members in Floyd County, Indiana, was attributed to potato poisoning.

Since there is little specific data available regarding human potato poisoning, an account of two recent deaths after eating greened potatoes may be of interest. About October 15, 1924, James B. Matheney, of Vandalia, Illinois, gathered about one and one half bushels of tubers from a patch of strawed potatoes. The tubers were distinctly green, due to having been exposed to sunlight following the scattering of the straw by chickens. On October 18, the family started to use the greened potatoes and two days later began to show symptoms of poisoning. All members of the family, consisting of father, mother, two daughters and five sons, were ill with the exception of the father, who did not partake of the tubers, and a child of 18 months, who lived on milk almost exclusively. The mother, aged 45, died on October 25, while a daughter, Cynthia, aged 16, died two days later. The other five members of the family recovered.

Altogether, six physicians worked on these cases. Two diagnoses were made, milk sickness and potato poisoning, but the milk sickness theory was eliminated when it was shown that the two heaviest users of milk, the father and 18-months-old child, were not affected, while the mother, who died, never used milk or dairy products, with the exception of an occasional teaspoonful of milk in her coffee and a small amount of butter. Furthermore, the four cows in the pasture exhibited no symptoms of white snakeroot poisoning even after having been violently driven. In addition, the characteristic breath odor of milk sickness was absent. No wild berries, nuts, etc., had been eaten. The evidence seemed clear that the deaths of the mother and daughter were due to potato poisoning as a result of eating greened tubers.

The symptoms were described by Dr. Walter D. Murfin, of Vernon, Illinois, one of the attending physicians, as follows:

> The symptoms of all were nearly the same. The first symptom was epigastric pain, which increased in severity until nausea and vomiting ensued, which began from one to two hours after the pain started. After emesis of the stomach contents and bile, the vomiting ceased and there was but little pain. All were constipated except the fourteen-year-old boy who exhibited mild diarrhoea. There was no fever; the temperature was 97.4 to 98.4. The pulse was normal. The expression was dull, while the patients were apathetic, indifferent and extremely exhausted. Two were restless before exhaustion began. One was extremely thirsty, the others did not crave water. The respirations were extremely difficult and accelerated but not of the Cheyne-Stokes type. No particular odor to the breath. Weakness and prostration were marked. Consciousness was retained by the two who died until within three or four hours of death. No convulsions. Examination of the chest, abdomen and reflexes was negative.

These symptoms agree in several particulars with the symptoms described in the case of 56 Berlin soldiers previously mentioned. Briefly, these symptoms were headache, colic, nausea, diarrhoea, general debility, vomiting and acute gastro-enteritis. The majority were drowsy and apathetic. Several victims fainted and a number showed rise in temperature to 103° F.

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SO-CALLED SALMON POISONING OF DOGS

THE question of whether or not salmon is the cause of a disease of dogs is an old one in the Pacific northwest. The findings in studies now in progress are considered of sufficient importance to be reported.

A number of dogs developed typical symptoms and died after eating "sore-back" salmon. This is a popular term which applies to the mature fish that are found in fresh water streams during the spawning season. The spawned salmon undergo tissue degeneration which results in discoloration of the skin. They die after reaching fresh water.

Salmon which was caught in salt water was fed to dogs. No symptoms developed in these dogs.

A small trematode has been found in the intestinal tracts of dogs that died after eating "sore-back" salmon. Large numbers of these parasites and their eggs have been found accompanied by a severe inflammation of the intestines. This trematode is a fluke, but has not yet been identified.

Microscopic cysts have been found in the muscles of the "sore-back" salmon used in this experiment. It is logical to infer that these cysts may be one of the intermediate forms of the mature fluke found in the intestines of affected dogs.

Further work with the life cycle of this parasite will be attempted. Work will also be continued on various other phases of this problem.

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SCIENTIFIC BOOKS

An Introduction to the Theory of Optics. BY SCHUSTER AND NICHOLSON. *A Treatise on Light.* BY R. A. HOUSTOUN, 2nd edition.

