owed its selection to the occurrence in the title of the phrase 'cold-blooded animals.'

It would require undue space to demonstrate here what the individual observer can easily verify, namely, that there are characteristic differences in the method of treatment given the material by different national bureaus. Some have clearly over indexed, others have been as distinctly deficient. Among German references it was difficult to find errors in classification, while among those of some other nations they were all too frequent.

As a result of a most careful study of this work one is forced to conclude:

1. With respect to promptness, completeness and accuracy the results are distinctly inferior to those already achieved for zoology by several bibliographic agencies.

2. A subsidy for any one of the existing agencies equal to a fraction of the amount spent on this part of the 'International Catalogue' would yield much greater results in giving the investigator actual control of the literature in zoology.

3. The effort to construct a bibliography from materials furnished by numerous national bureaus will not result in the production of a consistent work.

4. A useful bibliography in this field can not be prepared by mere cataloguers, however expert they may be, and however great the means at their disposal for the prosecution of the work.

5. The contention of Weltner and others is abundantly justified that only the specialist in zoology can make a satisfactory analysis of zoological publications, and only he should be allowed to control such work.

6. It is most important to add to the mere record of titles a brief critical annotation regarding the subject matter of each paper. Additional subsidies should be devoted to the improvement of existing agencies rather than to the creation of new organizations.

Henry B. Ward.

University of Nebraska.

SCIENTIFIC JOURNALS AND ARTICLES.

The Museums Journal of Great Britain for December has an excellent article 'On Colors in Museums,' by Hans Dedekam, dealing at some length with the question of what are the best colors for backgrounds for various exhibits. The balance of the number is devoted to reviews and notes, and includes a good review of Dr. Meyer's recent memoir.

The contents of the January number of the *American Journal of Mathematics* is as follows:

'Some Properties of a Generalized Hypergeometric Function,' by F. H. Jackson.

'Relation between Real and Complex Groups with Respect to their Structure and Continuity,' by Dr. S. E. Slocum.

'Determination of all the Characteristic Subgroups of any Abelian Group,' by G. A. Miller.

'Collineations whose Characteristic Determinants have Linear Elementary Divisors with an Application to Quadratic Forms,' by A. B. Coble.

'Concerning Certain Elliptic Modular Functions of Square Rank,' by John A. Miller.

'Minors of Axi-symmetric Determinants,' by E. J. Nanson.

'On the Forms of Sextic Scrolls having a Rectilinear Directrix,' by Virgil Snyder.

SOCIETIES AND ACADEMIES.

THE NEW YORK SECTION OF THE AMERICAN CHEMICAL SOCIETY.

A regular meeting of the New York Section of the American Chemical Society was held at the Chemists' Club, Friday night, December 9. The following councilors were elected from the New York Section: Messrs. Leo Baekeland, F. D. Dodge, T. J. Parker, W. J. Schieffelin and Hugo Schweitzer.

The regular program of the evening was then taken up and the following papers presented:

The Art of Sizing Paper with Rosin Soaps. Martin L. Griffin.

The subject is introduced by some general considerations pertaining to sizing paper, but deals principally with the claims frequently made, that acid or free rosin sizes are most desired, and that it is the free rosin that is the effective sizing agent in paper.

The author has made a large number of experiments, sizing paper stock in different ways with different reagents, showing conclusively that this is not the case, that free rosin

is a poor sizing agent, and that the base of the precipitating agent plays a very important part in sizing paper. Incidentally he shows that any reagent whose base is alkaline will not effectually size paper, no matter how completely the rosin may be precipitated in combination with it.

The Tensile Strength of Bronzes. WILDER D. BANCROFT.

The tensile strength of the copper-tin bronzes containing more than 92 per cent. copper varies relatively little with the different heat treatments. With bronzes containing 75 to 92 per cent. copper the strength is much greater if the alloy is quenched from above 500° than if it is quenched from below 500°. The extreme effect is to be found with the 79 per cent. bronze, which has a tensile strength of over 70,000 pounds per square inch if quenched from low red heat and a strength of only about 30,000 pounds per square inch if quenched from 400°. Similar results were obtained with the ductility measurements, though the maximum ductility does not occur at the same concentration as the maximum strength. The bronze containing 90 per cent. copper gives a 40 per cent. elongation if quenched from 540°, and only a 10 per cent. elongation as cast. This work has been made possible by a grant from the Carnegie Institution.

The Production and Modern Uses of Carbonic Acid. JOHN C. MINOR, JR.

The paper describes the causes leading to the development of the carbonic acid industry, taking up the different methods of production, viz., calcination, acid treatment of carbonate, fermentation, the coke process, and the method used at Saratoga Springs for securing CO_2 from the natural mineral waters there. The treatment of the gas after production and the cylinders for holding it under high pressure are discussed. Among the commercial uses for CO_2 described at some length are mentioned: the manufacture of carbonated beverages, the extinguishing of fires on shipboard, the drawing of beer, the use in breweries for replacing the secondary fermentation, refrigeration, the operation of block signals, and the extraction of logwood. The therapeutic uses of CO_2 are also indicated.

