committee of twenty to proceed with the necessary organization for the meeting of the International Astronomical Union which is to be held in this country in 1932. An executive committee consisting of E. W. Brown, W. W. Campbell, R. S. Dugan, Frank Schlesinger, Harlow Shapley, Joel Stebbins and H. N. Russell has been selected, and several subcommittees appointed. The meeting will be held in Cambridge, Massachusetts, beginning as soon as practicable after the total eclipse of the sun on August 31.

THE Botanical Society of New Orleans was organized on October 9 with the following members as a nucleus: Professor William T. Penfound, Mrs. William T. Penfound, Mr. M. E. O'Neill, of the College of Arts and Sciences of Tulane University; Dr. Miriam L. Bomhard, Miss Anna Haas, of Newcomb College of Tulane University; Mr. E. L. Demmon, Dr. L. J. Pessin, Mr. Philip C. Wakely, Mr. W. G. Wahlenberg, Mr. P. V. Siggers, Mr. R. M. Lindgren, Mr. G. H. Lentz, Mr. J. D. Sinclair, Mr. Robert Winters, Mr. Henry Bull, Mr. H. G. Meginnis, of the Southern Forest Experiment Station; Mr. George Thomas, head of the New Orleans Parking Commission, and Mr. James McArthur, director of nature study in the Orleans Parish Public Schools. The organization proposes to interest itself chiefly in the taxonomy and ecology of the Gulf States, discussing particularly certain general phases of ecology from the standpoint of their local application. Professor Penfound is president and Dr. Bomhard is secretary-treasurer of the society.

Industrial and Engineering Chemistry writes: "An organization of Yale chemists and chemical engineers, to be known as the Yale Chemical Association, was formed on September 27, at New Haven. Some sixty men and women met at 'Bethwood,' the beautiful country home of Professor Treat B. Johnson, for a picnic luncheon and reunion. The guest of honor was Professor Emeritus W. G. Mixter, now in his eighty-fourth year, who is known and loved by several generations of Yale men. After the luncheon a brief meeting was held, at which Dean W. T. Read, of Rutgers, presided. Informal talks were made by Professor Johnson, Dean C. H. Warren, of the Sheffield Scientific School; A. J. Hill, chairman of the department of chemistry, and C. O. Johns. A nominating committee composed of H. W. Foote, C. R. Downs and E. M. Shelton presented a report which resulted in the election of the following officers: *President,* C. O. Johns; *vice-president,* E. B. Hurlburt; *secretary-treasurer,* J. J. Donleavy.

ACCORDING to the *Journal* of the American Medical Association graduate courses for surgeons and radiologists, held four times a year at the Johns Hopkins Hospital, were announced at the recent three-day graduate teaching course on "The Diagnosis and Treatment of Bone Tumors," held under the auspices of the Garvan Research Laboratories and the Copley Surgical Pathological Laboratory of the Johns Hopkins University, under the direction of Dr. Joseph Colt Bloodgood. The attendance comprised 363 physicians from 42 states. The plan is to supplement the new courses by correspondence and a system of diagnosis in which roentgen plates are sent in by nonresident radiologists. Another development announced in the war on cancer is the creation of a corporation to advance the science of radiology as it bears on the diagnosis and treatment of cancer. This corporation—the Radiological Research Institute—will finance research workers and fellowships in universities and is made possible by gifts from the Chemical Foundation and its president, Francis P. Garvan. The graduate course given at Johns Hopkins will be repeated before the meeting of the Radiological Society of North America in Los Angeles, December 1–5; the admission is free, but attendance is limited to 800.

DISCUSSION

THE FORMATION OF STRIAE IN A KUNDT'S TUBE

SOME experimental work has been carried on by the author from time to time on the formation of striae in a Kundt's tube. Since the summer of 1924 observations seemed to show a rotation of the dust particles on each side of the striae, and in July, 1929, the author succeeded in showing that such rotation does take place.

