the "Wants" column. All are invited to use it in soliciting information or seeking new positions. The name and address of applicants should be given in full, so that answers will go direct to them. The "Exchange" column is likewise open.

APPLE AND PEAR SCAB.

THE microscope has revealed the fact that the brown scab which has become so prevalent on certain varieties of apples and pears during recent years is itself a plant, reproducing itself by spores, which are borne upon the wind and find their congenial soil in the leaves, tender twigs, and fruit of the apple and pear.

When the nature of the pest was ascertained a remedy was suggested in the treatment which has recently been discovered to be so effective in the case of other fungoid diseases of plants, namely, the spraying of the affected trees with a solution of copper sulphate. This treatment has been recommended by the national Department of Agriculture for several years; but, as heretofore practiced, it has often injured the foliage of the trees to such an extent that the remedy was almost as bad as the disease.

The Ohio Experiment Station has this season conducted an extensive series of experiments, some on its own grounds, some in a large orchard in the neighborhood leased for the purpose, some in the fruit region of the lake shore, and some in orchards along the Ohio River. In these experiments several preventive solutions have been tried, but especial attention has been given to the question whether the strength of the copper sulphate and lime solution (known as the Bordeaux mixture) might not be reduced so as not to injure the foliage and yet accomplish the object of preventing disease. The results of this work were shown in a striking exhibit, made at the State fair and other places, in which sprayed fruit was shown to be almost absolutely free from disease, while that from neighboring trees left unsprayed was almost worthless.

The spraying not only reduces the injury to the fruit, but it largely increases the total crop. This is because the foliage on the sprayed trees remains healthy, while on the unsprayed trees it is diseased and unable to perform its functions. Furthermore, the scabby fruits fail to develop to their normal size, because of the scab that is on them. The sprayed apples are fully twenty-five per cent larger than the unsprayed, and are more highly colored. As might be expected, the sprayed apples sell for more than the unsprayed, there being a difference of more than twenty-five per cent in favor of the former. This was found to be the case by an actual test in the market, the sprayed apples selling more rapidly at fifty cents per bushel than the unsprayed at forty cents. This makes a total gain in favor of spraying of fully fifty per cent. The cost per tree for the season does not exceed twenty-five cents, while there is often a gain of one dollar or more, depending largely upon the variety, as some are much more subject to scab than others. Spraying also prevents the premature falling of the leaves, which is one of the results of the scab, for it affects the leaf as well as the fruit.

Following are the formulæ used in these experiments: No. 1—copper sulphate, 4 pounds; lime, 4 pounds; water, 1 barrel. No. 2—copper sulphate, 4 pounds; lime, 4 pounds; Paris green, 4 ounces; water, 1 barrel.

No. 1 is used for apple and pear scab, and to prevent the leaves of plum and pear trees from dropping prematurely; also, for raspberry cane scab, or anthracnose. Apply once before the leaves open and about three times thereafter. It should not be used on plums and early fruits later than July 1, and it is not necessary to use it on any fruit later than Aug. 1. It should not be used on raspberries after the blossoms open, and care should be taken to direct the spray to the young growth and avoid the old canes after the first application.

No. 2 is used on pear, apple, plum, and cherry trees after the blossoms fall, for the purpose of destroying insects. On plum and cherry trees the applications should be made once in two weeks, and oftener if the weather is rainy, up to within six weeks of the time of ripening. For the last application on these fruits, it would be well to dilute the mixture one half, or more, so as to avoid lime coating; or the following may be substituted: Paris green, 2 ounces; copper carbonate, 2 ounces; dissolve in three pints of ammonia; add half a pound of lime and one barrel of water.

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

The Man of the Future.

DOCTOR LANGDON'S remarks in a recent issue of *Science* (No. 452) on the probable further evolution of man is one full of interest to every speculative anthropologist. To the present writer it is evident that man has by no means arrived at the acme of his development, either mentally, morally, or physically; indeed, I conceive the entire genus *homo* to be but little more than just started upon its career of evolutionary growth.

