Prague Technical High School.—Professor Pichl: Meteorology and climatology, 1; climatological practise, 1.

Strassburg University.—Professor Hergesell: Meteorological conferences, 2; meteorological practise, 2. Professor de Quervain: Climatology, 1.

Stuttgart Technical High School.—Professor von Weyrauch: Aerostatics and aerodynamics, 2.

Vienna University.—Professor Hann: General meteorology, 2; dynamic meteorology, 2; oceanography, 1. Professor Pernter: Meteorological instruments, with practise at the central institute for meteorology and geo-dynamics, 3; meteorological conferences, 1; meteorological work for advanced students, 3. Professor Felix Exner: Insolation and radiation at the earth's surface, 2. Professor Valentin: Magnetic work, 2. Professor Przibram: Radioactivity, 2.

Würtzburg University.—Professor Wien: Electricity and optics, 5.

Beside the above definitively meteorological courses there are a great number of others in hydrodynamics, thermodynamics, optics, electricity, and general physics, which include applications to special atmospheric phenomena.

The expense of attending a course of lectures in a European university is usually not greater than the attendance on American lectures of the same grade. The added facility that one acquires in the use of the German or French language, as well as the stimulus that comes from working together with young men of the same tastes, will doubtless always attract the most ambitious American students. Of course the same arguments bring many foreigners to American universities, and this international scientific intercourse can but be of permanent value to a science that embraces the atmosphere over the whole globe.—*C. A.*

OBSERVATIONS OF "SHADOW BANDS" WITHOUT AN ECLIPSE.

In the Comptes Rendus, Paris, April 9, 1906, M. Cl. Rozet describes an interesting method that he has devised for observing "shadow bands."

Heretofore this interesting and mysterious phenomenon has been observed only during the occurrence of solar eclipses, but by a very simple method M. Rozet has been able to make daily observations of the bands at sunrise and sunset. The light of the sun at the time of its appearance and disappearance behind somewhat lofty mountains on the horizon is received on a white screen, arranged in the observer's room, and bands are produced apparently identical in character with those observed during an eclipse. The following is a summary of the results of M. Rozet's observations:

(1) The position of the dark bands on a screen perpendicular to the sun's rays is invariably parallel to that part of the crest of the mountain at which the sun rises or sets.

(2) The direction of the movement is always perpendicular to the position of the bands, but this movement may take place in two opposite directions, which may be called "direct" and "retrograde." In the direct movement the bands seem to fall, that is, to enter the shadow of the mountain projected on the screen; in retrograde movement to rise, i. e., to emerge from the shadow. They may move in either direction both at sunrise and sunset, and in successive appearances and disappearances of the sun at brief intervals, due to irregularities of the mountain crest, their direction may differ. In the same appearance or disappearance of the sun the bands usually move in a single direction; however, on several occasions, after a few seconds of direct motion, they have been observed to retrograde, and at other times times the screen was traversed at the same time by two distinct series of bands, not exactly parallel, and moving in opposite directions.

(3) The velocity of movement is subject to much variation; it has, however, been observed to have a pretty close relation to the velocity of the wind; the rapid movements are coincident with high winds, while the slowest movements occur when the air is calm or nearly so. The greatest velocities attained are approximately six to eight meters a second, the least one to two meters, and the ordinary velocity two to four meters.

(4) The bands are usually seen as soon as the sun appears. Sometimes they do not appear until two or three seconds after the beginning of sunrise; they also sometimes disappear a few seconds before the end of sunset; in these cases their movement is in the retrograde direction. When the appearance or disappearance of the sun takes place behind a portion of the mountain crest perpendicular to the sun's apparent movement the usual duration of the visibility of the bands is twelve to fifteen seconds. The visible part of the sun need not be very small; in one instance bands were observed when as much as a quarter of the solar surface was visible.

(5) At first faint, broad, and far apart, the bands become more sharply defined, narrower, and closer together up to the time of their complete cessation, whether at sunrise or sunset, despite the fact that the intensity of the light increases in the former case and diminishes in the latter. Sometimes, instead of occurring at uniform distances apart, they move in groups of five or six. Their breadth, which is commonly three to four centimeters, may vary from one to seven centimeters, while the distance apart, which is ordinarily three to four centimeters, may vary from one to twenty centimeters. The width of the bands and their distances apart appear to vary with the velocity; they are greatest when the movement is most rapid.

