through the tips of the glumes, which open just a little to let the thread-like filament hang out, and then close up tightly. One should then remove the ovary, with stamens and pistil, of a plant just about to flower, and, by breathing on them gently, the anthers will be seen to burst with a spasmodic motion, scattering the pollen in part upon the pistil. Immediately after the bursting of the anthers, the filament becomes restless, and begins to move. Contrary to the usual nature of this organ in plants, it is elastic; and one may watch it increasing to the length of half an inch, carrying with it, as it creeps along, the now empty and useless anthers. These observations will prove that the filament does not expand till after the discharge of the pollen, and consequently that the ovaries have been already fructified when the wheat is in flower.

This exceptional elasticity of the filament is a wonderful fact. Its purpose is to make room within the narrow seed-case for the enlarged grain by ejecting the used-up organs of the inflorescence. Occasionally, in a ripe wheat-ear, it will be found that they have not been got rid of, but lie shrivelled and crushed up within the glumes.

In social plants, which, like wheat, naturally grow best when they grow by themselves to the exclusion of others, the great law of 'the survival of the fittest' will ever be in active operation. Many feeble plants will die out, or dwindle to a stage only short of extinction, thrust out of existence by more vigorous neighbors.

The foregoing observations seem to prove that much yet remains to be studied in the habits of the wheat-plant before we shall arrive at a scientific knowledge of wheat-raising. To prepare the right soil (for too rich soil produces stalk to the loss of seed), to sow most judiciously, to withstand the injuries of mildew, insects, birds, etc., to prevent loss in harvesting or threshing,—all are problems that deserve more attention than they have received, in order that the usual yield of fifteen bushels may be increased toward the possible one hundred and fifty.

POISONOUS MUSSELS FROM IMPURE WATERS.

THE not infrequent occurrence of poisoning from eating mussels makes the discovery of any facts concerning the causation of such poisonous qualities a subject of special interest. In the following, gathered from several recent German publications, it appears that impure waters will produce such effects, and hence it impresses the necessity of careful sewerage regulations upon such seaport cities where food-supplies are derived more or less from the immediately adjacent waters.

In Wilhelmshaven, a city of north Germany, a few months ago, a large number of people were suddenly taken sick after having eaten of the common edible mussel of Europe and North America (Mytilus edulis), obtained from the harbor. Several thus poisoned died from the effects, in one case within a few hours.

The subject has attracted much attention throughout Germany, both from the public and a number of scientific men. It was ascertained later that the mussels of this harbor, when transferred to other waters, lost their poisonous nature; and, *vice versa*, harmless mussels, placed in the harbor, in a week or two acquired poisonous qualities. From the report by Professor Möbius, of his researches upon the subject, it appears that the basin or harbor of Wilhelmshaven is closed in by a breakwater, so that the water becomes stagnant and unfreshened by the tides, the breakwater only being opened at high tides to allow the entrance of ships. The sewerage of the city is not discharged into the harbor, but into the open sea, and all ships are prohibited from throwing matter into the water that could cause pollution; nevertheless the stagnating water, as will be seen, is impure, and highly dangerous in its effects upon animal life. The only fishes that live in the harbor are eels and whiting. Others that find entrance at the opening of the sluice-gates soon lose their activity, and can be easily caught in the hand; even the eels in summer are observed in a weakened condition swimming sluggishly near the surface.

Numerous and repeated experiments showed that the mussels, when freshly taken from the water and cooked, possessed a most virulent poison, killing rabbits in from two to ten minutes. It was also shown that these mussels, taken from situations where the currents of outside water entered, were not at all poisonous. Hence it is evident that the water of the harbor contains qualities that render the mussels poisonous without appearing to injure them.

The researches of Professor Virchow and Dr. Wolff have shown that the poisonous nature was not due to decomposition. The mussels, when freshly taken from the water, gave no external signs of disease. From the extended studies of the latter author, however, as given in the last number of Virchow's *Archiv*, it appears that all portions of the body were inert except the liver, and that in every case rabbits and guinea-pigs inoculated with a portion of this organ died in from two to twenty minutes. The liver is a large, yellowish brown, soft body, enclosing the

stomach on the upper side, and involved in numerous loops of the intestine. There seems to be no doubt that the poison lay in this part exclusively. Changes of size, color, and fatty degeneration were affirmed by Coldstream to exist in the liver when of a poisonous nature, but Dr. Wolff says that none of these changes are sufficiently constant to base a positive decision upon them. The last-named writer does not believe that the poison is due to any foreign substance, such as copper, etc., in the organ, but that it originates there. Virchow has shown the resemblance between the action of this poison and that from fishes, which not seldom occurs; and it is not at all improbable that many cases of the latter are due to the ingestion of the liver.

