unless modified by the words "of which a copy is now known to exist." It is true that the earliest copies of the "Grete herball" now known are dated July 26, 1526, but this was certainly not the first edition, and good evidence exists that in its first form it was dated June 20, 1516—nearly nine years earlier than Banckes's Herbal.

JOHN HENDLEY BARNHART

REPORTS

SCIENTIFIC WORK OF THE CARNEGIE INSTITUTION OF WASHINGTON[1]

A REVIEW of all the activities of the institution would make interesting reading, but it will have to wait until the time comes when the full story can be told. It is now impossible to mention fine work being done by many of the staff members of the institution, since it remains in a confidential category.

The normal research activities of the staff, in view of the interruptions and distractions now present, are not inconsiderable. The full Year Book gives the record, again with an interpretive statement by each director of a department or division. Here a few high lights will be noted, in the hope that this will lead to further perusal.

In spite of preoccupation of most of the staff members of the Department of Terrestrial Magnetism with defense research, the fundamental program of this department still continues significantly. Unless further delays accrue in procuring materials for which priorities are sought, the cyclotron will shortly be completed and made available for cooperative studies in which the Department of Embryology and the Department of Genetics will have a part. Searchlight studies of the electrical and chemical conditions of the air at great heights are also progressing, as well as coordination of magnetic, solar and upper-air studies as related particularly to problems of radio transmission.

Dr. Adams reports from Mount Wilson a number of interesting results. To seize upon one of these, he tells of the first definite evidence of the presence of iron in interstellar space, the density being such that there is present roughly one atom in a cubic meter. This is a very low density. The best vacuum man has produced artificially still contains gas many million times as dense. Yet interstellar space is so enormous that the mass of material represented in these gases is large, and the significance of the discovery may be great. Continued study of atomic and molecular spectral lines from this vast area may in time give us not only the composition but also the distribution and motions of the clouds of cosmic dust and gas that inhabit it, and provide much knowledge of the physical state of its matter. Another item relates to the discovery of the remains of Kepler's Nova of 1604 through the use of red-sensitive plates, and its recognition as the third supernova to appear in the observable region of the galactic system within the last 900 years. Finally, the vexed question of the direction of rotation of the great universes of stars represented by the spiral nebulae seems to have received a definite answer. The evidence shows clearly that in each of the objects investigated the spiral arms are trailing as the nebula rotates. This result is of fundamental importance in theories of the origin and dynamics of stellar systems.

Completion of construction of the 200-inch telescope at California Institute of Technology has been somewhat retarded by pressure of defense research activities, but we continue to cooperate closely in this program, and in consideration of plans for future operation of the giant telescope. In accordance with agreement reached in 1936, tapering financial support which the institution has provided for the seismological program at California Institute will terminate this year.

The Geophysical Laboratory has been concerned with investigation of the radioactive content of rocks as a vital factor in many geophysical problems, and as a part of this undertaking determination of radioactive elements in deep-sea cores obtained by Piggot from the Caribbean Sea has developed new and fundamental relationships. In this connection also a special study of radioactive elements in sea water has been carried out during the past year. Ultrabasic, deep-seated rocks make up the fundamental material of the earth's structure, and the whole problem of the thermal conditions of the earth depends largely on the radioactive content of certain of these rocks. It has now been possible to initiate a cooperative study concerning determination of age and heat production relating to rock formation. The equipment for studying silicate minerals in the presence of water at high temperatures and pressures such as prevail deep within the earth has produced a variety of interesting results. This apparatus is essentially an electric furnace within a strong closed chamber in which materials can be exposed to the action of steam at pressures of several thousand pounds and at temperatures far above a red heat. In the course of some experiments on solubility and melting point the formation of clear quartz crystals at a fairly rapid rate was observed.

[1] From the annual report of Dr. Vannevar Bush, president of the Carnegie Institution of Washington.