A PERUSAL of these two books is highly educational, not only because of the store of information they

contain, but also because of questions which are suggested by comparison of their respective contents and method of treatment. What, for instance, should a book whose title is "Light" or "Optics" be reasonably expected to include within its scope? Or, stating the question from another angle, is an author entirely fair to his reader when, under a general title such as "Optics," he really writes about "Those topics in optics which interest me"?

The question of what to include in modern optics is a difficult one to answer, because optics, considered in the light of the fields of knowledge it has opened up to us, has become one of the most comprehensive of the sciences. Taking its start in the study of the phenomena of unaided vision, it became later a study of the means of aiding and extending vision. One branch of optics thus initiated was physiological optics, which has led the searcher after knowledge into the most abstruse problems of photochemistry, neurology and psychology. The earlier means of increasing the scope of the eye were mirrors and lenses, which led to the study of optical instruments and geometrical optics. Optical instruments as exemplified in the telescope and microscope have led us on the one hand to the bounds of the universe and on the other to the most minute forms of life. In studying the manner in which the eye is stimulated, we have investigated the nature of light and have thereby learned that visible radiation is only a small part of an enormously extended spectrum, reaching now from X-rays at one extreme to wireless waves at the other. In analyzing the method of transmission of radiant energy, we have been led to the hypothesis of the ether and so to speculations on the relation of matter to ether. Testing these by the most refined methods of optical analysis, as in the famous Michelson-Morley experiment, we have been driven to the theory of relativity, which threatens to revolutionize our ideas of the form of the universe. Analysis of the composition of emitted radiation, through spectroscopy, has led us to conceptions of the ultimate structure of matter and of radiation, formulated in the quantum theory, which are at the present time the most vital in the whole realm of physics. It is obvious from this superficial statement of the fields included under the general title of "Optics" that not only is there a real problem before the author of a book with such a title, but it is also probably after all humanly impossible for any one man to take all optics as his province.

A really informative account of the two books under review must start with a statement of what each contains, because the authors have quite different ideas as to what it is incumbent on them to treat. Schuster and Nicholson do not include under optics any phase of physiological optics. The only discussion of the eye is in connection with its behavior as a lens, namely, its resolving power. Color and color vision are not recognized as optics. Geometrical optics appears only in a highly generalized form. The elementary laws of reflection and refraction and the properties of lenses and mirrors lie, one learns by casual mention, outside the scope of this volume. On the other hand, the book is exceptionally full in its treatment of such branches of optics as are related to mechanics. Practically every problem is introduced as a problem in mechanics, the optical bearing of the discussion appearing often as a rather minor conclusion. It is thus characteristic of the book that it opens with a discussion of periodic motion (altogether excellent) and that it is not until 22 pages have been read and the second chapter entered that the word "light" is found at all, and then only as illustrative of a point in wave propagation. The practical methods for the measurement of light we find do not lie within the range of this treatise on optics, but the measurement of earth tides does.

Readers should be cautioned against the section entitled "Photometry." The statement that the difficulties of heterochromatic photometry have been "solved" by Merton and Nicholson will startle workers in photometry. As a matter of fact, in entire consistency with their policy of ignoring physiological optics, the photometry the authors have in mind is really radiometry. The difficulty caused by unequal sensitiveness of the radiometer at different wave lengths—the only one they recognize—is probably the least troublesome problem encountered by the photometrist when facing a color difference.

Schuster and Nicholson's book is noteworthy for a very full discussion of theories of light. This discussion, while most interesting, leaves one with the impression that there is a conflict still going on between the elastic solid and the electromagnetic theory. It is undoubtedly of interest to learn how near the elastic solid theory came to success, and there may be a pedagogical reason for introducing practically every optical problem as one of the problems of an elastic solid, but the interest is now largely historical. The battle ground to-day has shifted to the question of wave theory *vs.* quantum theory.

