caution the crude material might safely be used, especially if it is not brought in direct contact with the plant, or if used in the dormant season.

The experiments with phylloxerized grape-vines were carried on under direction of Dr. Fischer at La Grave d'Ambarès, near Bordeaux. Fifteen badly infested stocks,[1] partly growing on light, partly on heavy soil, were treated in April, 1883.

It was placed in a hole dug in the ground near the main root, and subsequently covered up; and the quantity used was on some plants one, and on others one-half, kilogram. On Sept. 18 the plants were examined, with the following result: all plants experimented with, but especially those treated with the largest quantity of naphthaline, showed a new and healthy growth of numerous long, fine rootlets, which were perfectly free from Phylloxera: in fact, the Phylloxera had entirely disappeared from the roots of all plants experimented with, whereas several plants not treated with naphthaline showed no young growth of rootlets, and an abundance of Phylloxera. The growth above ground, of the plants treated, showed no difference as compared with plants not treated, — a fact explained by insufficient time for the treated plants to recuperate. Some of the most vigorous new rootlets were found to have penetrated the layer of naphthaline, thus showing that the latter has no injurious influence upon them. A considerable quantity of the naphthaline was found unchanged at the date of examination, which shows that the evaporation is very slow, and that its effects will be correspondingly lasting.

The results are certified to by official affidavits, and were more marked on plants growing in heavier and moister ground than on those in light and gravelly soil.

As the most convenient mode of application, Dr. Fischer recommends that about one kilogram of the naphthaline be put in a trench dug around the plant a few inches from the stock; the trench to be not less than from fifteen to twenty centimetres deep, and to be at once filled up again. He attributes the failure of former experiments, 1, to the small quantity of the material employed; 2, to its being employed too near the surface of the ground, so as to permit evaporation in the air. He also thinks that results were expected after too short a lapse of time. C. V. RILEY.

RECENT DETERMINATIONS OF STELLAR PARALLAX.

DR. DAVID GILL, director of the Cape observatory, has presented to the Royal astronomical society of London the results of the heliometer determinations of stellar parallax made by him and Dr. W. L. Elkin. The distances of each star, the parallax of which was sought from two comparison-stars situated on opposite sides of it, were measured at the times when the effect of parallax was least and when it was greatest.

[1] It is not stated whether the roots of these stocks were examined at the time, to ascertain whether or not the Phylloxera was still at work.

The following were the results obtained for the stars observed: —

	Parallax.	Probable error.
α Centauri	+ 0″.75	± 0″.01
Sirius	+ 0.38	± 0.01
ε Indi	+ 0 22	± 0.03
Lacaille, 9,352	+ 0.28	± 0.02
o² Eridani	+ 0.166	± 0.018
β Centauri	− 0.018	± 0.019
ζ Toucani	+ 0.06	± 0.019
e Eridani	+ 0.14	± 0.020

The probable error of a single observation by Dr. Gill averaged 0″.1, and of a single observation of Dr Elkin, 0″.16. The determinations had all been made with the Cape heliometer of four inches aperture, and with a power of a hundred and seventy-five diameters.

Dr. Gill refers to the importance of parallax investigations in order that our knowledge of the sidereal system may be advanced. We do not know at present whether bright stars, or stars having large proper motions, are the more likely to give large parallaxes. There are, therefore, two questions to be solved, — first, what is the average parallax of stars of the first magnitude, of stars of the second magnitude, of the third, and so on? and, second, what connection is there between the parallaxes of the stars, and their proper motions? The present series of measures shows that the parallax of a star can be determined from sixteen measures with a probable error of ± 0″.02, assuming that the observations were free from systematic errors. With a more powerful instrument, which would give a greater choice of comparison-stars, it would seem that any systematic errors might be eliminated. There are sixteen stars of the first magnitude in the southern heavens: a similar number of stars might be selected of the second, sixteen more of the third, and so on. In making these observations, a reversing-prism should always be employed, as in the Cape measures, that the results may not be affected by the position of the comparison-stars. It should always be borne in mind that measures of two or more pairs of stars are much better than repeated measures of the same pair of comparison-stars. Another most necessary precaution is the use of screens to render the two stars equal in brightness. The heliometer employed should have a considerably greater light-gathering power than the Cape instrument, that there may be a freer choice of comparison-stars. It should be of at least seven inches aperture. A considerably higher power than the one used in the Cape determinations should also be employed. A single observer, by making two hundred or two hundred and fifty observations each year, might complete the entire series in the course of ten years. This is a work urgently demanded in the interest of sidereal astronomy, and one that should be undertaken without hesitation or delay.

The heliometer of the observatory of Yale college is yet more powerful and perfect than that of Dr.

