versity of Oklahoma, was elected president of the board of directors of the newly incorporated Grassland Research Foundation at a meeting held in Norman, Okla., on November 7. Other officers are G. W. Goldsmith, professor of botany at the University of Texas, and V. E. Shelford, professor of zoology at the University of Illinois, *vice-presidents;* J. M. Aikman, professor of botany at Iowa State College, *secretary;* and Mrs. M. W. Shackleford, professor of biology at the Oklahoma College for Women, *treasurer.* Incorporation of the group has been completed under the laws of Oklahoma. Membership, however, includes those living in the grassland area as far distant from Oklahoma as Saskatchewan, Oregon, Arizona, Texas and Illinois. A meeting of the corporation will be held in Columbus, Ohio, during the Christmas vacation, as part of the meeting of the American Association for the Advancement of Science. The Grassland Research Foundation is the outcome of the work of the committee on ecology of the grasslands of the National Research Council.

FOR the positions in the Bureau of Animal Industry, Department of Agriculture, of protozoologist at a salary of $3,800 a year, of associate protozoologist at a salary of $3,200 a year and assistant protozoologist at a salary of $2,600 a year, applications must be on file with the U. S. Civil Service Commission at Washington, D. C., not later than January 2. Vacancies in positions requiring similar qualifications will be filled from these examinations, unless it is found in the interest of the service to fill any vacancy by reinstatement, transfer or promotion. The salaries named above are subject to a deduction of 3½ per cent. toward a retirement annuity. Separate lists of eligibles will be established in each of the above grades in: (1) Coccidiosis; (2) parasitic protozoa of the blood; (3) general parasitic protozoa. Permanent employees in the classified service will, upon earning a passing mark in these examinations, have their names placed upon a separate list of eligible government employees, which list may be certified separately to fill appropriate vacancies in accordance with the civil-service rules.

DR. ERNEST CARROLL FAUST, secretary of the American Academy of Tropical Medicine, reports that the sixth annual session of the academy was held in conjunction with the American Society of Tropical Medicine meeting with the Southern Medical Association at Memphis, Tenn., on November 23. The presidential address was delivered by Dr. W. W. Cort, of the Johns Hopkins University, on the subject "Research on Helminth Diseases and Public Health Progress." The second presentation of the Theobald Smith Gold Medal of the George Washington University for distinguished work in tropical medicine was presented by Dr. Alfred C. Reed, of the University of California, for the academy, to Dr. Richard P. Strong, of the Harvard Medical School. At the business session of the academy, the officers elected were: Admiral Charles S. Butler, *president;* Dr. Marshall A. Barber, *vice-president;* Dr. Ernest Carroll Faust, *secretary;* Dr. Thomas T. Mackie, *treasurer;* Colonel George R. Callender, *councillor.* Five new members were elected, and Dr. L. O. Howard, member, was elected to honorary membership. It was voted to hold the seventh annual session of the academy with the American Society of Tropical Medicine at Louisville, Ky., in November, 1940.

ACCORDING to the *Journal* of the American Medical Association, the Milwaukee Academy of Medicine and the Marquette University School of Medicine have consolidated their medical libraries, forming a collection of 34,000 volumes. Dr. Irving S. Cutter, dean of Northwestern University Medical School, Chicago, was the speaker at the ceremony inaugurating the new library on October 17. Facilities have been enlarged at the university to receive the academy's library, the most important part of which is the collection of the late Dr. Horace Manchester Brown.

DISCUSSION

HEAVY WATER AND LONGEVITY

THE suggestion by Barnes[1] that deuterium oxide would be found to retard life processes, thus favoring longevity, was predicated upon the lower energy content of deuterium as compared with hydrogen.

The undersigned[2] have shown, during the past summer, that heavy water retards four chief growth activities of *obelia geniculata.* This is a sessile marine animal living in colonies of a few millimeters length. Forty-six experiments on 27,000 animals were made with concentrations up to 10 per cent. D_2O. The results accord with the general trend of observations by others on the growth of various low forms of life[3] and can best be interpreted on the assumption that deuterium oxide blocks anabolism. Since the evidence concerning regressive and senile stages of obelia also favors retardation rather than acceleration by D_2O, the prolongation of individual existence in these animals appears established.

While our results, as far as they go, fulfill the prediction of Barnes, they do not contribute convincingly

[1] T. C. Barnes, *Jour. Am. Chem. Soc.,* 55: 4332–4333, 1933.

[2] F. S. Hammett and H. G. Barbour, *Growth,* 3: 4, 1939.

