zerland; Richard Winzler, University of Stockholm; William Barry Wood, Jr., the Harvard Medical School.

THE University of Alabama Chapter of the Society of the Sigma Xi was installed on April 4. Dr. Edward Ellery, national secretary of Sigma Xi, gave an address on "The Urge to Know and Academic Freedom," at a special morning convocation. Dr. George A. Baitsell, national president, gave a lecture on "Uniformity in Nature" immediately after the banquet. During the formal installation exercises, the following were elected as officers of the new chapter: *President*, Dr. Emmett B. Carmichael, professor of physiological chemistry; *Vice-president*, Dr. J. D. Mancill, assistant professor of mathematics; *Secretary*, Dr. E. F. Richards, assistant professor of geology, and *Treasurer*, B. W. Gandrud, metallurgist, U. S. Bureau of Mines, Southern Experiment Station, Tuscaloosa.

THE Graduate Science Club of Stanford University was installed as a chapter of Gamma Alpha Graduate Scientific Fraternity on April 14 at the Stanford Union. Dr. Carleton F. Scofield, the national president of Gamma Alpha, was the installing officer. In the evening there was an installation banquet at which many distinguished guests were present.

SIR FREDERICK BANTING has been appointed by the Associate Commission on Medical Research, which is financed by the National Research Council of Canada, to investigate medical research facilities in all parts of Canada. He has completed a survey of the maritime provinces and is expected to report to the associate commission the results of his work this year. The survey was made possible by the aid of the Canadian Medical Association and the Royal College of Physicians and Surgeons of Canada. During the survey of western Canada, Sir Frederick will visit the University of Manitoba, the University of Saskatchewan, the University of Alberta and the University of British Columbia. On his return to eastern Canada, he will consult with Calgary and Regina hospitals and Brandon College authorities.

IN compliance with the requirements of a gift under the will of the late Francis Amory, of Beverly, Massachusetts, the American Academy of Arts and Sciences announces the offer of a septennial prize for outstanding work with reference to the alleviation or cure of diseases affecting the human genital organs, to be known as the Francis Amory Septennial Prize. The prize may be awarded to any individual or individuals for work of "extraordinary or exceptional merit" in this field. In case there is work of a quality to warrant it, the first award, which will exceed ten thousand dollars, will be made in 1940. It may be given in one or more awards. Requests for further information should be addressed to the Amory Fund Committee, care of the American Academy of Arts and Sciences, 28 Newbury Street, Boston, Massachusetts.

THE Dazian Foundation for Medical Research recently began to function. In accordance with the will of Henry Dazian, the foundation is prepared to award fellowships to individuals holding the degree of doctor of medicine, for the purpose of post-graduate study and research, and grants to laboratories, hospitals and similar institutions, for research in medicine. Applications and inquiries should be directed to the Secretary, 180 East 64th Street, New York, N. Y. Members of the board of directors are: Alexis Carrel, William W. Cohen, treasurer; Philip Finkle, secretary; Emil Friedlander, assistant secretary and treasurer; Emanuel Libman, president; Harrison, S. Martland, Alfred L. Rose, Israel Strauss, vice-president, and Harold Williams.

DISCUSSION

ON THE PATH OF THE FIREFLY WHILE PERIODICALLY FLASHING[1]

A GREAT deal has been written on the life history of the fire-fly, and many, including physicists and chemists, have speculated on the efficient light that these small insects can turn on and off at will. It is not the writer's intention to say anything regarding the former, since he is not a zoologist, or anything regarding the chemical and physical aspects in the production of the light, but he does wish to call attention to one of the firefly's instinctive qualities, namely, to its path in flight while periodically flashing. A fairly complete search through the literature for discussions on this point has been made without much success.

[1] Read before the Zoological Section of the Illinois State Academy of Science, May, 1938, and to be printed in the forthcoming *Transactions* of the academy.

The writer was reared on a farm in the "Big Woods" of northwestern Ohio at a time when nature there was still in its unspoiled state, for three fourths of the area was forest. He remembers as a boy a field of about ten acres, recently cleared, lying along side of the road and adjacent to his father's place. We often drove along this road at dusk and with wonderment observed the myriads of fireflies moving about over this newly cleared, but not yet broken, field. The soil conditions, the humidity, the decaying stumps and new undergrowth must have been favorable for their existence and propagation. It was in this field that the writer first observed the actual path that the firefly traces in flight while flashing periodically. He has observed this same characteristic path down through the years, and only last summer checked it again. It

should be stated that numerous persons have been interviewed, including zoologists, chemists, physicists, physiologists and psychologists, and he has the first one yet to find who definitely stated having noticed the recurrent irregularities in the flight of the firefly at the time of flashing.

