the surface. Four cells are thus formed beneath the blastoderm, and they are apparently added to the mesoblast, for in the next stage their derivatives can not be distinguished from the rest of the mesoblast. The entire mesoblast then originates from one cell which is separated from the entoblast in the fourth cleavage (16-cell stage), and from four other cells which are derived from the ectoblast in the sixth cleavage forming the 62-cell stage. The lineage of these four 'secondary' mesoblasts has been traced back to the first and second ectomeres.

The course of the cleavage as sketched above has been determined to be quite constant. Cells of definite origin in the early cleavage stages are the ancestors of cells which occupy particular positions in later stages. Following Conklin's terminology ('97), the cleavage may be characterized as 'determinate.' This conclusion is completely opposed to the results of the earlier investigators of Cirripede development.

Gastrulation is of the epibolic type, and is the result of the extension of the ectoblastic blastoderm over the entoblastic yolk-macromere. The blastoderm usually closes over the blastopore during the sixth cleavage (62 cells). The blastopore is identified as marking the ventral and posterior of the future embryo.

In the general features of the late development of the embryo the results of this investigation confirm those of some earlier workers.

A paper with figures in support of all the above conclusions has been prepared, and is now awaiting publication.

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ERNST HARTIG.

Ernst Hartig, 'der Geheime Regierungsrat Professor Dr. Hartig' of the 'kgl. Sächsische Technische Hochschule,' at Dresden, died April 23rd. He was born, Jan. 20, 1836, studied at the Dresden Polytechnikum, finding in the late Geheimrat Professor Dr. A Hulsse an inspiring teacher and a warm friend through whose encouragement and aid he was induced promptly to take up a line of study and work which gave him, ultimately, large opportunities and great reputation. He became, in 1862, the assistant for mechanical technology and was promoted to his professorship in 1865. In 1890 he became the director of the Technical High school. He was active in the organization of the various technical departments and the laboratories of engineering research and made himself an authority relative to the materials of engineering and in all departments of textile work. He published some important papers.

His 'Untersuchen uber die Heizkraft der Steinkohlen Sachsens' came out as early as 1860; from 1864 to 1869 he was engaged in the pursuit of a number of researches and published the results of an experimental investigation of the power required in the operation of spinning and weaving machinery. In 1873 he brought out his work of similar character on the machine-tools and in 1876 that on the machinery of the combed wool manufacture. At the desire of its author, then surrendering his hold upon his long-sustained work in that direction, Hartig undertook the preparation and admirably completed the issue of the fifth edition of Karmarsch's 'Handbuch der mechanischen Technologie' for his old friend and teacher and assumed thenceforth the position of a leading authority in that branch. From 1877 he had much to do with the formulation and systematization of the patent laws and patent systems of the kingdom and of the empire, accomplishing much for the inventor, and for the courts as well. He was an admirer of the United States system and recognized its

enormous influence upon the welfare of the country and in encouraging that fecundity in invention which has always distinguished this country. His spirit, his learning and his logical mind are exhibited in 'Studien in der Praxis des k. Patentamtes,' 1890.

Hartig was named as 'kgl. sächsischen Regierungsrat,' in 1876, and as 'Geheimen Regierungsrat,' in 1888. He was decorated with the 'sächsischen Albrechtsorden Komthur 2 kl.,' and the 'sächsischen Verdienstorden Ritterkreuz I. kl.,' the 'preussische Rote Adlerorden 3 kl.' and the 'österreichische Franz Josef-Orden Ritterkreuz' and was made a member of many learned societies.

Ernst Hartig was one of the most modest and companionable of men, kindly, considerate, seeking to please his friends, and always most courteous to strangers. As a colleague on the International Jury of 1873, the writer, working side by side with him for weeks together, came to know the man and to recognize his admirable personal qualities most fully. His affection for his older colleagues and his former teachers, his friends and his pupils was always in evidence. His mind was a storehouse of information and his sincerity and quiet dignity gave him an aspect of age which was yet contra-indicated by his alert and youthful movement. He will always be remembered by those who have known him as one of the most admirable of men, the best of friends and the most able and useful of workers in a field in which there is never likely to be a surplus of such men.

R. H. THURSTON.

SCIENTIFIC BOOKS.

The Grammar of Science. By KARL PEARSON, M.A., F.R.S. Second edition revised and enlarged. London, Adam & Charles Black. 1900. Pp. 548.

It is possible to acquire a speaking and indeed a fairly extensive knowledge of a language without any special attention to its grammatical peculiarities. The conscious realization of syntax and conjugation, or of rules and exceptions may be quite unnecessary in 'picking up' an acquaintance with a new tongue in its local habitat. None the less the student even of 'French at a glance,' or of 'Fourteen weeks in German,' finds it profitable to include genders and declensions, and principles of structure in his aperçu. The more earnest student and, most of all, the specialist must penetrate still more deeply into the intricacies of grammatical structure and development. The same is true, though more readily overlooked in regard to the language of science. In both cases a facility of comprehension and expression, and a sympathy with the pervading spirit or genius of the language are of inestimable value, and for many purposes are indefinitely more useful than knowledge—particularly than unassimilated and uninterpreted book knowledge—of the results of analytical acumen. A scientifically-minded person may be more at home in the realm of scientific fact, may be less likely to wander astray, than he who has greater knowledge of principles with less insight into their practical combination. The observant but empirical linguist may interpret usage with greater success than the formal philologist. None the less the grammatical principles of science are of inestimable importance in imparting breadth and scope as well as depth of insight and vigor of logic to the conceptions of professional scientists and of that larger class who think scientifically and find an interest in scientific problems. That Professor Pearson's 'Grammar of Science' has met the needs of such thinkers creditably and suggestively, is evidenced by the appearance of the second edition, as well as by the comments of approval which greeted the first issue of the volume.

It will hardly be necessary in the notice of this second edition to present an account of the several chapters and of the method of treatment of the book; it will suffice to outline the scope and power of the whole. Three general groups of topics are included. The first portrays the general scope and spirit of science, or describes the purpose of the worker; the second interprets its fundamental conceptions, or de-