(6) The color of the bands is, over their entire length, a uniform gray, darker or lighter according as the bands are more or less narrow. Often one of the edges (the second with reference to the direction of movement) seems better defined than the other. The spaces between the bands are illuminated irregularly without relation to the increase or decrease of the solar light.

In the course of the observations the distances of the mountains from the screen and their elevation above the theoretical horizon have varied from 6 kilometers to 36 kilometers, and from 3° to 22°, respectively. Despite these great differences, no variation in the phenomenon has been observed which could be attributed thereto. The variation appears to be related solely to atmospheric conditions.—*C. F. T.*

TORNADO IN AUSTRALIA.

A very destructive local storm passed over North Sydney, N. S. W., on the afternoon of Tuesday, March 27. It had every appearance of being a mild form of the American tornado. During the previous morning the weather had been showery and stormy, and the daily weather map of the 27th shows that Sydney was, at that time, on the east side of a trough of relatively low pressure extending from Melbourne northward. In the Southern Hemisphere the circulation of the winds is such that a depression of this kind in the eastern part of Australia brings to Sydney northeast winds and rain, analogous to the southeast winds with rain that are experienced in the Northern Hemisphere when the center of a low area passes by on the north side of an observer. Our American tornadoes occur in this region of southerly winds, and move eastward; while this North Sydney tornado occurred in the corresponding region of northeast winds, and moved southeastward. The path of the tornado through North Sydney, with many illustrations of the damage done, is published in full in the Sydney Daily Telegraph of March 28. From the text, written by Mr. Andrew Noble, and some contributions by Mr. H. A. Hunt, the Government Meteorologist, we make the following abstract:

A little before 2 p. m. there was a sudden development, and before the hour had struck many homes were destroyed. The storm was introduced by a very sudden downfall of torrents of rain that was described as like the bursting of a waterspout, or like a cloudburst. * * * The rain lasted for a few minutes followed by a lull, and then, with a bang and a howl, came the wind. * * * The greatest width of the tornado's direct influence was about a hundred and fifty yards. Buildings were razed to the ground, others were unroofed and others collapsed. The wind cut a lane for itself, with very clearly marked edges. A stately palm tree still stands, with all the branches on one side ripped off, but the other side untouched. Sergeant Brennan, of the North Sydney police, watched the wind sweep one side of his house, while on the other side there was no disturbance. * * * Leslie's house was lifted up and carried along bodily, until it was crushed against some large trees. Mr. Wilson, in speaking of Kemsley's cottage, says "that it rose quite steadily, as if something was underneath, raising it up, and then came down almost as gently, like a parachute; then it was moved horizontally about five feet." At Windgrove's cottage a sheet of iron was taken out of the roof, almost straight up in the air, and caught in the limbs of a tree; then the wind destroyed the cottage. Another house was lifted up bodily into the air, like a box kite, and collapsed while in the air. The tornado passed on, across Lavender Bay and over the Botanic Garden.

Mr. Hunt states that this storm should not be called a hurricane or a cyclone, but a tornado, or destructive local whirlwind. Many similar tornadoes are on record in New South Wales, such as that at Pyrmont, in 1890 or 1891; Leichhardt and West Balmain, in 1889; at Wyalong in 1893; at Pirillie in 1895; and at Mudgee and Nevertire in December, 1896; at Narrabri in January, 1902; at Berrigan and Deniliquin in 1901; at Bourke in 1894, and at Cootamundra in April, 1903.

C. A.

CHANGE OF TITLE AND ADDRESS.

The Director of the Astro-Meteorological Observatory in Trieste, (Prof. Dr. Edward Mazelle) announces that this institution has been transferred to the Minister of Commerce, and its future title and address will be:

K. k. Maritimes Observatorium, Trieste, Austria.

METEOROLOGICAL INSTITUTE OF SAXONY.

Prof. Dr. Paul Schreiber, Director of the Royal Meteoroogical Institute, Saxony, whose central office has for many years been located at Chemnitz, announces that the office of the Institute has been transferred from Chemnitz to Dresden. The mail address will be: Dresden, Neustadt, Grosse Meissner Strasse 15, for the official mail; but Professor Schreiber's personal address will be simply Dresden, N. 6.

