eral morphological characters. He then devotes considerable space to a consideration of the conditions, such as temperature, nutritive substances, and the like, favoring their growth; their effect in causing the groups of changes included under the terms fermentation and putrefaction; finally, discusses their relation to disease. Of their method of action, he very properly refrains from expressing an opinion.

The list of pathogenic microbia, according to Ziegler, is a larger one than the strictly cautious observer will admit. For, to go beyond as a proven fact that specific organisms have been found in connection with other diseases than anthrax, relapsing fever, septicaemia of mice, and probably with tuberculosis, glanders, malignant oedema, and, under the Hyphomycetes, actinomykosis, is, in the present state of our knowledge, unwarrantable.

In regard to the mutability of bacteria, the views of various writers *pro* and *con* are given, but no definite conclusion is expressed.

To the Hyphomycetes a chapter is devoted; and, while giving a very good account of what is known in regard to their pathogenic qualities, one can but be impressed with the fact of the extreme meagreness of knowledge of the relation which the ever-present mould-fungi bear to disease.

The chapter on animal parasites contains nothing of special interest.

The book as a whole shows evidence of having been written by a young man. All that is new has special stress laid upon it, while the work of the earlier generation receives less attention. The author inclines to state things positively, with but little of the cautious scepticism which marks the writings of the older and more conservative worker who is prepared to weigh every objection, and combat every point.

This latter quality, however, does not in the least detract from the value of the work, for the object for which it was intended; on the contrary, much enhances it. For nothing can be more disheartening to the student beginning a subject, than to be plunged at first into that mire of doubt which is ever present for him who attempts a deeper insight into a science.

The English translation is a remarkably good one. It is certainly as agreeable as it is rare, to read a smooth translation, where one is not constantly reminded of the tongue from which it had its origin.

The letter-press and wood-cuts are much superior to those usually found in text-books; and Macmillan deserves with Dr. McAlister the thanks of the English-reading profession for presenting Professor Ziegler's work in so attractive and readable a form.

As a text-book for students, physicians, and those men of science who are interested in the sciences upon which medicine rests, it fills a gap which has long been felt.

ECONOMIC ENTOMOLOGY IN ENGLAND.

Report of observations of injurious insects during the year 1882, with methods of prevention and remedy, and special report on wire-worms. By Eleanor A. Ormerod, F. M. S, etc. London, 1883. 98 p., illustr. 8°.

This is the fourth of a series of reports prepared by Miss Ormerod for the use of the farmers of Great Britain. The plan of these reports is peculiar. They consist largely of abstracts from the writer's correspondence; the greater part of which is presumably in reply to circulars issued by her. In thus collecting and publishing the results of the experience of the more observing agriculturists, Miss Ormerod is doing an important work, and the enthusiasm and energy which she has displayed in it are deserving great praise. It is fortunate, however, that she has not confined herself to the work of compilation, but has recorded the results of personal observations. And we venture to suggest that what she states on her own authority will be read with more interest than the quoted portions of her work. For no one but herself can judge of the relative value of the conclusions of her various correspondents. We realize, however, that the publication of the reports of these correspondents is probably a considerable part of the incentive to their co-operation with her; and the system has produced such good results that one should be slow to criticise it.

The report for 1882 contains notes on more than thirty different species of insects infesting fruit, garden-vegetables, field-crops, and forest-trees. The most serious injury recorded for that year is that to hops by Aphides. It is estimated that the loss to the hop-growers of the United Kingdom from this cause was not less than £1,750,000. This injury is the greatest which has been incurred for many years.

Nearly one-half of the report is devoted to an article on wire-worms, or click beetles. This article was compiled from notes contributed in reply to a circular issued by the council of the Royal agricultural society, and it doubtless gives a very good idea of the popular beliefs now held in the British isles respecting these pests. We wish that the above-named society

would now afford their entomologist, Miss Ormerod, an opportunity for directing a series of comparative experiments to test the truth of these beliefs.

The report is well illustrated, partially by some of the well-known figures of Curtis, and partially by original figures drawn by the authoress.

WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

MATHEMATICS.