A brief description and discussion follow: The firefly on its twilight excursions flies for the most part in a horizontal direction. Take a windstill evening. A trace of its path viewed horizontally and from the side is shown in Fig. 1. The portions *a, b* and *c* represent

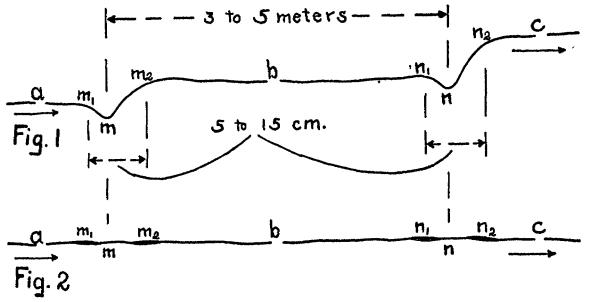

FIG. 1. Side elevation. Two flashes, m_1 m m_2, and n_1 n n_2, are shown. FIG. 2. Top plan, looking down. Wavering shown by thickened line.

the more or less undulating stretches of the flight of the fly, while m_1 m m_2 the path during a "flash" and n_1 n n_2 the path during the next following flash. As viewed from the side the fly on approaching m_1 slows down appreciably (seeming to waver slightly as though in an effort to stop) but maintains its flying level. The light is then turned on, and simultaneously the firefly drops visibly from its horizontal flight, but acceleration at once ensues, the downward duck is quickly arrested, followed by an upward spurt, as shown by the trace m m_2 in the figure. On reaching m_2, at a distance of from 5 to 15 cm from the beginning of the flash, the light is suppressed and simultaneously the flight is again slowed down. The fly seems to waver, as in an effort to regain its equilibrium, before continuing its more or less undulatory flight along *b*, reaching n_1, When the luminous path cycle is repeated.

Looking down from above, Fig. 2, the path discloses no outstanding characteristics. The direction of flight is pretty much straight ahead, but on close observation there may be at times signs of wavering at the points m_1 and m_2 and also at n_1 and n_2, referred to above and shown in Fig. 2 by the thick portions of the line. Observations from above reveal the accelerations in flight, both positive and negative, over the flash period. These observations are not easy to make, as one can well imagine.

Speculating on the evidence revealed by the foregoing, it seems that the system (the firefly) may be thought of as containing stored energy under control of the insect for both maintaining flight and producing flashes of light. The fly now contemplates a flash as it approaches, say, m_1. On turning on the light (drawing energy from the common source) the attendant "overload" causes the mechanism necessary for sustained flight to slow down and the fly drops slightly. Simultaneously extra stores of energy are tapped, the flight mechanism responds, the illumination brightens and the insect speeds upward, in its endeavor to overcome the falling tendency, and reaches the point m_2, having thus described the smooth path m_1 m m_2. At m_2 the energy for the production of the light is shut off, and with it, doubtless, some that was needed in maintaining flight. The flight mechanism again slows down, the fly may waver as though to regain its balance (Fig. 2), and then starts off at reduced speed over the routine flight between flashes, while energy for the next flash is generated (chemically or otherwise) en route. That considerable energy is expended in the production of the flash and must be renewed (between flashes) is evidenced by the fact that if the fly is caused to emit light continuously its brightness dims perceptibly with time.

The above are the writer's observations, extending over a long period. Fig. 1 depicts the path quite accurately. Have other observers noticed similar persistent irregularities?

CHAS. T. KNIPP

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PATENTS FOR ACTS OF NATURE

Now that Senator Joseph G. O'Mahoney and his colleagues of the Temporary National Economic Committee have apparently concluded their series of snapshot exposures of the iniquities of patent-owners who pool their patents to create wicked monopolies and who exercise "dog in the manger" control of inventions by "pigeonholing" the patents upon them, let them investigate a real abuse of our patent system—patents for true chemical compounds—surely the most preposterous patent monopolies that have ever been foisted upon the public with, alas, the sanctions of some of the courts.

All patent monopolies in this country derive from that provision of the Constitution which reads:

> Congress shall have Power. . . . To Promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.

As early as 1790, Congress, pursuant to the grant of this express power, enacted legislation authorizing the granting of patents for arts, manufactures, engines, machines and devices, and improvements upon such subject-matters, but this legislation soon proved to be far from satisfactory. So, three years later, Congress