F. H. POUGH,
Secretary.

THE TORREY BOTANICAL CLUB.

THE regular meeting of the club was held December 13 at the College of Pharmacy, Dr. H. H. Rusby in the chair, eleven members present.

The first paper on the program was by Professor F. E. Lloyd, who spoke of the Desert Botanical Laboratory at Tucson, Ariz. He pointed out that there were four characteristic types of desert visible with great regularity from the car window westward from El Paso, as the train passed from mesa to hill country or *vice versa.*

The character plants of these four deserts, which are remarkably distinct and pure, are the *Yucca, Ephedra, Mesquite, Parkinsonia* and *Fouquieria* in abundance. Professor Lloyd spoke in some detail of the vegetation in the vicinity of Tucson, illustrating his remarks with numerous excellent photographs, including several good pictures of *Cereus giganteus* in bloom and in fruit.

It was remarked that the plants with motile leaves, such as *Cassia, Acacia* and *Parkinsonia,* all faced the sun at sunrise, but did not follow its course during the day. *Fouquieria* was described in detail, attention being called to its short-lived primary leaves and curious spines, which were cited as an example of direct metamorphosis, the rosettes of secondary leaves appearing in the axils of the latter.

The primary object of Professor Lloyd's stay at the laboratory was the determination of the relation between stomatal action and transpiration. Numerous experiments were made, the results of which are to be reported in detail later.

The second paper, by George V. Nash, was on the vegetation of Inagua. Mr. Nash recently spent four weeks in collecting there. Inagua includes a large and a small island located some sixty miles northeast of Cuba, and with a total area of between five and six hundred square miles of mostly low land, the

highest point reaching only 132 feet above the sea.

The flora is poor, embracing some 350 or 400 species, the relatively numerous cacti in the genera *Opuntia, Cactus, Melocactus* and *Pilocereus* emphasizing the desert-like conditions prevailing on the islands. Five plant areas were differentiated: (1) That of the strand; (2) the scrub, where nearly all the endemic species of the islands have been found; (3) the white sand or white land, as it is called locally, characterized by a species of *Coccothrinax;* (4) the salinas, characterized by the shrub *Avicennia nitida* Jacq., and (5) the savannas, where *Conocarpus sericea* Forst. is the characteristic shrub and *Sporobolus virginicus* the common grass. In the numerous salt holes is found the only fern of the islands, *Acrostichum aureum.*

Excellent photographs were exhibited showing the dwarfing effect of the sharp winds of the southern coast, where the vegetation, elsewhere six or eight feet tall, is reduced to a foot or two in height and becomes widely spreading.

One of the results of Mr. Nash's trip was the extension of the range of *Pseudophœnix sargentii* about 350 miles to the southward; another the collection of a number of new species.

Numerous photographs, and specimens from each of the plant areas, illustrated the speakers' various points.

Edward W. Berry,
Secretary.

THE SCIENCE CLUB OF NORTHWESTERN UNIVERSITY.

The Science Club of Northwestern University held its regular monthly meeting Friday evening, January 6, 1905.

The program was furnished by the department of mathematics of the university, Dr. W. M. Strong, of Chicago, presenting a paper on 'Some Points of Interest in Mortality Tables.'

Floyd Field,
Secretary.

DISCUSSION AND CORRESPONDENCE.

THE EPIDIASCOPE.

To the Editor of Science: With reference to Professor Todd's query in the last issue of Science, 'Who saw the Epidiascope at St. Louis?' I am happy to say that the apparatus has recently been installed in the anatomical laboratory of Brown University, a much appreciated gift from physicians of Providence and other cities. I had an opportunity of seeing the epidiascope in operation at Jena in 1903 through the usual courtesy of the Carl Zeiss management.

In actual use in the laboratory it surpasses expectations both in respect to convenience in handling and to range of capabilities. Lantern slides or other transparent objects up to about twelve inches in diameter and microscopic slides are projected with good effect. The new feature which especially distinguishes the apparatus—the projection of opaque objects—is of course the most remarkable. In this as in other respects we find that the claims put forth in the prospectus are, indeed, very modest. The color, texture, motion and third dimension of objects are beautifully reproduced. Colored lithographs in bound periodicals or reprints may simply be placed upon the carrier of the machine while the book is held open with the hand, and the whole page appears with the colors and lines of the figures perfectly reproduced. It is a great advantage that the image is not reversed. A manuscript or page of text can be read from the screen directly. Original water color or oil paintings are reproduced altogether too faithfully, for the effect is that received when standing close to the picture. Insects of various kinds have been tried; they lose nothing in the reproduction. The metallic luster and iridescence of the beetles show better because of the brilliant light than when viewed directly. On the other hand, moths or butterflies with bright colors and soft texture appear with as much naturalness as do the beetles. Such natural objects of course do not suffer from the magnification of details. A small adder and a newt when placed on the carrier appear on the screen as a boa constrictor and a giant salamander. Embryos or dissected