The symptoms of the mussel-poisoning were of three different kinds, — exanthematous (dermal eruptions), choleraic, and paralytic. On rabbits, experiments only produced paralysis and loss of power, with increasing difficulty in respiration, ending in death.

It is difficult, if not impossible, to determine in any given case whether a mussel is dangerous or not; and Dr. Wolff, therefore, advises that this food should be avoided as much as possible, at least when one does not know whence it is obtained. Under all circumstances the liver should not be eaten. It has further been ascertained, however, that the poison is rendered inert by cooking the shell-fish in a solution of soda.

NEW BOOKS.

'WATER-METERS,' by R. E. Browne (New York, *Van Nostrand*), is one of the well-known science series, and gives a description of certain mechanical devices. The book will be of service to hydraulic engineers. —— 'The preservation of timber by the use of antiseptics,' by S. B. Bolton (New York, *Van Nostrand*), is another of the series, and contains a reprint of a paper read before the English institution of civil engineers. —— 'Rameses the Great,' from the French of F. De Lanoye (New York, *Scribner*), is a history of Egypt thirty-three hundred years ago, and attempts to picture Egyptian life of that date. —— 'The phenomena and laws of heat,' by A. Cazin (New York, *Scribner*), is a popular account of the modern theory of heat, based upon experimental results. The author avoids referring to heat as a mode of motion, or trying to give any conception of what its ultimate nature may be. —— 'The intelligence of animals,' by E. Menault (New York, *Scribner*), contains descriptions of the intellectual manifestations displayed among various insects, fishes, reptiles, birds, and mammals, interspersed with numerous anecdotes of their intelligence. It contains a number of illustrations of varying excellency, and will be of more especial interest to a younger class of readers. —— 'A farmer's view of a protective tariff,' by Isaac W. Griscom (Woodbury, N.J., *The author*), is a farmer's plea for free trade. It is written in a more sober and judicious spirit than characterizes many of the pamphlets belonging to the tariff discussion. He denies that the agriculturist is getting any more for his products than before the civil war. No system of protection can have much influence upon the prices of those staples of agriculture of which the country produces more than it consumes; and the law of equalization of profits will quickly modify the prices of such crops as are supposed not to depend for their price on a distant market. —— 'La photographie appliquée à l'histoire naturelle,' by M. Trutat (Paris, *Gauthier-Villars*), contains an intelligent and fresh account of the apparatus and methods for photography of natural-history objects, illustrated with fifty-eight woodcuts. A number of phototype plates are given, showing both the excellences and defects of photography for the production of natural-history figures. The work lacks conciseness, and contains considerable matter in zoölogy and botany not germane to the subject under consideration. The author, also, is rather too strongly prejudiced in favor of the merits of photography to be an altogether safe guide. —— 'Chemical tables for schools and science classes,' by A. H. Scott-White (New York, *Scribner & Welford*), purports to be a text-book for examinations in which a knowledge of elementary analysis is required. The book is the outgrowth of the difficulty found by the author in having notes satisfactorily taken.

THE German quinquennial census, on the 1st of December last, so far as the published returns reach, gives a decided increase of the city populations. Berlin, especially, shows an unexpected growth. This city, which now numbers 1,316,382 inhabitants, ranks as the third European city in size; and this does not include the close-lying suburbs. Since 1880 the increase has been over sixteen per cent, and within twenty years the city has doubled in size. A few of the other more important cities show the following populations: Breslau, 298,893, an increase of 15,981; Munich, 260,005, with 30,082 increase; Dresden, 245,550, with 24,732; Leipzig, 170,076, with 20,995; Frankfort, 153,765, with 17,934. Some of the middle German towns have grown remarkably, not a few showing an increase of from twenty to forty per cent. Only a single city has fallen off in population, Ausbach, which has a loss of 0.15 per cent.