A glass tube about 150 cm long and about 2 cm inside diameter had some burned cork scrapings scattered along its inside. A sheet tin piston connected to one prong of an electrically driven tuning-fork was used to excite the air vibrations in the tube. The piston was inserted a short distance into the end of the tube and the other end of the tube was closed with a tight-fitting cork. When the fork was made to vibrate complete disks of cork dust were produced across the tube at the antinodes, and close observation showed that at each disk two distinct orbits of rotating particles were present, one on each side of a single striation, one clockwise, and on the opposite side a counterclockwise rotation. The rotations take place so that the particles leave the top of the striation and enter at the bottom of the same striation. Midway between two adjacent striae little striae lower than the others tend to form but are soon destroyed by the rotations mentioned above, the dust particles forming these lower striae being pulled away in opposite directions and forced into the two adjacent striae at the bottoms of the same. Thus the dust particles are pulled away from a line approximately midway between adjacent striae in opposite directions and forced into the major striae at their bottoms. When the agitation of the dust particles is violent the striae at the antinodes, especially those extending completely across the tube as disks, do not remain always in one position but very often merge into each other. When the agitation is less violent, as in the case where the striae do not extend completely across the diameter of the tube from top to bottom, there seem to be two orbits of rotation on each side of a striation, one above the other, rotating in opposite directions so that the direction of rotation is from near the middle of the striation, one orbit entering the top of the striation and the other orbit entering the bottom of the striation, somewhat as two meshed cogs, one directly above the other, would rotate.

While there seems to be experimental evidence in the scientific literature for the support of the explanation of the formation of striae in a Kundt's tube as given by Koenig,[1] the author is inclined to believe that the formation of these striae may be satisfactorily explained in a manner similar to the explanation for the formation of ripple-mark in sand as given by Darwin.[2]

In the summer of 1927 the author was able to maintain two paper segments (cut in a shape similar to a dust striation) upright in the tube. When pith dust also was present a violent somewhat elliptically shaped rotation, about an inch long along its major axis parallel to the axis of the tube, was produced. Also a single segment of paper similar to a dust striation has been maintained upright in the tube for a short time by means of the air vibrations.

In the summer of 1927 striae were obtained by the author by allowing puffs of air, produced by interrupting a continuous air stream from a small glass nozzle by a rotating siren disk, to enter a glass tube, one end of which was corked and in which pith dust was distributed along the bottom. These striae were formed when the air jet was interrupted too slowly to produce an audible tone.

The author is continuing his investigation of these striae photographically and is making an effort to determine the effects produced by forming them in various gases, in tubes of various diameters and lengths, and by sources of various frequencies.

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1 *Wied. Ann.*, 42: 353, 549, 1891.

2 *Proc. Royal Soc.*, 36: 18, October 18, 1883.

A HYPOTHESIS ON THE CAUSATION OF CANCER[1]

ACCORDING to genetics, all variations in species are due either to mutations of the chromosomes or to recombinations of chromosomes in which mutations have previously occurred. If this mutation occurs in a germ cell, it will result in a hereditary characteristic that will persist until the line is extinct or until a new mutation intervenes, but if this mutation occurs in any other cell of the body except a germ cell, it will persist only as long as the particular individual lives, and will become extinct with the death of this individual, unless the tissue of mutated type cells is transplanted to some other sustaining medium. (All cells other than germ cells are called somatic cells.) This latter type of mutation is called "somatic" mutation. Such mutation may be lethal or beneficial.

Cancer is generally regarded as a localized lawless and unrestrained growth of epithelium, the cells (somatic) having become parasitic cells, and attacked the host. The only cure thus far discovered is an early destruction or removal of the abnormal parasitic cells.

The causation of cancer apparently lies in the disturbed balance of the forces of stimulating and restraining growth in the affected cells, and is probably essentially a faulty cellular chemistry.[2]

Unequal distribution of chromosomes in somatic cells may result in abnormal tissue and also a change in the physicochemical components of one or more genes in those cells.

This hypothesis then considers cancer as due primarily to mutation in a somatic cell. That the mutation is *lethal* is borne out by its subsequent course. Its ultimate result is death of the individual, the mutation being of a somatic cell and not of a germ cell. Whether cancer is a heritable factor or not has never been clearly shown, but it is entirely possible that the *lack of resistance* to the same type of mutation reappearing in subsequent generations of the same line could be passed on as an inherited characteristic, as shown by the well-known frequency of cancer as a hereditary taint in such lines.

Therefore, the theory of a bacterial causation of

1 The authors are deeply indebted to Dr. Herbert Fox, director of the Pepper Laboratory at the University of Pennsylvania, and to Professor W. R. Coe, professor of genetics and biology at Yale University, for their interest, advice and encouragement in the publication of this paper.

2 Ferris, "Evolution of Earth and Man," p. 213.