Other arrangements of the apparatus caused an unusual deposit of minerals formed by a solution of material in the vapor phase, followed by deposition in another part of the furnace. One of these minerals was sillimanite, which formed long needles of good size. This is the first time that this mineral has been obtained artificially, and it is probable that the manner of its formation in nature is similar in some respects to that here observed.

Further progress in studies on photosynthesis is reported from the Division of Plant Biology. Recent research relating to the chemical mechanism of the photosynthetic process has necessitated a considerable revision of the older set of hypotheses in regard to the chemical interactions involved. Refinement of existing methods of chemical analysis of the precise nature of the product formed by photosynthesis is being undertaken, and new materials are being subjected to photosynthetic measurements, including certain diatoms under culture. All lines of evidence, morphological, ecological, genetical and cytological, are brought to bear on problems concerning the analysis of plant relationships, in studies in the field of experimental taxonomy. These various methods of procedure are serving as effective checks and balances in development of the species concept.

As a result of work at the Department of Genetics, Blakeslee and his associates, by further application of the alkaloid colchicine method in study of the developmental history of the plant, have found that the stamen is evolutionarily a reduced axis and not homologous with a leaf, as is the classic belief. A gene mutant type has been located in *Datura* which so closely resembles the peculiar effects of a certain virus disease that further light is thrown on the question whether there are not close similarities between genes and virus particles, the chief difference between the two, perhaps, being in the fact that the virus particle has unlimited powers of multiplication, whereas the gene is imprisoned within a chromosome and can multiply only when the latter divides.

In accordance with the expressed desire of the trustees of the institution for the development of an effective program for cooperation between the Department of Genetics and the Long Island Biological Association at Cold Spring Harbor, an agreement was reached whereby Dr. Demerec, assistant director of the Department of Genetics, served as director of the Biological Laboratory of the Association during the summer of 1941, and Dr. Corner served as chairman of a scientific advisory committee for the Biological Laboratory program. This arrangement led to a symposium at Cold Spring Harbor on the subject of the gene and chromosome, which attracted a large group of scientists, and which was followed by the annual meeting of the Genetics Society of America. Plans for continuation of such effective cooperation are being formulated in connection with the institution's program of research at Cold Spring Harbor for next year.

The program of the Department of Embryology contemplates an increased use of physiological, physical and chemical methods in expansion of the experimental studies of mammalian embryology. Whatever work is undertaken in the future, however, will be intimately and soundly based upon the understanding of the form and structure of the human embryo which has so remarkably and effectively grown out of the past activities of this department. Dr. Streeter is now engaged in classifying and summarizing the results of these morphological studies on the development of the early human embryo, in fulfilment of one of the original purposes for which the Department of Embryology was established. The full statement of the objectives of the department is presented by the new director, Dr. Corner, after a year of study and consultation with his colleagues, during which time the aims of the program of research have become focused, although so defined as to admit of adaptation as conditions and opportunity may warrant.

Despite cooperation in defense research, which has required attention of staff members of the Nutrition Laboratory, work at the laboratory has progressed in development of instrumental technique and in cooperative studies of carbohydrate metabolism with reference to diabetes.

Dr. Kidder reports the interesting circumstances surrounding the discovery of ancient footprints in a stratified formation in Nicaragua, which was previously reported to the trustees. Investigation is being extended in the attempt to learn, if possible, more about the individuals who made these tracks, and when they made them. Work has proceeded at the ruins of Copan, Honduras, where extensive and necessary repairs are being completed preparatory to the inauguration of a brief but intensive program of archeological study. Continuation of humanistic studies in Middle America has placed the institution in an unusually favorable situation to cooperate effectively in various types of scholarly effort being undertaken in this region by numerous agencies.

Fortunately the institution has been privileged, even under somewhat adverse conditions, to continue its cooperation with a number of other agencies in furthering fundamental studies having direct relation to its major projects. Comments by directors on such subjects will be found in the Year Book, as well as independent reports from some of the investigators who have worked upon cooperative problems during the past year.