more has been done in the study of the principles of safety and stability of the flying machine than was accomplished by Liliendahl, by Pilcher and by Chanute, in Germany, in England and in the United States, respectively. It is almost ten years since Maxim mounted his machine and actually flew a short distance at high speed and with disastrous results to his machine and danger to himself, and the experiment has not been repeated. Langley's experiments and discussions have provided us with a correct knowledge of the physical and the mathematical principles involved in flight, so far as measures of lift and of head resistance are concerned, but the applied theory is still to be illustrated in any full-sized and practically useful apparatus. The steadying action of the balloon is relied upon wherever, as in the case of Myers, of Frankfort, N. Y., the oldest and most successful among pioneers in this line of development, and in that of Dumont, the inventor and exploiter, one seeks to traverse the air safely. Only when stability and permanence of stability can be insured can aviation become practicable. The experiments of the Messrs. Wright, of Dayton, O., mostly conducted at the shore on the coast of North Carolina, have seemingly advanced our knowledge greatly in this direction.

The Wright apparatus is double-decked like that of Chanute, but the endeavor was to provide for direction and balance without shifting the body of the aviator with every change in the direction and force of the wind. It was found that practice would make perfect the experimenter here, as in every other field of action; that constant practice should be provided for; that the horizontal position should be assumed by the operator and that it is actually practicable; that a small steering vane could be set in advance of the aeroplanes adopted and successfully employed in directing flight and in counteracting the fluctuating action of the wind in disturbance of the position of the center of pressure on the planes; that twisting the planes is a more effective method of meeting the changes of pressure produced by wind disturbances of small extent than any system of movement of the body.

The machine finally adopted spread 308 square feet of canvas, was 22 feet long, 7 feet high and double-decked. The wings or planes were given the section observed in the wing of the pigeon, *i. e.*, slightly curved from front to rear and with the curvature sharply increased at the leading edge in a degree determined, necessarily, by experiment. Gliding or soaring was successfully attempted with this construction, in winds of velocities ranging from 11 to 27 miles an hour, and distances were attained with small elevation at the start up to a maximum range of about 400 feet; the operator finding no special difficulty in either steering or balancing the machine. The rate of drop was as low as two feet per second in some instances.

These investigations have probably disclosed a method of study of the action of the aerodrome which is comparatively safe, which permits the investigator to dispense with a motor if he so desires during the preliminary work of tracing out the principles underlying stability and safe operation of the aviator in a moving atmosphere. The work is a distinct contribution to existing knowledge in this fascinating field of research.

R. H. T.

U. S. CIVIL SERVICE EXAMINATIONS.

The Civil Service Commission announces an examination on May 6 and 7, for positions in the Philippine service of agricultural chemist, analytical chemist, physical chemist, physiological chemist and pharmacologist with salaries of $1,500 to $1,800. In announcing this examination, the Commission sends the following statement:

These examinations offer an excellent opportunity to enter a service which has many attractive features and to see a most interesting part of the world. The Philippine Service is classified, and the law contemplates promotions on the basis of merit from the lowest to the highest positions.

Thirty days' leave of absence is granted each year, exclusive of Sundays and holidays, and those employees who are promoted to $1,800 per annum are entitled to thirty-five days, or about forty days including Sundays and holidays. Leave is also cumulative, and at the end of three years those who have to their credit cumulative leave for two years may visit the United States without having

the time in going to and returning from San Francisco charged against their leave. China and Japan are near at hand and are favorite places to visit during vacations. Saturday is a half-holiday.

Appointees will be required to pay their traveling expenses to San Francisco, but the Government furnishes them transportation free of charge on its transports from that point to Manila, but exacts a charge of $1.50 a day for meals while en route, which is returned to the appointee upon his arrival at Manila. Employees who are residents of the United States at the time of their appointment shall, after six months' satisfactory service, be reimbursed for their traveling expenses from the place of their residence to the point of embarkation for Manila.

The Philippine climate is good, and nearly all of the employees are in excellent health. Medical attendance, when required, is furnished employees without cost. Good accommodations (room and board) can be secured in Manila for about $35 a month, while employees assigned outside of Manila obtain cheaper accommodations. The office accommodations in Manila are good, and the work is done under pleasant conditions.

The Commission also invites attention to the examination which will be held on April 22, for the position of assistant (scientific), Department of Agriculture.

This examination is designed for the purpose of securing persons who are qualified for the scientific work of the Department of Agriculture. Applications will be received from graduates of colleges or universities where it is shown that the applicants have pursued courses of instruction which will qualify them for the scientific work of the Department of Agriculture. Each applicant will be required to show the scope of the studies pursued and the length of time devoted to them, and his standing in each of the studies. At the time the application is filed the applicant must also submit therewith a thesis prepared by himself upon some special subject, either technical or scientific, selected by the applicant, relating to the work he is qualified to perform, or, in lieu thereof, such literature on the special subject selected as he has published over his own signature.

In connection with this examination applicants may also qualify as scientific aids in the Department of Agriculture, in order to qualify for which, however, applicants must be graduates of colleges receiving the benefits of grants of land or money from the United States, and submit with their applications the material as set forth in section 73 of the Manual. In the case of applicants for assistant it is not necessary that they be graduates of colleges receiving the benefits of grants of land or money from the United States, but they must submit with their applications the matter required by the examination for scientific aid. In addition to the foregoing, the applicants may be examined in any of the following subjects: Chemistry, (*a*) analytical, (*b*) agricultural, (*c*) industrial; physics, (*a*) especially as applied to meteorology, (*b*) soils, (*c*) irrigation; botany, plant physiology and pathology, horticulture; bacteriology (plant and animal); forestry; zoology; ornithology and mammalogy; entomology; physiology and nutrition of man; animal pathology; animal production and dairying; rural engineering, specially as applied to road making and irrigation; practice of agriculture; agricultural statistics; library science and methods.

From the eligibles resulting from this examination it is expected that certification will be made to positions in the Department of Agriculture along the lines indicated, and to other departments where similar qualifications are desired.

SCIENTIFIC NOTES AND NEWS.

THE Secretary of War has sent to the House a recommendation that Surgeon-General Sternberg be granted the rank of major-general before his retirement on reaching the age limit June next.

THE University of Edinburgh has conferred its LL.D. on Professor William James, the eminent psychologist of Harvard University, and on Dr. J. G. Schurman, president and formerly professor of philosophy at Cornell University.

PROFESSOR SIMON NEWCOMB will leave New York City for Naples on April 19.

PROFESSOR WILLIAM M. PUFFER, of the Massachusetts Institute of Technology, has returned