ber, 1907. The first number was dated February, 1866, and was published by the late Mr. G. J. Symons. Meteorologists the world over will unite in congratulating Dr. H. R. Mill upon the appearance of No. 500 of this unique magazine, and in wishing him continued success in carrying on his important work for British meteorology.

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THE NEW PHILIPPINE MEDICAL SCHOOL ESTABLISHED BY THE GOVERNMENT OF THE PHILIPPINE ISLANDS

The second annual meeting of the Philippine Islands Medical Association was held in Manila during the early months of 1905, and in the course of the discussions the fact was brought out that the Philippine archipelago has an average of only one physician to every 21,209 of the population, or one to every 430 square miles of territory. The association consequently deemed it its duty to bring this matter forcibly to the attention of the government and to request that some action be taken looking towards the establishment of a permanent and modern medical school in the Philippine Islands. The conditions for the success of such a school were very auspicious, as the Bureau of Science and the Bureau of Health would be able to furnish a number of trained men to take part in the teaching.

As a result of this agitation and also as an expression of an ideal which for some time had been in the minds of the secretary of the interior and of the various directors and members of the large scientific institutions in the Philippines, the United States Philippine Commission on December 1, 1905, passed an act establishing a medical school in the Philippine islands, placing it in charge of a board of control which consists of the secretary of public instruction, the secretary of the interior, one other member of the Philippine Commission and a member to be designated by the governor-general. The dean of the faculty of the school after its establishment also became a member of the board of control. The school is to form a department of the future Philippine University.

The actual work of organization was not undertaken until more than a year after this, one reason for the delay being that other scientific undertakings were in the course of active growth, and the other because much time was necessary to perfect the actual working plans. However, a faculty was finally appointed, including the chairs of chemistry, clinical medicine, tropical medicine, surgery, hygiene, pathology and bacteriology, pediatrics and obstetrics, with associate professors in several of the branches and with assistant professors in charge of anatomy, pharmacology, and physiology. The full professorships of the latter three chairs were left open because it was realized that the three assistants would need to be called from the United States, and it was desired to leave the higher positions open so as to give more opportunity for advancement to the right men. About one third of the faculty consists of natives of the islands, the other two thirds being either government employees or American physicians or surgeons engaged in hospital practise in Manila.

The most serious subjects to consider in planning the work for the first year were the nature of the entrance examinations to be required, the number of years of study and the feasibility of admitting students to advanced classes who were either graduates of the present medical school of the University of Santo Tomas or who had taken one or more years of medical study therein. These questions present different phases than they do in the United States, as in America there already are a sufficient number of medical schools of good standing, and no communities are actually suffering from lack of medical attendance; whereas in these islands we must endeavor to furnish reasonably well educated physicians as soon as possible, so that the duty of the faculty is not only to elevate the grade of medical instruction in the Philippine Islands, but also as rapidly as may be feasible to fit with at least a fair knowledge of medicine young men who should be able to take their places in the provinces where no medical attendance whatsoever is now possible. A

rigid standard of entrance examinations could be lived up to, provided these were so to be gauged as to provide not only for admission from the government schools conducted under American auspices and giving a grade of instruction parallel to that in the United States, but also from a number of academies and colleges under ecclesiastical control. The entrance examinations for the first year were therefore conducted so as to secure for us a very good class of students, some of them perhaps not the equal of our own high school graduates in certain branches of study, but all of them with sufficient training of one kind or another to enable them successfully to carry on their medical studies. It seemed impossible to secure students on examination for the advanced years, as our courses of study would be so different from the ones which had been conducted in the ecclesiastical medical school existing in the Philippine Islands, that it would be hopeless to expect candidates to pass the same questions as would be submitted to our own scholars; consequently, the faculty decided it to be advisable to admit to the advanced classes only special students not candidates for a degree, and to permit the latter gradually to become regular upon passing the examinations at the end of each college year.

The government approved of the above plans, and to enable the school to establish the first four years of its five years' course, it appropriated the sum of $64,000 United States currency to meet the ordinary expenses of equipment and salaries. A temporary building was assigned to the faculty, which was fitted up to serve fairly well for two years, the laboratories being those of chemistry, anatomy, bacteriology and pathology, clinical microscopy, histology, physiology and pharmacology. In addition to this appropriation there also were provided fifty additional free beds in St. Paul's hospital, so that the number at the disposal of the school for clinical purposes in the first year will be one hundred. Rooms were also prepared for an out-of-door, free dispensary in the same hospital building. The members of the civil government who were to teach in the Philippine Medical School accepted their positions without additional remuneration, so that the expenses for salaries were only to pay members of the faculty not otherwise engaged in government work.

