$71,000 from the state for maintenance, as compared with $49,500 last year. An additional appropriation of $60,000 was made for a physiology building and equipment.

The proposal to admit women to be fellows of the Royal College of Surgeons of Edinburgh after examination, on the same conditions and with the same privileges as men, has been accepted.

Dr. H. Monmouth Smith, who is at present assistant director of the Carnegie Nutrition Laboratory in Boston, and who was formerly connected with Syracuse University, has been appointed a professor of inorganic chemistry at the Massachusetts Institute of Technology.

Professor Frank C. Whitmore, of the University of Minnesota, has succeeded Professor Harry A. Curtis as professor of organic chemistry in Northwestern University, Evanston, Ill.

Mr. J. D. Black has been appointed professor and chief of the division of agricultural economics at the University of Minnesota, in the place of W. W. Cumberland, whose leave of absence for service in Turkey as financial and economic adviser to the commission to negotiate peace between the Allies and Turkey has been continued for another year.

Mr. A. Amos, of Downing College, has been appointed lecturer in agriculture in Cambridge University.

Dr. Hugo Fuchs, professor of anatomy at the University of Königsberg, has been transferred to the University of Göttingen, succeeding Professor Merkel.

DISCUSSION AND CORRESPONDENCE

THE ATTAINMENT OF HIGH LEVELS IN THE ATMOSPHERE

In the March 19, 1920, issue of Science appeared an article by Alexander McAdie, entitled "The Attainment of High Levels in the Atmosphere." As certain incorrect statements which are detrimental to the Curtiss Aeroplane & Motor Corporation appeared therein the following correction is made. No criticism of Professor McAdie is intended, nor any desire on his part to misstate a fact is in any sense suspected.

Unauthorized statements are made in the press, the results of which are far reaching. One of these is the innocent acceptance of them by Professor McAdie as being correct and the corresponding reappearance of the incorrect values in the above mentioned article.

On September 18, 1919, Roland Rohlfs, the test pilot of the Curtiss Engineering Corporation, made an altitude flight, obeying in every particular the official rules laid down for such contests. It should be stated here that the compliance with these rules is a serious handicap and in justice the same conditions should be observed by all competitors.

The flight was made in a Curtiss triplane fitted with a K-12 motor without supercharger and without the use of special fuel. The result obtained from the barograph chart by the Bureau of Standards after all corrections for instrumental errors had been made was 34,910 feet, this value being, however, uncorrected for the average temperature of the air column. The instrumental corrections to the barograph readings were determined by subjecting the instrument to the same variations of pressure and temperature in the laboratory as those encountered during the actual flight.

The value of 34,910 feet, although uncorrected for air temperatures was homologated, this being strictly according to the 1919 rules and was of interest for comparison with the French altitude flight of Jean Casale made June 14, 1919, which was calculated by the same method.

It is well known that this way of expressing results, that is, without air temperature corrections, is not only unsatisfactory and unfair but also scientifically incorrect and the Curtiss Company has always admitted that the true (tape line) altitude reached by Rohlfs became 32,450 feet when the air temperature correction, also made by the Bureau of Standards, was applied. There is thus a large but proper reduction in the indicated altitude. This correction is the larger the colder the air encountered in the flight.

It may be noted here that the undersigned was at least partially instrumental in awakening interest in the unsatisfactory official rules, the result being that both the Bureau of Standards and the homologating body sent representatives to Europe with a view of putting the rules on a fairer and more scientific basis.

The outcome is that the rules are greatly improved but are still open to proper criticism and objection. It is necessary, however, for all either to accept the rulings of the official body or, if they are to be ignored, for all to work on the same unbiased scientific basis and abide by the decisions of an authoritative and independent scientific laboratory such, for example, as the Bureau of Standards at Washington.

In order to bring out clearly an important point in this matter, that is, the importance of the air temperature correction, assume that two identical perfect barographs with no instrumental errors are taken up, one in the summer time and the other in winter, to such an altitude that both read say 8 inches of mercury as the minimum pressure. Assume also that the average temperature of the air is in the first case —10° C. and in the second —30° C. which values correspond closely to actual observed figures.

The true altitudes corresponding to this pressure are in the first case 33,475 feet and in the second 30,929 feet, although the altitude uncorrected for air temperature is the same for both, *i. e.*, 36,020 feet. These figures are obtained from Circular No. 3 of the Aeronautic Instruments Division of the Bureau of Standards and are within ½ per cent of the true values. The correction for the first case is —2,545 feet and is twice as much for the second, or 5,091 feet. The value 36,020 feet assumes that the air is at a uniform temperature of —10° C throughout. As stated above Rohlfs' record reduced in this manner by the Bureau of Standards gave a true altitude of 32,450 feet.

We now quote from the Air Service News Letter No. 11, issued by the Information Group, Air Service, of March 9, 1920.