[3] See reviews: S. L. Meyer, *Jour. Tenn. Acad. Sci.,* 10: 111–115, 1935; H. G. Barbour, *Yale Jour. Biol. Med.,* 9: 551–565, 1937; C. B. Davenport, *Ann. Rev. Physiol.,* I: 81–108, 1939.

to the question of mammalian longevity. The retarding effects of D_2O on the growth of mice bearing tumor transplants were demonstrated by Barbour and Allen.[4] One fifth saturation with deuterium oxide retarded the growth of both tumors and hosts, the latter showing shorter survival periods than the H_2O controls. A number of other mice have for several months tolerated one fifth saturation with D_2O, without evidence for enhanced longevity.

More significant is the fact that while the obelia offers evidence for decreased catabolism in low forms of animal life, mammals respond to one fifth saturation of deuterium oxide by catabolic stimulation persisting for many days.[5] Such difference in mammals may be attributable to checks and balances acquired in their phylogenetic development, as are, for example, provided by the elaboration of hormones. Now, deuterium oxide, presumably by providing a slow-acting form of hydrogen, protects and "prolongs the life" of at least two of these unstable hormones, namely, epinephrine[6] and acetylcholine.[7] The first of these has been found responsible for the metabolic increases, up to +20 per cent., which tend to make the mice "live faster" rather than slower.

Therefore, although deuterium oxide retards growth and anabolism and in toxic concentrations even delays catabolism in all forms of life so far examined, it is not to be expected that mammals enjoying the luxury of partial saturation with this substance will exhibit enhanced longevity.

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HEPARIN AND BLOOD CLOTTING

THERE recently appeared an article in which Astrup[1] confirmed our observation[2] that normal plasma contains an unknown factor, which, in conjunction with heparin, blocks the transformation of prothrombin into thrombin. Both his work and ours showed that heparin alone has little or no effect in blocking this reaction—a finding which conforms to the earlier experiments of Mellanby[3] and Quick.[4] However, in mixtures containing both the plasma factor and heparin, our work and that of Astrup showed that marked inhibition of thrombin formation results.

In a recent note in this column, Ferguson[5] discussed these results, and indicated, erroneously, we believe, that Howell and Holt's[6] original work had brought out all these same facts. It is true that they did find that the *destruction* of thrombin by heparin requires a plasma factor ("pro-antithrombin"), but they believed that heparin interfered *directly* with the conversion of prothrombin into thrombin (antiprothrombic action of heparin). Our work and that of Astrup has brought out the new concept that a plasma factor is needed for this inhibitory action of heparin.

Although we have suggested that this new plasma factor and the pro-antithrombin of Howell may be identical chemically, as yet no data are available on this point and the question must be left for future work.

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MASTODON REMAINS FOUND IN WEST VIRGINIA

ON Monday, October 9, there was brought to the biological laboratories of Bethany College the proximal portion of a long bone, too large to be that of any local domesticated animal. This bone fragment had been uncovered and picked up by a Mr. Funk, the operator of a steam shovel engaged in stripping coal about two miles west of Bethany, W. Va., in Brooke County, on a tract of land known as the Pendleton Farm and owned by a Mr. Petzol, of Hollidays Cove, W. Va.

The undersigned went immediately to the stripping operation and there found a number of other fossilized bones, as well as a portion of a tooth. These materials were removed to the biological laboratories of Bethany College. Dr. Leroy Kaye, paleontologist of the Carnegie Museum, Pittsburgh, Pa., was called into consultation and it was agreed that these were parts of a skeleton of the American mastodon.

The skeleton remains were found in a deposit of blue clay about 18 feet below the surface. This layer of clay was 6′ 3″ in thickness. It was probably a Pleistocene deposit. This layer contained an abundance of Gasteropod and Pelecypod fossils, as well as numerous pieces of fossilized wood. Overlying this was another layer of yellow clay of a gravelly nature,

[4] H. G. Barbour and E. Allen, *Am. Jour. Cancer*, 32: 440–446, 1938.
[5] H. G. Barbour and L. E. Rice, *Jour. Pharm. Exp. Therap.*, 62: 292–300, 1938.
[6] H. G. Barbour, Internat. Physiologen-Kongr., 16, Zurich, 1938, *Kongressber.*, pt. 2, 34–35.
[7] H. G. Barbour and V. C. Dickerson, *Jour. Pharm. Exp. Therap.*, 65: 281–286, 1939.
[1] T. Astrup, SCIENCE, 90: 36, 1939.
[2] K. M. Brinkhous, H. P. Smith, E. D. Warner and W. H. Seegers, *Am. Jour. Physiol.*, 125: 683, 1939.
[3] J. Mellanby, *Proc. Roy. Soc. B.*, 116: 1, 1934.
[4] A. J. Quick, *Proc. Soc. Exp. Biol. and Med.*, 35: 391, 1936.
[5] J. H. Ferguson, SCIENCE, 90: 272, 1939.
[6] W. H. Howell and E. Holt, *Am. Jour. Physiol.*, 47: 328, 1918.