above the intestine, against the spinal column. The presence of this air-bladder allows a fish to rise and sink with great ease. In the case of a fish taken at a great depth, and brought to the surface, the gases enclosed in this bladder expand to a very considerable extent. As a result, the bladder presses upon the abdominal wall, and, as this expands, it gradually loses by abrasion the scales which cover it. When the expansive limit of the bladder is reached, its lower end pushes against the stomach, on the head of which it rests, enters the mouth, and leaps outside. The pressure which is thus brought to bear on the upper wall of the mouth-cavity is so great that it yields, and the eyes are forced from the sockets. We have endeavored, in fig. 12, from a specimen in the exhibition of the Talisman, to show in what state fishes caught at a great depth are brought to the surface. The same enormous pressure, brought to bear upon the collecting implements, may be understood

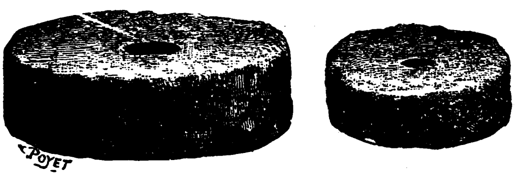

FIG. 13.—Effect of deep-sea pressure on cork.

from the injury to one of their parts. In order to keep the mouth of the trawl-net open, there is arranged within a set of large cork disks strung on a string. These disks, when new, have a rather large diameter, but after a few days' use they shrink to about half their original size. Under the pressure exercised, the tissue of which they are made settles considerably, and at the same time becomes as hard as wood. Fig. 13 shows different sides of two of the disks, — one before use, the other after, — drawn upon the same scale.

THE USE OF NAPHTHALINE AS AN INSECTICIDE.[1]

NAPHTHALINE, in one form or another, has for some time been used by entomologists as a means of preventing injury to their collections from Acari, Psoci, Dermestes, Anthreni, and other museum pests. My own experience is, that it destroys the Acari and Psoci, but not the other pests, though it tends to repel them. Recent investigations would seem to indicate that it may be used to advantage in the field as an underground insecticide. It appears that as early as 1842 a French physician, Rossignon, pointed out the possible use of naphthaline, not only as a remedial agency in medical practice, but also as a substitute for camphor, for the destruction of museum pests. But up to the appearance of the grape Phylloxera in France, no serious experiments were made with it in the field. Among the substances tried against this pest, naphthaline played its part. The efficient ingredient in the 'poudre insectivore' of Peyrat, was, according to Maurice Girard, naphthaline; but the experiments with it did not yield encouraging results.

Baudet recommended it to the French academy in 1872; while in 1874 E. Fallières proposed gypsum saturated with naphthaline, the mixture to be distributed over the soil. It was also among the numerous substances experimented with by Messrs. Maxime Cornu and P. Mouillefert, the results of which were published in the well-known memoir presented by these gentlemen to the French academy in 1877. Naphthaline, up to this time, proved to be of little value in killing the insect, and of no value as a repellant. Nevertheless, Dr. Ernst Fischer of the Strassburg university, encouraged and induced by the most favorable results obtained with naphthaline as an antiseptic and as a destroyer of micro-organisms (moulds, Schizomycetes, Bacteria, etc.), has, since 1881, again experimented with it as a direct remedy for the Phylloxera; and he has given us the results of his experience in an interesting brochure lately received. The first part of Dr. Fischer's work treats of, and strongly recommends, the use of naphthaline for surgical purposes as an antiseptic superior, in most respects, to all other antiseptics now in use. His conclusions are based on extensive experiments showing the effect of the material on the lower organisms, and prove, that, properly used, it not only arrests the growth of these micro-organisms, but eventually destroys them. This part of the work will be of especial interest to those who are experimenting with a view of destroying disease-germs. It is to the second part that I would here call attention. Preliminary to a statement of the results of this part of Dr. Fischer's work, a few facts in regard to the nature of the substance may not be out of place.

Naphthaline, a carbohydrate of the formula $C_{10}H_3$, was first made in 1820, by Garden, from coal-tar. It is volatile at any temperature, melts at 79.2° C., boils at about 214° C., and has a specific gravity of about 1.1. Essentially insoluble in water, alkalies, and diluted acids, it is easily soluble in ether, hot alcohol, hot concentrated sulphuric acid, and in many volatile and rich oils. It is readily carried off with aqueous vapors; so that, in order to quickly disinfect a room, it is only necessary to heat a vessel with water in which naphthaline has been put. The naphthaline gas mixes very readily with atmospheric air, and is also readily taken up by water. It is not poisonous to man or to the higher animals, and, for surgical purposes, should be used chemically pure. The crude material is by far cheaper; and, upon inquiry, Dr. Fischer found that in London it can be obtained, without barrels, at 25 marks ($6) per 1,000 kilograms (about 2,200 pounds), in Paris at 100 francs, and in Cologne at about 45 marks (barrels included). The crude naphthaline contains more or less phenol and creosote, and is a stronger insecticide than the purified article, but also more injurious to plants. Dr. Fischer used the purified naphthaline in his experiments on Phylloxera, but thinks that with some pre-

[1] Das naphtalin in der heilkünde und in der landwirthschaft. Von Dr. Med. ERNST FISCHER. Strassburg, *Trübner*, 1883.

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. 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.

[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.