Gill at the Cape observatory, and it is hoped that Dr. Elkin will employ it in continuing these remarkable measures. We believe that no method of determining stellar parallax, so accurate and expeditious as this, has ever before been at the command of astronomers.

SIMON NEWCOMB.

CARNIVOROUS HABITS OF THE MUSKRAT.

AT a recent meeting of the Biological society of Washington, a paper was read by Mr. Henry W. Elliott, setting forth an entirely new fact in regard to the diet of the common muskrat (Fiber zibethicus), proving that carp-ponds in the west are being completely devastated by this animal. Ponds which should produce many carp are almost entirely barren; and for a long time the owners have been unable to account for it, no hawks being seen, there being no possibility of escape from the ponds, and in some it being impossible for other people to take them with a seine on account of obstructions placed in the way to prevent this. It was finally suggested, and afterwards proved conclusively, that muskrats were the miscreants. Carp have the stupid habit of sticking their noses into the mud during the winter, and hibernating; thus rendering it possible for so clumsy an animal as a muskrat to obtain them easily, — a thing which it would probably do in winter, when roots, etc., its natural food, are hard to obtain. If it be a fact that the muskrat has acquired the habit of eating carp, immense damages are likely to result, unless speedy and extreme measures be taken; for, under these circumstances, such a sluggish and poorly protected fish as the carp can hardly be expected to resist or avoid its enemy, but will become its easy prey: and thus one of the most important works of the fish-commission, from which such great economic benefits were expected, will result in nothing. As a means of getting rid of these pests, so hard to shoot, and not easily trapped, poisoning by means of strychnine placed in apples was suggested as the best, it having been applied with success in many cases. In his communication, Mr. Elliott asserted that in no monograph of the animal could he find any mention of the diet of the muskrat, other than that it was an exclusive vegetarian, and, so far as he could ascertain, this was the first time that the carnivorous appetite had ever been brought before scientific men; in which statement he was sustained by an authority upon mammals, present at the meeting. This was surprising to many; for it seems to be well known, as was proved by the discussion which followed the paper, that the muskrat will, and does frequently, under favorable conditions, eat animal food. One gentleman mentioned that he had seen muskrats take bait, and even live fish, from his hook, while fishing in fresh water. The piles of Unio shells frequently seen upon the tops of muskrat mounds, also prove conclusively that it will at times eat animal food. It is noticed that the shells are always perfect, not even having chipped edges; and it would seem strange that this should be so, unless we supposed that they were left to die before being eaten, the meat then being easily picked out.

The muskrat is not the only rodent which departs occasionally from a vegetable diet; for such animals as the squirrel and capybara are, and have been for a long time, known to eat flesh when the circumstances are favorable. Mice and rats, of course, are well known to be omnivorous, eating animal food as quickly as vegetable, this being the partial result of contact with man. In the other orders of herbivorous mammals, examples of deviations from the normal class of food are frequent, especially under domestication: for example, the feeding of fish to cattle; while, under similar conditions, the carnivorous dog and cat can be made to eat vegetables or vegetable products. By thus adding one more animal to the number of recorded species which will adopt an opposite diet from the natural, Mr. Elliott is deserving of credit; for, notwithstanding the fact that it is known to some, still it has never been placed before the scientific world in any recognized monograph or treatise upon Rodentia.

RALPH S. TARR.

CONDITIONS OF GROWTH OF THE WHEAT-RUST.

THE last part of the journal of the Royal agricultural society of England has sixty pages devoted to a 'Report on wheat-mildew.' Mr. W. C. Little prepared an extended list of questions concerning the wheat-mildew, or wheat-rust (Puccinia graminis), to which a large number of answers were received from British farmers who had suffered from the rust. From these reports it is gathered, that the rust is more prevalent in those localities where the atmosphere is most moist. Spring frosts, heavy rainfalls, and violent changes of temperature, encourage rust. Hot weather, with frequent thunder-storms, is most favorable for the rapid development of the fungus parasite. Some of the observations point toward the belief that about eleven days are required for the full development of the Puccinia after it has entered the wheat-plant.

Perhaps the most valuable results of the compiled answers are those upon the relation of soils to the rust. The pest is more prevalent on peat and clay soils than on gravel or light lands. Drainage is a partial preventive of rust. High farming encourages the development of rust, especially if the wheat is rank, and it becomes lodged or fallen. There is an agreement of opinion that rust prevails in wheat sown after clover. Newly broken up lowland pastures are seldom sown to wheat because so sure to become rusted.

Dr. J. B. Lawes holds the view that plants are liable to the attacks of parasites, either insects or fungi, in proportion as the soil is deficient in available mineral food. Common tilled land contains about ninety-seven per cent of mineral matter, and three per cent of vegetable substance. The lowlands have this proportion nearly reversed. Dr. Lawes says, "Plants are very much like ourselves: their power to escape disease, and to struggle against