the relatively extensive knowledge which we have of its properties, seem to commend it as the most useful curve to represent the type of distribution to which scholarship marks should conform. If it is desirable to have the grades express significant local factors, this can always be done by adding some constant value to these grades, and the constants so found will also give an index as to the scholarship of a particular institution.

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SCIENTIFIC BOOKS

Nature's Harmonic Unity. By SAMUEL COLMAN, N.A. Edited by C. ARTHUR COAN, LL.B. New York, G. P. Putnam's Sons. 1912. Cloth, $8 \times 9\frac{1}{2}$ in. Pp. viii + 327; 302 illustrations. $3.50 net.

The purpose of this book appeals to the scientist and ought to be a matter of serious study for every beginner in the vocation of arts.

It contends to prove that pleasing forms of nature, as well as of human creation, are ruled by mathematical laws.

That this is true to a certain extent has been shown by the reviewer in an article on "Mathematical Principles of Esthetic Forms," which in October, 1900, appeared in the *Monist,* and in various other publications, where also a number of important references may be found. The fact that the author does not seem to be familiar with these accounts for some serious defects in the presentation of the subject. A writer who attempts to explain the principles of esthetic forms in nature should not neglect to study, for example, Schwender's "Vorlesungen über Mechanische Probleme der Botanik."[2] Furthermore, what a rich source of beautiful natural forms might he find in Haeckel's "Kunstformen der Natur."[3]

In neglecting the physiological and psychological factors of the problem, the treatment must necessarily become antiquated and, from the standpoint of the exact scientist, in many parts shrouded by a semi-mathematical mythology and naïvely stated principles.

The book contains, nevertheless, a number of very readable chapters which will be of value to any one interested in the problem. The examples chosen from biology are by far the most interesting, while some of those in architecture are of questionable value. See, for instance, on page 79, the combined figure of a snow crystal and the Parthenon. It is evident that a hexagonal figure may always be drawn to fit the tinted square and resembling a snow crystal. But what about the exact dimensions? Again, the paraphrase of a vase, p. 273, designed according to, what in this and similar cases I call mathematical mythology, is certainly no object of universal admiration. Notice the painfully weak points in the foot.

The Greeks did not know the logarithmic spiral as would appear from a statement in connection with the discussion of the Ionic volute in the chapter on conchology. This particular spiral, expressed by the polar equation $\rho = e^{a\theta}$, was discovered by Descartes in 1638. When writing about the Ionic order, why not mention the Lituus ($\rho^2 = a^2/\theta$) discovered by Cotes in 1722. It seems strange too, that the catenary should be given the prize as the most beautiful curve. Those algebraic lines which pass through the circular points are generally considered as the beauties among the curves.

The technical aspect of the book is generally pleasing. It is, however, to be regretted that in a treatise with esthetic purposes most of the geometric figures should be so crudely drawn. They are clumsy-looking and lack neatness and precision of execution.

[1] "Mathematik in Natur und Kunst," *Mitteilungen der Naturforschenden Gesellschaft in Solothurn,* Vol. XV., 1906. "Sur quelques exemples mathématiques dans les sciences naturelles," *L'Enseignement Mathématique,* Vol. XII., Paris, 1910. "Wiskunde en Natuurlijke Historie," *Wiskundig Tijdschrift,* Vol. 10, Haarlem, 1910. "Mathematics and Engineering in Nature," *Popular Science Monthly,* November, 1911.

[2] Engelmann, Leipzig, 1909.

[3] Leipzig, 1899–1903.

We fully agree with the author when he states:

> Proportion is a principle in nature which is a purely mathematical one and to be rightly interpreted by man through the means of geometry; therefore geometry (?) (mathematics) is not only the gateway to science but is also a noble portal opening wide into the realms of art. Still to a great majority of artists, and to the world at large, the effort to relate science with art is now looked upon with the greatest disfavor and even repugnance, and this accounts in a measure for the overwhelming percentage of immature work which characterizes all branches of art in our times.

It would be another extreme, however, to try to explain all natural forms and everything in art by stereotype mathematical laws. This would soon lead to barren formalism and sterility. True art in many of its phases must conform with mathematical, or, more generally, scientific principles. But it can not live without the inspiration derived from physiological and psychological factors.

Colman's book on "Nature's Harmonic Unity" serves a very noble purpose: a rational appreciation of beautiful natural forms and, based upon it, the cultivation of a truly artistic spirit.

It is for this reason that, in spite of its defects, we wish a large circle of readers for it.

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A Revision of the Amphibia and Pisces of the Permian of North America. By E. C. Case. Washington, Carnegie Institution, Publication No. 146. 1911. Pp. 179, text figs. 56, plates 32.

This monograph is the third of a series by Dr. Case on the Permian vertebrates of North America. The work is divided into five parts: an historical review, a systematic revision, and a morphological revision of the Amphibia, a description of some Permian insects by Dr. E. H. Sellards, and a review of the Permian fishes of North America by Dr. Louis Hussakof. The historical review shows the development of the taxonomy and nomenclature of the Permian vertebrates from the earliest descriptions by Cope in 1875 to the time of publication.

In the systematic review the author has been very conservative and has rejected the more recently proposed classifications of the Amphibia. The one adopted is, in general, that most commonly in use for the Stegocephalia. Under this order two suborders are recognized, the Microsauria and the Temnospondyli. The author has used the term Microsauria (with question) in the sense commonly employed and has made no attempt to define this sadly mixed group. To it are referred the family Diplocaulidæ and genus *Diplocaulus*. The suborder Temnospondyli is divided into two groups, the rhachitomous and the embolomerous. Under the first division are placed 12 genera arranged in five families: family, Eryopidæ, genera, *Eryops, Parioxys, Anisodexis* (?), and *Acheloma;* family, Trimerorhachidæ; genera, *Trimerorhachis, Tersomius* and *Zatrachys;* family, Dissorhophidæ, genera, *Dissorhophus, Cacops* and *Alegeinosaurus;* family, Aspidosauridæ, genus, *Aspidosaurus;* family, Trematopsidæ (not Trematosauridæ), genus, *Trematops* (not *Trematosaurus*). The embolomerous division is represented by the family Cricotidæ and genera *Cricotillus* and *Cricotus*. Under the heading, "Incerte sedis," are placed, family, Crossotilidæ, genus, *Crossotelos;* family, Gymnarthridæ, genera, *Cardiocephalus* and *Gymnarthrus;* all referred to the suborder, Gymnarthria. Under the second order represented, the Urodela, is placed the family Lysorophidæ and genus *Lysorophus*. In this Dr. Case agrees with the majority in considering *Lysorophus* an amphibian in opposition to the few that still believe it a reptilian form. At the end of this section is a set of tables showing the characteristics of the various families, genera and species. These are so arranged that the related forms can readily be compared.

In the morphological revision the following genera are treated in detail: *Diplocaulus, Eryops, Acheloma, Trimerorhachis, Zatrachys, Dissorophus, Cacops, Gymnarthrus* and *Lysorophus,* genera which, till recently at least, were but little known. In an attempt to bring the publication up to date the author