> The purpose of this letter is to keep the personnel of the Air Service both in Washington and in the field informed as to the activities of the Air Service in general and for release to the public press. At an indicated altitude of 36,000 feet . . ., the temperature at his greatest altitude was 67 degrees below zero F. . . . The preliminary calibration of the barograph indicates that the airplane reached a pressure of eight inches of mercury which corresponds approximately to 36,000 feet on the Bureau of Standards altitude chart.

In commenting on this letter we note that it does not claim that a record was obtained. We ask then by whose authority a record is granted and published as such. We note also that approximately 36,000 feet corresponds almost exactly to the stated minimum pressure of eight inches of mercury, which shows that this value has not been corrected for air column temperature. The ground temperature is not stated but the Weather Bureau kindly furnished us with the values, max. +18° F., min. +13° F. for Dayton, Ohio, February 26, 1920. Using the most favorable value, *i. e.*, +18° F., for the McCook Field flight, the average is —31.4° C., which gives a correction, using the Bureau of Standards tables of —5,269 feet and hence the true altitude is not 36,020 feet (as published) but is 30,751 feet.

This altitude does not reach that of Rohlfs by 1,700 feet, figured on the same basis, and as according to the rules for beating a record it should surpass it by 328 feet (100 meters) it lacks 2,027 feet to beat Rohlfs' record.

It is not surprising then that the Curtiss Company wished to protest the validity of this new record. The premature announcement in the press that Major Schroeder has beaten all altitude records with a flight to 36,020 feet, beating the previous one held by Rohlfs, is neither justified by the figures, nor authorized by the Army bulletin nor fair to the Curtiss Company's machine and motor nor just to its pilot, Mr. Rohlfs. Slightly modified results were given personally to the writer at a meeting which he had with Major Schroeder, showing an uncorrected altitude of 36,118 feet and a true altitude of 30,835 feet.

The Curtiss Company will be among the first to acknowledge a properly authenticated record beating the one it now holds and in a true competitive spirit and for the benefit of aviation attempt to better it at the first opportunity.

J. G. Coffin,
Director of Aeronautical Research
Curtiss Aeronautical & Motor Corporation,
Garden City, L. I., N. Y.

CONCERNING BALLISTICS

To the Editor of Science: For sufficient reasons I was unable to attend the meeting of the American Association, and so was not so fortunate as to hear Major Hull's very valuable and interesting address on ballistics, nor Professor Ames's extremely scholarly and clear address on Einstein's theory. However I have read Professor Hull's address in Science with great pleasure. In it he is good enough to speak of my pressure gauge for guns, but says that its use appears to be limited to the cases of guns that can be rigidly clamped during the explosion. I hope to demonstrate shortly that there is no such limitation. Over a year ago I was offered the use of a six-inch gun at Aberdeen to put my gauge on, and Admiral Earle has at last taken an interest in my results and has manifested a willingness to assist me. The coming of the armistice, however, removed so much money and personnel from Aberdeen that nothing came of it.

I should have been pleased if Major Hull could have seen fit to call attention to the fact that I was the first person to publish trajectories of "la grosse Berthi" that bombarded Paris two years ago. The bombardment began on March 23, 1918. The next week I began to deliver lectures on exterior ballistics, and in a few days we had a number of trajectories calculated. In four weeks from that date I read a paper at the meeting of the American Philosophical Society in Philadelphia, at which I showed a number of trajectories. I used the height function for the density as given in Major Hull's address, and at that time it had never been used by either the United States Army or Navy. I showed my results to Major Moulton, who was just beginning his distinguished service in the army, and he showed much interest. Later he advised me not to publish them, as such calculations were now "a matter of routine."

I reminded him that although they may be such now, they were not when I read the paper. I have also seen in French journals pictures with articles apparently written by experts which would lead one to believe that there are discontinuities in the atmosphere, or that it stopped suddenly a few miles up. In a recent letter from M. Henri Le Chatelier, regarding my paper, he says that the French had made guns with an initial velocity of 1,200 meters per second, but had not thought of using them for high fire, as they were intended for penetration of ships armor. We also constructed curves showing the decrease of density upon both the isothermal and adiabatic hypotheses, neglecting and taking account of the variation in gravity, as given in my book on Dynamics, and also the observed values as kindly furnished me by Professor Humphreys. Unfortunately I was requested to keep the number of figures down, and these were not printed. I should be glad to send the paper to any one interested. The gauge paper is unfortunately exhausted. I may say that M. Sugot, the chief engineer of the Commission de Gâvre, told me last summer that ballisticians had been waiting fifty years for my instrument, and that the publication of my curves had rendered useless all the theoretical work of ballisticians on interior ballistics. Of course that is not so, but I hope next month to show how this gauge answers all questions that can be asked on the subject. I think I was the first professor to give lectures on ballistics, both interior and exterior, at an American university.

My ballistic institute is having hard sledding. At first encouraged by a vote of the Naval Consulting Board, turned down by the Honorable the Secretary of the Navy (without a word of regret), financed by a great arms company for awhile, helped by the Bache and Rumford Funds, it looks as if it would have to be given up for lack of money. When we began I had one assistant, one machinist and