products of the bacterial growth. The tumors though small have been obtained repeatedly on several kinds of plants and there seems to be no reasonable doubt that they are due to the fleeting chemical stimulus which I have applied. Judging from my experiments, which have been continued for some months, the mechanism of tumor growth appears to be wholly one of changed osmotic pressures brought about by the metabolism of the tumor parasite. A full paper will be published as soon as I have finished studying my serial sections and have had time to make suitable photomicrographs to illustrate it.

Erwin F. Smith

U. S. Department of Agriculture,
Washington, D. C.,
October 17, 1916

QUOTATIONS

THE OPTICAL INDUSTRY IN FRANCE

A series of articles by various authors has recently been appearing in the *Revue générale des Sciences* on the methods to be adopted for the development of French trade after the war. Amongst these have appeared two articles (May 30 and June 13) by M. A. Boutaric on the French optical industry and its future.

He points out that before the Napoleonic wars France had been dependent on England for its optical glass, and it was as a result of the British blockade that its manufacture was commenced in France.

At the present time the house of Parra-Mantois manufactures practically all the special optical glasses made by Schott and Co., and the French makers undoubtedly are more successful than their competitors in the manufacture of the glass discs required for very large astronomical mirrors and objectives. In every branch of optical science French physicists have invented instruments and methods for testing their qualities, but the French manufacturers have not done themselves justice by an efficient catalogue propaganda. M. Boutaric, when referring to the firm of Zeiss, mentions especially that it "has surrounded its products with a scientific propaganda." He shows how severe the German competition in microscopes was before the war, although there are two good French makers—Nachet and Stiassnie. The metallurgical microscope of Le Chatelier has been developed by Pellin with considerable success. The polarimeter in its present commercial form was developed by the French makers Soliel and Laurent, and is essentially a French instrument, yet the German houses have almost obtained a monopoly in the sale of the instrument outside France.

The manufacture of binoculars is the most successful of all the French optical industries, several large firms (Balbreck, Baille-Lemaire, Société française d'Optique, Société des Lunetiers, etc.) being employed in their manufacture. As showing the large quantity of optical glass used in these glasses, it is stated that the Société des Lunetiers alone use about 200,000 kilos of glass annually.

Although French makers showed several prism binoculars of the Porro type at the 1867 Exhibition, yet the manufacture of these glasses passed almost entirely to Germany. Now, however, glasses equal to the best German models are being made in France in large numbers for her army and those of her Allies. The original supremacy of the French photographic lens has passed away, because, in the opinion of M. Boutaric, the French makers did not use the new glasses and modern grinding methods, nor sufficiently avail themselves of skilled technical knowledge. M. J. Richard has developed with great skill and success a stereoscopic camera, the "Verascope," and also a very rapid camera shutter, but the majority of the cameras used in France have been imported. The kinematograph, the invention of a Frenchman, Professor Marey, has been carried to a high state of perfection by the firms of Lemaire, Pathé and Gaumont. To a certain extent France is dependent on outside sources for kinematograph film, but, on the other hand, she exports finished printed film to the annual value of £600,000. The lighthouse industry, built on the theoretical work of Fresnel, is a successful one, although it has had to face keen competition from English and German makers.

M. Boutaric points out that although in nearly all optical matters French savants are the pioneers, yet the French optical industry is very small as compared with the German. In an interesting paragraph he endeavors to analyze the reasons for this success. "Here, as in everything else, the Germans have been saved by their deep sense of business. The German industry demonstrates by a wise publicity the worth of its goods, sometimes excellent, but sometimes also copies of our models and inferior to ours; their catalogues, well edited and illustrated, are published in many languages, and give full details of the instruments they describe, their travelers, men of parts, knowing intimately their instruments . . . and trying to satisfy the wishes of their customers."

M. Boutaric points out that the collaboration between the man of science and the manufacturer is far more close in Germany than in France. In the former the man of science is in intimate touch with the works, and is well paid for his services. The foreman and apprentices are trained in the theoretical side of their subject in classes they are obliged to attend. In the firm of Zeiss half the time spent by the workers in the technical classes is counted as time spent in the works. No steps are neglected to perfect the organization as a whole; everything is done to make the machine independent of a single individual. In France the success and reputation of a firm have too frequently depended on one individual. That some steps are being taken to strengthen the optical industry in France is shown by the fact that a large factory has been built by La Société française d'Optique, formed in conjunction with the firm of Lacour-Berthiot, for meeting the competition of the best German firms. M. Boutaric urges that if the future of the industry is to be assured, new blood must be introduced, young mechanics trained, and a school of optics founded. This school, for which M. Violle has pleaded, should be divided into at least two sections: optics proper and photography. In it practical classes on glass grinding, etc., should be given in conjunction with theoretical work.—*Nature.*

SCIENTIFIC BOOKS

A System of Physical Chemistry. By W. C. McC. LEWIS. New York: Longmans, Green, and Co., 1915. 19 × 13 cm.; 2 vols. Pp. vii + 552; xiv + 523. Price $2.50 net, each volume.

In the preface the author says: "The scientific treatment of any set of phenomena consists in applying the minimum of general principles or theories which can afford a reasonable explanation of the behavior of matter under given conditions; and predict its behavior under new conditions. The principles referred to as far as physics and chemistry are concerned are the kinetic theory and thermodynamics. In the kinetic method of treatment emphasis is laid upon the actual molecular mechanism of a given process; in the thermodynamic method the emphasis is laid upon the energy changes involved. Both methods should be familiar to any one who undertakes the task of original investigation. . . . I have therefore divided the book into three parts, in which the phenomena exhibited by systems in equilibrium and not in equilibrium are treated first from the 'classical' kinetic standpoint only; then independently from the thermodynamic; and finally from the standpoint of thermodynamics and the new or 'modified' principles of statistical mechanics."

One obvious criticism of this plan is that the same subject is treated more than once, which seems a pity. The author has covered an enormous amount of ground. He takes up electrochemistry pretty thoroughly; he has one chapter on colloid chemistry, another on Nernst's heat theorem; a third on photochemistry, and a fourth on the quantum theory. In a sense it is therefore a pretty comprehensive treatise on physical chemistry, covering something the same ground as Nernst's "Theoretical Chemistry" but in more detail. The plan of the book is an ambitious one; but the task was rather more than the author could handle. The treatment is essentially not critical and the reviewer finds the book much less interesting and inspiring than Mellor's "Chemical Statics and Dynamics."

WILDER D. BANCROFT