As soon as the funds were available, the necessary microscopes and apparatus for a thoroughly modern equipment were ordered from abroad and the entrance examinations were held on June 10. The school began its first year with fifty-four matriculates and it must be confessed that the standard of work among the students in the first three months has been very high. The school was able to secure the services of Dr. Robert Bennett Bean in anatomy and Dr. Philip K. Gillman in pathology, but as yet has not called any incumbent to the chairs of physiology and pharmacology.

As soon as the temporary quarters were occupied and instruction was being carried on systematically, the faculty began to plan for its new medical building and for a general hospital, the staff of which should be the members of the faculty of the school. The government, realizing the necessity of these improvements has appropriated $125,000 for the Medical School building and $390,000 for a general hospital of 350 beds. These permanent structures insure the future of the medical school, and will in all probability be occupied within the next eighteen months.

The establishment of this medical school is one of the greatest steps recently made in the advance of the American government. The great benefits to be derived from the obstetrical ward and our out-door clinic alone would warrant the outlay, as we strongly hope soon thereby to exert a marked influence upon the alarmingly high infant mortality in the Philippines. The graduates of the school in a few years will also begin to make their presence felt. The American physician has never been able to reach the common people in the same way as the native, and the missionary work of a good number of well educated native physicians in the matter of hygiene and public health can not be underestimated.

The training and character of the members of the faculty render it certain that their

time will not only be devoted to teaching but also to the advancement of research in tropical medicine.

Paul C. Freer,
Dean of the Philippine Medical School

Some Astronomical Consequences of the Pressure of Light[1]

The experiments of Lebedew and Nichols and Hull have proved conclusively that light presses against any surface upon which it falls, and the extraordinarily accurate experiments of Nichols and Hull have fully confirmed Maxwell's calculation that the pressure per square centimeter is equal to the energy in the beam per cubic centimeter.

A clearer idea of the effect of light or radiation pressure is obtained by thinking of a beam of light as a carrier of momentum. We then see that not only does it press against a receiving surface, but also against the surface from which it started.

Some experiments by Dr. Barlow and myself appear to bring to the front this conception of light as a momentum carrier. If a beam falls on a black surface at an angle to the normal, there should be a tangential stress along the surface. An experiment was described in which light fell on a blackened disc at the end of a torsion arm, the disc being at right angles to the arm.[2] The disc was pushed round by the tangential stress. The experiment was carried out in a partially exhausted vessel, but the residual air was a source of disturbance by convection and radiometer effects. A better experiment was made by suspending a disc of mica blackened beneath, about two inches in diameter by a quartz fiber, the disc being horizontal and suspended from its center. When a beam of light fell at 45° on a part of the disc, the horizontal component of the beam being at right angles to the radius to the part where it fell, the disc moved round through the combined effects of convection, radiometer action and the tangential stress, When the beam was allowed to fall on the same place at 45° on the other side of the vertical, convection and radiometer action were very nearly as before, but the tangential stress was reversed. The difference in torsion in the two cases was twice that due to the tangential stress. An experiment with prisms[3] was also described.

Regarding a beam of light as a momentum carrier, it is easily seen that if the receiving surface has velocity u towards the source and the velocity of light is U, the pressure is increased by the motion by the fraction u/U. If the velocity is reversed, the pressure is decreased by this fraction. This is the "Doppler reception effect."

If the source is moving, and we assume that the amplitude of the emitted waves depends on the temperature and nature of the source alone, it can be shown that the pressure on the source is $U/(U \mp u)$ of its value when the source is at rest. This is the "Doppler emission effect."

In considering the consequence of light pressure, it is necessary to know the temperature of a body exposed to the sun's radiation. It can be shown that a small black particle, at the distance of the earth from the sun, has about the mean temperature of the earth's surface, say 300° Abs., and that the temperature of the sun is about twenty times as high, say 6000° Abs. The temperature of the particle varies inversely as the square root of its distance from the sun.

The direct pressure of sunlight is virtually a lessening of the sun's gravitation pull. On bodies of large size this is negligible. On the earth it is only about a forty-billionth of the sun's pull, but the ratio increases as the diameter decreases, and a particle one forty-billionth of the earth's diameter, and of the same density, would be pushed back as much as it is pulled in, if the law held good down to such a size. If the radiating body is diminished, the ratio of gravitation pull to light push is similarly diminished, and it can be shown that two bodies of the temperature of the earth's surface and of the earth's mean density would neither attract nor repel each other, if their diameter was about one inch. The consequence of this on a swarm of me-

[1] Abstract of an address before the Royal Institution of Great Britain.

[2] *Phil. Mag.*, IX. (1905), p. 169.

[3] *Ibid.*, p. 404.