To an American fishery biologist the book is most refreshing not because the facts are new—they have all been published in the technical literature—nor because the conclusions and the plan of action for restoring the fisheries of Northwestern Europe are unique but because they parallel so closely the conditions revealed by fishery research in American waters and because the correctives for overfishing in Europe are the same as those that must be applied here. Indeed, Dr. Russell's conclusions have universal application and, although the method of applying them will vary for different species and in different localities, it is for this reason that the book merits thoughtful reading by American fishery administrators, operators and fishermen.

The American scientist also may well find the book a fascinating introduction to a distinct and rapidly developing field of science with which he is, by and large, quite unfamiliar. The late great Dr. Raymond Pearl recognized the affinities of fishery biology with the particular field of human biology in which he had labored so effectively. It is to him that the handful of us are so greatly indebted for the privilege of becoming acquainted with the rugged integrity and the kindly, homespun personality of Dr. Russell—a man honored at home with the Order of the British Empire for outstanding scientific work in a field so "lowly" as the fisheries.

ELMER HIGGINS

FISH AND WILDLIFE SERVICE,
WASHINGTON, D. C.

SOCIETIES AND MEETINGS

THE WISCONSIN ACADEMY OF SCIENCE

THE annual meeting of the Wisconsin Academy of Sciences, Arts and Letters was held at the University of Wisconsin, on Friday and Saturday, April 17 and 18. Forty-one papers were presented by members and guests of the academy, while 32 papers were read in sessions of three societies which met jointly this year with the academy—the Wisconsin Archeological Society, the Wisconsin Museums Conference and the Wisconsin Folklore Society.

Dean of speakers on the academy program was the 91-year-old ex-president of the University of Wisconsin, Edward Asahel Birge. Mr. Birge has been a member of the Wisconsin Academy since 1876, six years after the founding of the academy by act of the Wisconsin Legislature in 1870. During this period Mr. Birge has been one of the most regular of attendants at academy meetings, and has published many limnological articles in the *Transactions*. Mr. Birge delivered a paper entitled "The Relations between Water and Transmitted Sunlight."

Papers dealing with a wide variety of subjects were presented by academy members from Wisconsin colleges and universities, as well as by members from outside of Wisconsin. Two programs of correlated papers were arranged by Professors Lowell E. Noland and Arthur D. Hasler, both of the zoology department of the University of Wisconsin. The first-named group included several papers on the fresh-water clam, *sphaerium*, and the snail *Lymnaea stagnalis*. Professor Hasler's group of papers included a series of studies of Lake Geneva, Wisconsin, where in the summer he is the director of the Lake Geneva Institute of Natural Science.

Officers elected for 1942–1943 are as follows: A. W. Schorger, Madison, *President;* W. N. Steil, Milwaukee, *Vice-president in Sciences;* Ralph Buckstaff, Oshkosh, *Vice-president in Arts;* Berenice Cooper, Superior, *Vice-president in Letters;* Loyal Durand, Jr., Madison, *Secretary-Treasurer*. The secretary is also editor of the *Transactions*, a new number of which is being started to press. Award of the research grant from the American Association for the Advancement of Science was made to Professor James F. Groves, of Ripon College.

LOYAL DURAND, JR.,
Secretary

NORTH CAROLINA ACADEMY OF SCIENCE

THE forty-first annual meeting of the North Carolina Academy of Science was held at the Woman's College of the University of North Carolina, Greensboro, on April 24 and 25. Despite emergency curtailment of tires and gas and despite the fact that many of our members are directly engaged in war work, the meeting was well attended. About 300 scientists heard a varied program of some 70 papers. The North Carolina Section of the American Chemical Society met at the same time and place with 9 papers on their program.

A new section dealing with the problems of wildlife conservation and management was organized this year. The program of 10 papers was heard by a large group, and considerable discussion followed each paper. This appears to be a very desirable section, which promises to grow in interest, and one which may operate to the profit of all who are interested in making the most of our wildlife.

In addition to the usual sectional program of formal papers the psychologists held a panel discussion on

"The Psychological Aspects of Morale." The meeting was well attended and evoked considerable interest and discussion.

The Poteat Award was conferred on J. P. Decker, of Duke University, for his paper on "The Effect of Temperature on Photosynthesis in Red and Loblolly Pines." The High School award of $20 went to Ernest Hardwick and Arthur Budlong, of the Winston-Salem High School. They demonstrated a home-made stroboscope.