In the first place there are many species and sub-species of men upon the face of the globe of very low type that will either have to be, or will be, exterminated in time by some branch of what ultimately will persist as the dominant race. As examples, we may point to the pygmies of Africa, many of our North American Indians, and similar ferine tribes. Some of these, however, will undoubtedly to a certain extent fuse with the root-stocks of the dominant race; some may be assimilated entirely,—a fate that seems to await the negroes of the United States, and perhaps later the Japanese and others. In short, I am inclined to think that, in the ages to come, the human species of this world will eventually tend to form one homogeneous race, and that race will speak but the one language. When that epoch has fully arrived, then indeed will the human species be fairly on the road towards its perfection. Multifarious tongues now stand as a prime factor in the way of man's more rapid evolvement. All this will require an enormous lapse of time, and when it arrives the face of the earth will be greatly changed. Man will have subordinated all things to his will,—and nearly all other forms now existing, with the exception of the very few that may prove useful to man, will have been completely exterminated.

Many of these changes are now slowly advancing under our very eyes. Take the ideal man of the present day,—one of the most perfectly organized ones as they now exist, and what do we find? In the vast majority of cases, as Clevenger has shown, he is still subject to a variety of diseases which arise from the fact that within a comparatively recent time of the world's history he has assumed the erect attitude; has passed from quadrupedal to bipedal locomotion. Often these diseases prove to be fatal,—as prolapsus uteri, the hernias, and others: is there to be no improvement along this line? Again, he has still clinging to his organization many of the structural vestiges that link him with the

brutes: is there to be no improvement in that direction? It has been proven that modifications are taking place in his dental armature, his dermal appendages (as the hair disappearing, and so forth), and perhaps to some extent in his very form, due to dress, as encasing the feet, and strapping certain parts of the body. Will these causes not, if continued, produce their ultimate effects?

However daintily he may mask the animals he kills and devours, he is still as carnivorous as most of the *Felidæ*. He often settles his disputes by the murder of masses of his kind, and the leaders in such assaults are glorified by having monuments erected to them in the high places. In these days such monuments are seventy-five per cent more numerous than are those erected to the great among men of letters, of science, the arts, and the industries. All of this savors very strongly of savagery, and can hardly be characteristic of a fully developed race of men.

This aspect is not improved when we come to think of the vast number of what many in the world would reckon as our best developed specimens of men, whose minds are still controlled by the nursery myths, the miracles, and the fables that were told and sung to the children of the early peoples of the world in Asia. Is the mind of the man of the future to remain in such a condition of thraldom? In fact, the most of the opinions held, the institutions, the very language, the entire organization by and of the best existing types of men, are each and all to me highly indicative of a very early stage of the development of the species.

So I cannot fully coincide with Dr. Langdon when he says, "While, therefore, we may anticipate an increase in the average perfection of parts, and consequently a more harmonious development of man's present plan of structure, we cannot rationally look for any radical change in the plan itself." Although it would not demand any radical change in the *plan* of structure of present man, has it ever occurred to your correspondent that in the dim future of the world the *environment* of man may have progressively so changed as ultimately to produce a race of enormous giants; or, other conditions obtaining, a race of the veriest pygmies may be the result? Who among our present-day naturalists, had he lived in Eocene time, and become familiar with the little *Eohippus*, no bigger than a fox, would ever have predicted that from it was in time to be developed the highly modified modern horse? It is safe to say, not one,— yet *Eohippus* must have appeared quite perfect for its kind in its day.

There is every reason to believe that in the lapse of time, or when many more millions of years have rolled by, our little earth will become cold from changes now going on: she may solidify to her very core, and become as frigid as a moon, and utterly incapable of supporting any manner of life upon her surface. In fact, life will probably be at an end long before any such condition in her comes about. The last one of the human species, the very last individual of all, the very tip of the last twig of the tree of human descendants, must also die,— perish. If that modified form possesses sight, its eye may look out upon a remarkable scene indeed. Earth may be stripped of all timber; coal beds all burned up; metals all moulded into medallions, machines, and monuments; her land-surface graded nearly or quite level by causes now in operation; every other living thing, every lion, lark, and louse in the land exterminated; and nothing remaining but the works of the modified man. — R. W. SHUFELDT, M.D.

