discussed, representing two hundred and eighty-eight genera and fifty-five families.

Students of Canadian birds are fortunate in the possession of this cyclopedia of comprehensive and accurate information. It is scarcely less interesting and valuable to the ornithologists of the United States, who will find in it a larger mass and greater detail of reliable matter concerning many of our species than is to be found in any other like publication. It is a methodical, careful record of data of observation, simply and clearly written, for the compilation of which the authors deserve the gratitude of all students of American ornithology.

Stephen A. Forbes

Weitere experimentelle Untersuchungen über Artveränderung, speziel über das Wesen quantitativer Artuntershiede bei Daphniden. By R. Woltereck, Vehr. der Deutschen Zool. Gesellsch. 1909. Pp. 110–172, 18 text figures.

Dr. Woltereck has selected the very variable *longispina* group of *Daphnias* for his studies in variation and heredity and the results on which the paper is based were obtained in experiments covering a period of three years. The plan of the investigation embraces a study of four problems: (1) The cause, extent and character of the variations in this group of crustaceans; (2) the characters possessed by hybrids resulting from the crossing of two elementary species; (3) whether a pure culture biotype can be changed through the selection of extreme variants; (4) whether and how much a long-continued exposure to a particular environmental condition will change the characteristics of a biotype hereditarily.

So far the experiments have been confined mainly to the first problem and attention has been directed chiefly to two characters, the length of the helmet and sexuality. The author found that the length of the helmet is dependent primarily on the quantity of food (an external factor) and the number of the generation (an internal factor). Indirectly also it is affected by the temperature of the water through its influence on assimilation and body activities. The length is directly proportional to food assimilation and is not affected directly by other external factors such as salt or gas content of the water, light or temperature. With respect to the internal factor, the first generations produced by ephippial eggs have small helmets but, under the same food conditions, later generations will have larger helmets. This seems to show the presence of a "Helmhöhepotenz" which has become hereditarily fixed so that the size of the helmet may be modified by food conditions, but it can not be entirely controlled by this factor. No mutations were observed.

Concerning sexuality, it was found that the sexual stage might be postponed for several generations (ten to twelve) but it was not possible to postpone this stage indefinitely in all individuals. In some cases it became obligatory in all individuals, while in other instances it became only partial and facultative. The parthenogenetic stage was found to be obligatory in all generations.

Dr. Woltereck also studied two regressive characters, the pigment fleck (Nebenauge) and the dorsal shell teeth. Some individuals, especially those belonging to the earlier generations, possessed a rather large pigment fleck while this character was entirely absent in individuals belonging to later generations. At first this was supposed to be a mutation but further study revealed the presence of a number of intermediate stages, thus showing a continuous variation. Environment did not seem to affect the variability of this character.

The dorsal teeth also showed a continuous variation in size, in position, and in heritability. Through selection the number of individuals possessing these teeth was raised to 50 per cent. in the third generation. This character was affected by a marked change in the temperature of the water. If a female having ripe eggs in her ovary were suddenly transferred from water having a temperature of 25° to water at 12° and kept at this temperature, the young produced by these eggs possessed dorsal teeth.

One series of experiments is concerned with

the production of new characteristics by overfeeding and the fixation of these characters. The time during which these experiments have been in progress has been divided into three periods. During the first period, which includes the time immediately following the starting of the culture, the form of the head varied very widely under the new food conditions, but it soon returned to the original form when original conditions were restored. In three to four months after the culture was started, the form of the head was more regular and there were fewer aberrant individuals. Young females returned more slowly to the original head form when changed to original environment. The third period began almost two years after the culture was started and it was found that the young no longer returned to the original helmet form when original conditions were restored. A larger helmet persisted, thus showing a tendency toward the fixation of a new helmet form.

All of these experiments are still in progress and a more extended report on the results is promised at some future date.

C. JUDAY

MADISON, WIS.

SCIENTIFIC JOURNALS AND ARTICLES

The American Journal of Science for September contains the following articles: "Use of the Grating in Interferometry," by C. Barus; "Fox Hills Sandstone and Lance Formation ('Ceratops Beds') in South Dakota, North Dakota and Eastern Wyoming," by T. W. Stanton; "New Occurrence of Hydrogiobertite," by R. C. Wells; "New Occurrence of Plumbojarosite," by W. F. Hillebrand and F. E. Wright; "Heat of Formation of the Oxides of Cobalt and Nickel," and sixth paper on the "Heat of Combination of Acidic Oxides with Sodium Oxide," by W. G. Mixter; "Mosesite, a New Mercury Mineral from Terlingua, Texas," by F. A. Canfield, W. F. Hillebrand and W. T. Schaller; "Researches upon the Complexity of Tellurium," by W. R. Flint; "Gravimetric Estimation of Vanadium as Silver Vanadate," by P. E. Browning and H. E. Palmer; "Brachiopod Genus *Syringothyris* in the Devonian of Missouri," by C. Schuchert; "George Frederic Barker."

SPECIAL ARTICLES

THE INFLUENCE OF EXTERNAL CONDITIONS UPON THE LIFE CYCLE OF HYDATINA SENTA

THE search for the factors which regulate the production of the parthenogenetic and the sexual phases in the life history of the rotifer, *Hydatina senta*, has been conducted for some time. Maupas concluded that temperature regulated these two phases, while Nussbaum found that the controlling factor was food. Punnett and the writer[1] were unable to confirm these results. Recently Shull[2] has claimed that the absence of certain chemicals in the culture water causes the sexual phase to be produced, while the presence of these chemicals prevents the appearance of the sexual phase. This suggestion is probably partially true, but it does not seem to express the whole truth, nor solve satisfactorily the whole problem.

During the past two years I have kept pedigree strains or families of these rotifers continually in the laboratory and have made some observations which may lead to a clearer understanding of the conditions which control the production of the sexual and parthenogenetic phases in the life cycle of this rotifer.

A general food culture for rotifers is usually made by adding about one hundred and fifty grams of fresh horse manure to about two thousand cubic centimeters of ordinary water and allowing this mixture to stand at room temperature after being inoculated with a miscellaneous lot of microorganisms. It is readily noticeable that in large jars of such newly made food cultures in which rotifers have been placed, that sexual females (females capable of producing either males from small parthenogenetic eggs or females from large fertilized eggs) appear quite abundantly for a few days or weeks, then gradually disappear and only parthenogenetic females remain in the cultures as they become older.

In June, 1909, several general cultures

[1] *Journ. Exp. Zool.*, Vol. 5, pp. 1–25.

[2] *Amer. Nat.*, Vol. 44, pp. 146–150.