The Meteorological Institute of Saxony conducts its own daily weather forecasts, and maintains one central station of the first order, fifteen stations of the second order, six of the third order, 150 of the fourth order, 600 stations for the measurement of depth of snow, and 4000 stations for the reports of hail and thunderstorms. It quite recently employed two scientific assistants, four clerks, one mechanic, one lithographer, and twelve computers. The annual allowance is about twelve thousand dollars, which is exclusive of the salary of the director.—*C. A.*

MONTHLY REVIEW OF THE PROGRESS OF CLIMATOLOGY THROUGHOUT THE WORLD.

By C. FITZHUGH TALMAN, U. S. Weather Bureau.

CLIMATOLOGY OF THE NILE VALLEY.

In 1893 Sir W. Willcocks wrote:

> As Egypt possesses no barometric, thermometric, or rain-gage stations in the valley of the Nile, we are always ignorant of the coming flood.

In his "Rains of the Nile basin in 1904" (Cairo, 1905), Capt. H. G. Lyons says:

> Five years ago there were not more than six or eight places in the Nile basin where the rainfall was being measured regularly, while to-day there are more than forty, of which thirty-two lie to the south of Berber (latitude 18° north). The parts played by the different tributaries of the Nile have also been determined during the last few years so that we are now able to recognize, with very fair accuracy, the share which the rainfall of the different districts takes in supplying the Nile, and to trace the effects of excessive or deficient rainfall in any area.

Captain Lyons does not think it necessary to add that the immense progress recently made in the hydrological investigation of the Nile Valley is largely the fruit of his own efforts. In his "Rains of the Nile basin in 1905,"[1] just issued, we have the latest statistics regarding the distribution of rainfall stations in this region. Sixty-four of these are now in operation, of which 31 are in Egypt and the Sudan, the remainder being situated in the neighboring territories of Eritrea, Uganda, British East Africa, German East Africa, and British Central Africa. Besides these stations where the rainfall is regularly measured there are 44 stations which record the number of rainy days.

While the rainfall has been the chief subject of enquiry in northeastern Africa, the investigation of the other elements of climate has gone forward apace in this region during the past few years, as is fully attested by the wealth of meteorological data cited in Captain Lyons's beautiful monograph on the physiography of the Nile and its basin,[2] just published by the Egyptian Government. Most significant is the progress that is being made in the observation of atmospheric pressure. The leveling operations carried out by the Sudan Irrigation Service during 1905 have enabled the altitudes of the stations south of Khartum to be determined with considerable accuracy, so that it is now possible to reduce to sea level the observations of pressure made at many inland stations. New charts of pressure distribution have been drawn, which show clearly the very pronounced trend of the isobars from north to south along the Nile Valley, instead of in a westerly direction as far as the west coast of Africa, as was assumed when the only observations available were those of coast stations.

It has now been known for some years that the Nile flood is a faithful index of the rainfall of Abyssinia; since the volume of the White Nile is held back by the Blue Nile when in flood and the supply it furnishes is practically negligible during the flood season. The Abyssinian rainfall, in its turn, is a manifestation of the intensity and direction of the east African monsoon current, and therefore of the pressure conditions in this vicinity. The author adduces much evidence to prove that atmospheric pressure in northeastern Africa varies inversely as the rainfall of Abyssinia. A similar relation between pressure and rainfall has been demonstrated in other parts of the globe. Until recently, however, few pressure observations were available within the Nile basin; such outlying stations as Aden, Cairo, Alexandria, and Beirut have been used for purposes of comparison with the Nile flood.[3] In the present work the author is able to present provisional isobars for the summer months, for the whole of northeastern Africa, in the construction of which he has utilized observations from several new stations in the interior; while for the month of July he extends his isobars over the whole of northern Africa, with results differing markedly from all previous charts. A center of low pressure is conjectured to exist at this season between Lake Chad and Timbuctu. It is to be hoped that some of the French and British residents of this region will soon undertake regular observations of pressure, so that we may have positive information as to the existence or nonexistence of such a depression.

CYCLONIC WEATHER TYPES.

The last few years have been fruitful in suggestions looking to an improvement in the methods of presenting the statistics of climate. The demands made upon climatology are many and diverse; and it is probable that the climate of no place or region has ever been so fully portrayed as to satisfy all of

[1] Lyons, H. G. The rains of the Nile basin in 1905. Cairo, 1906.

[2] Lyons, H. G. The physiography of the river Nile and its basin. Cairo, 1906.

[3] Cf. On the relation between variations of atmospheric pressure in northeast Africa and the Nile flood, Proc. Roy. Soc., vol. A76, 1905, pp. 66–86.