Takoma, D.C., Oct. 9.

Rain-Making.

IN *Science* for Oct. 9 Mr. Powers takes exception to a short discussion of this question prepared by myself and published in August. I have no desire to enter the discussion, but simply to correct one or two misapprehensions of my own connection with this matter. Mr. Powers gives a novel view of Plutarch's statement regarding battles and rain. The following is a translation of Plutarch: "Extraordinary rains generally fall after great battles." He is doubtful whether by these the gods would wash out the trouble from the sky "or the blood and corruption, by the moist and heavy vapors they emit, thicken the air, which is liable to be altered by the smallest cause." It hardly seems as though this corresponds with the later view of Mr. Powers. But the view of another rain-maker does not agree with that of Mr. Powers "Let 10,000 Greeks march into battle chanting their 'paeans' and shouting their 'allallas,' beating time meanwhile on their shields, while 100,000 Persians are advancing against them, continually shouting their terrible battle-cries; then let the great armies rush together with the tumult of clashing swords and shields, the hoarse death-cries and shouts of victory, and surely the sound-waves rising from such a din will literally shake the heavens, and are capable of producing no insignificant effect among the volatile currents of the upper air. Moreover, the heat generated from the struggling masses and the moisture evaporated from their perspiration would exercise a decided influence in disturbing the equilibrium of the atmospheric conditions."

Exception is taken to my very guarded statement, "During the war of the Rebellion there were over 2,200 battles, on an average *probably* as severe as the average of the 158 above mentioned" (by Mr. Powers). I have italicized a very important word. I had no time to do anything more that compare several of the running statements of the battles given in the old edition of "War and the Weather" with other facts. This I did sufficiently to satisfy myself that such a statement could be made. It is an open question in my mind just how one should treat a continued battle and firing in studying its probable effect upon the atmosphere. The more or less desultory firing in many battles could not be considered as of much importance. Moreover, any rain which fell after an interval of a few minutes must probably be regarded as in no wise due to the explosions. I do not say that the smoke and carbon from the powder might not have some influence, but whatever they had would be felt a hundred miles or more from the scene of the explosions.

Mr. Powers thinks that the currents of the atmosphere do not travel at the rate of twenty to fifty miles per hour, or, at least, during these battles they did not do so. This is a question of fact which has been proved by actual observation, and cannot be gainsaid. The only time these currents are not moving with this velocity is when a high area or "clearing condition" is passing. Mr. Powers's theory of storm formation is exceedingly unique, and possibly he could help meteorology by establishing that theory. What he would need to do would be to select a high area or a "clearing condition," and then make his explosions and note the result. It certainly is not a fact that two currents pass in opposite directions near the point of formation of our storms. Mr. Powers takes exception to my statement, "One thing seems very evident, that absolutely no rain can be obtained out of a dry atmosphere." I will now take out the word "seems" which has no business in this statement, and leave the rest without fear of contradiction by any one who reads the expression as I meant it.

H. A. HAZEN.

Washington, D.C., Oct. 12.

BOOK-REVIEWS.

Laboratory Practice. By JOSIAH PARSONS COOKE, LL.D. New York, Appleton. 16°. $1.

ALL students of chemistry are familiar with "The New Chemistry," by Professor Cooke, the first edition of which appeared eighteen years ago, when it was one of the earlier volumes of the International Scientific Series. That book, which has fascinated so many, now appears in a revised and enlarged form. The book now issued is described by the author as a "companion volume to 'The New Chemistry.'" As will be remembered, the earlier book was largely descriptive of the problems and theoretical discussions of modern chemistry. "Laboratory Practice" gives a series of experiments on the fundamental principles of chemistry. The purpose of the author is to furnish the beginner in chemistry with a text-book which shall aid him in doing his laboratory work, but only when this work is carried out under the guidance of a competent teacher, — a teacher who can speak to the students from the fulness of his own knowledge. Professor Cooke, as the head of the chemical department of Harvard College almost as long as there has been such a department — for more than forty years — has had great experience as a teacher of chemistry, and it is certain that each and all of those who have had the pleasure of tak-