The most extensive new section in the book is that dealing with emission spectra and the quantum theory, which is handled in a very thorough manner as a problem in atomic structure and dynamics. One may, however, again raise the question as to what is appropriate to a work on optics. The development

of spectroscopy has made optics a powerful tool in the study of atomic structure, and it is undoubtedly fitting that some treatment of this subject should appear in a work on optics. Ought we not, however, to expect at least some discussion of the questions as to the nature of light raised by the quantum theory? What of the photoelectric effect (not mentioned) and of the difficulty of reconciling quantum phenomena of light emission and absorption with the wave theory which so much of the book is occupied in expounding? Here is a neglected opportunity, one may even say duty, for any one attempting to set forth the theory of optics. The authors fall clearly in that group of physicists who have been described as using the wave theory Monday and Wednesday and the quantum theory Tuesday and Friday.

Dr. Houstoun's book is very different from the volume of Schuster and Nicholson, to which in many ways it is complementary. There can be no doubt that the author's primary interest is in optical phenomena. "Light" is the first word of the text. He devotes considerable attention to the eye and to physiological optics. His treatment is much better calculated to appeal to students who are "eye-minded" than is the treatment found in the other book under review. Usually each optical phenomenon is described before its theory is discussed, and the theory is apt to be illustrated by diagrams which aid in understanding it. In the discussion of the laws of radiation, for instance, Houstoun describes the experimental black body and shows energy distribution curves of emission for various temperatures, while Schuster and Nicholson give several pages of mathematics, leading to the Planck formula, with the statement that the formula is well established. The first treatment is calculated to arouse interest in the physics of radiation. Can as much be said for the second?

The "Treatise on Light" is a new edition. It takes over from the first edition a full and well-written treatment of elementary geometrical optics and a clear and well-balanced presentation of the general divisions of physical optics. It contains much interesting material on the instruments and experimental methods of optics and takes up practical developments, such as artificial lighting. It is to be highly recommended as a text-book, in so far as its earlier portions go.

As a revised edition, the book is decidedly disappointing. One can not avoid the impression that the author's contact with and interest in his subject have waned. Revising that should have been done has been neglected, and the treatment of new developments is not satisfactory. What is the value of a "revised" section on spectral series which does not include the Bohr theory? One gathers that Dr. Houstoun is a skeptic on quantum theory, but its place in spectroscopy is too well established to excuse its utter ignoring. Other examples of unsatisfactory revisions are to be noted, among them several which one would not expect from a worker who has contributed as much in the realm of photometry and color vision as has Dr. Houstoun. The opening statement of the section on photometry that "a point source of light radiates equally in all directions" is quite wrong, unless Dr. Houstoun is trying to develop a new system of photometric definitions. A point source is simply one whose dimensions are small relative to the distances with which we work in measuring or using it. The crater of the carbon arc is one of the best examples of a point source and one of the most unsymmetrical in its light distribution. The statement on page 346 "by combining each positive with *the filter through which the corresponding negative* was taken . . . a picture is obtained on the screen of the original object in its natural colors" is one of which Dr. Houstoun should certainly not have been guilty.

The reviewer finds that in the effort to tell what these books contain, he has harped chiefly on what they lack. While it is true that they both leave some of the most important phases of modern optics inadequately treated, they do nevertheless contain a very large part of all that most students of optics may reasonably expect to get from text-books. Dr. Houstoun's book is one of the best introductions to optics available, and will carry many students as far as they need go in the subject. Schuster and Nicholson's book is for rather advanced workers in optics whose interest has been roused in special topics. For them it contains a wealth of material, not to be found elsewhere, which no one working in optics can afford to be without—for example, the treatment of such topics as the pulse theory of radiation and the theory of spectroscopic instruments.

It is a real service for leaders in a subject to bring together in book form the substance of their most important contributions, presented in proper relationship to what has been done before. It is probable that both these books after all gain more from the reflections they give of the views of their authors on their special lines of work than they suffer by neglect of certain fields. The modern student of optics, if he intends to be up-to-date on his subject, must expect to browse among many books and to read the periodicals of physical science as assiduously as the newspapers.

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