The elliptic differential equation. — M. Rud. Sturm has here given a method of integration for the general elliptic differential equation $\frac{dx}{\sqrt{X}} \pm \frac{dy}{\sqrt{Y}} = 0$, where X and Y are quartic functions of x and y respectively, say, $X = E(x-a)(x-b)(x-c)(x-d)$, and Y a similar function of y. He shows that this equation can be integrated directly by aid of an integrating factor which he determines. Denoting by $X_{ab} \ldots Y_{ab} \ldots$ the products of two of the factors $x-a, x-b \ldots, y-a, y-b \ldots$, then the left-hand side of the equation $\frac{dx}{\sqrt{X}} \pm \frac{dy}{\sqrt{Y}} = 0$ is made the exact differential of

$$\frac{1}{x-y}\left\{\sqrt{X_{ab}Y_{cd}} \mp \sqrt{X_{cd}Y_{ab}}\right\}$$

by multiplying it by the quantity

$$\frac{1}{(x-y)^2}\left\{[\tfrac{1}{2}(x+y)(a+b) - xy - ab]\sqrt{X_{cd}Y_{ab}}\right.$$
$$\left. \mp [\tfrac{1}{2}(x+y)(c+d) - xy - cd]\sqrt{X_{ab}Y_{cd}}\right\}.$$

— (*Math. ann.*, xxi.) T. C. [238

PHYSICS.

Electricity.

Efficiency of telephones. — K. Vierordt measures the weakening of sound through telephones by diminishing the sound at the transmitter until it just becomes inaudible at the other end. The sound is measured by the mass and height of a small leaden sphere, which is dropped upon a tin plate. Using two Siemens-Halske telephones, of 205 and 208 S. U. resistance respectively, he found that the loss over thirty-four m. of wire was less than seventy-five per cent of the loss in air. — (*Ann. phys. chem.*, xix. 207.) J. T. [239

Electric lighting. — Ganz & Co. of Budapesth find, that, with a continuous current, the carbon filament of an incandescent lamp gives out first at the end where the positive current enters, a spot of carbon being deposited on the neighboring part of the glass. If alternating machines are used, the life of the lamp is almost exactly doubled, and when the deposit forms it is all around the case. — (*Engineering*, June 15.) J. T. [240

ENGINEERING.

A great 'Sound steamer.' — The steamer Pilgrim, of the Old Colony steamship company, was recently added to the fleet now plying through Long Island Sound. The vessel is the largest and the most expensively fitted up of all steamers which have yet been built for those waters. The hull is of iron, double, and built in compartments. The boiler space is so enclosed by iron bulkheads that the danger of fire is wholly avoided. The engines are of the standard beam-engine type, and fitted with the Stevens valve-gear. They were designed by Messrs. Fletcher & Harrison, and built by Messrs. John Roach & Son. The steering is done by means of a Sickles steam steering gear, and the lighting is performed by Edison dynamos. The hull is 390 feet long on deck, 375 on the load line; the beam is 50 feet over the hull and 87.6 feet over the 'guards;' the depth of hold is 18.6 feet; draught of water, 11 feet. The engine has a steam-cylinder 110 inches in diameter and 14 feet stroke of piston. There are 12 boilers of steel, and calculated for a pressure of 50 pounds per square inch. The total power is estimated at 5,500-horse power. The wheels are of the radial type, and are 41 feet in diameter, weighing 85 tons each. The shafts are 26 inches in diameter. The cylinder weighs 30 tons; the bed-plate, 30 tons; the beam, 33 tons; the condenser, 60 tons. The machinery will weigh, altogether, with water in the boilers, 1,365 tons. There are 103 water-tight compartments; and it is considered that it will be impossible to sink the vessel by collision or grounding. There are 912 electric lamps operated by two Edison dynamos of a total of 11,400-candle power. They are driven by an Armington & Sims engine, built at Providence, of 150-horse power. The grand saloon is the largest in the world: it is 350 feet long, and accommodates 1,400 passengers, for whom state-rooms are provided. — (*Sc. Amer.*, June 30.) R. H. T. [241

CHEMISTRY.

(*General, physical, and inorganic.*)

Apatites containing iodine. — In continuing the study of the formation of artificial apatites, A. Ditte fused baric iodide with a mixture of sodic iodide and ammonic phosphate, the latter in small quantity. On slow cooling, the mass crystallized in hexagonal prisms of the composition $BaI_2 . 3\,Ba_3(PO_4)_2$. When ammonic arseniate was substituted for the phosphate, the corresponding iodarseniate, $BaI_2 . 3\,Ba_3(AsO_4)_2$, was formed. The iodvanadate, $BaI_2 . 3\,Ba_3(VO_4)_2$, crystallized in transparent prisms. The strontium compounds, $SrI_2 . 3\,Sr_3(PO_4)_2$, and $SrI_2 . 3\,Sr_3(AsO_4)_2$, and calcic iodvanadate, $CaI_2 . 3\,Ca_3(VO_4)_2$, were obtained. — (*Comptes rendus*, xcvi. 1226.) C. F. M. [242

The spectrum of beryllium. — Mr. H. N. Hadley finds that the spectrum of beryllium shows no marked analogy with the spectrum of calcium, mag-