After a complimentary dinner given by the Woman's College, Dean Jackson in his address of welcome lauded two former academy members, also former teachers at Greensboro, for their achievement in the scientific world. They were Gilbert T. Pierson and E. W. Gudger. Dr. R. E. Coker then delivered the presidential address, taking as his subject, "What Are the Fittest?" The address was a zoologist's view of the present world conditions. After the address an informal open house gave opportunity for renewing old friendships and establishing new ones. During this time the group experienced its first blackout.

Committee reports were made in mimeographed form, and these along with the treasurer's preliminary report were adopted. The secretary reported the election of about 50 new members. This makes a total of more than 225 new members elected in the last three-year period.

The following officers were elected: *President,* H. F. Prytherch, of the Bureau of Fisheries; *Vice-president,* Eva G. Campbell, of Guilford College; *Secretary-Treasurer,* Bert Cunningham (re-elected for a three-year term), of Duke University; *New Member of the Executive Committee,* O. J. Thies, of Davidson College; *New Member of the Research Grants Committee,* J. P. Givler, of the Woman's College.

A more detailed report of the meeting will appear in the *Journal* of the Elisha Mitchell Scientific Society.

BERT CUNNINGHAM,
Secretary

SPECIAL ARTICLES

THE RELATION OF URINARY CITRIC ACID EXCRETION TO THE MENSTRUAL CYCLE AND THE STEROIDAL REPRODUCTIVE HORMONES

THE role of citric acid in mammalian metabolism still remains obscure. Some of the prevailing theories and factual observations relating to this metabolite may be reviewed briefly. It is present in small amounts in the tissues and body fluids, and is a constant urinary constituent, (0.2–1.2 gms/24 hrs. in man.) It is evidently a product of endogenous metabolism, since it continues to appear in the urine during starvation, and the amounts excreted under normal conditions are greatly in excess of those present in the food or stored in the tissues.[1] Krebs, as a result of studies on minced tissues,[2] has assigned to it an important role in carbohydrate oxidation, but his theory still awaits support from work on intact tissue. In the living organism, citric acid has been shown to enter the carbohydrate cycle, but in a manner not implicit in the citric acid cycle postulated by Krebs. It exerts an anti-ketogenic effect and overcomes insulin hypoglycemia.[3] It is converted almost quantitatively to glucose in the phlorhizinized dog, and deposited as liver glycogen when fed to normal rats.[4,5] It has also been found to be related to acid-base regulation. Alkalosis, however induced, leads to an increase in urinary citric acid, excretion generally varying directly with urinary pH.[6] Finally, the unusually high citrate content of bone[7] is suggestive of some connection with calcium metabolism. The present paper links citric acid to still another physiological process, the menstrual cycle.

We wish to report experiments with human subjects which have revealed a relation between citric acid excretion and the steroidal reproductive hormones. These experiments were carried out on five young women with regular menstrual cycles, two young women with amenorrhea, and one hypogonadal male. Except in the case of two female subjects, both laboratory workers, the studies were carried out in the Metabolism Ward of the Department of Medicine in order to insure accurate urinary collections and proper dietary control. Citric acid was determined by a modification of the pentabromacetone method.

Analysis of the daily urinary excretion of citric acid during six complete menstrual cycles of the five subjects studied, showed, in all cases, a characteristic cyclic alteration in the level of the citric-acid content during the different phases of the menstrual cycle. The lowest levels always occurred during menstruation, the highest, at about the middle of the cycle. The shape of the curve varied with the different subjects, both with respect to the rapidity and height of the midmenstrual rise, and the duration of the increased excretion. In one patient studied over two

[1] C. C. Sherman, L. B. Mendel and A. H. Smith, *J. B. C.,* 113: 247, 1936.
[2] H. A. Krebs and W. A. Johnson, *Enzymologia,* 4: 148, 1937.
[3] E. M. MacKay, H. O. Carne and A. N. Wick, *J. B. C.,* 133: 59, 1940.
[4] I. Greenwald, *J. B. C.,* 18: 115, 1914.
[5] C. A. Kuether and A. H. Smith, *J. B. C.,* 137: 647, 1941.
[6] O. Östberg, *Skand. Arch. Physiol.,* 62: 81, 1931.
[7] F. Dickens, *Biochem. Jour.,* 35: 1011, 1941.