be still greater. In order, therefore, to obtain comparable values, even for neighbouring stations, it is essential that the data compared should be those of the same interval.

Both as regards season and amount, the changeableness of temperature depends very greatly on local geographical circumstances, so that neighbouring places very often differ greatly from each other. In Europe it increases from west to east and from south to north, in both cases towards the interior of the continent. It increases also on the whole with altitude, but very irregularly, being great on exposed plateaux, and comparatively small on mountain peaks. Places situated in valleys show very great differences, according to their exposure. Among the Austrian stations, those on the southern slopes of the Alps have the greatest vicissitudes, owing to the warmth they acquire in sunny weather and the consequent greater fall of temperature when a change of weather sets in. In general the changes of temperature at high elevations are greater than at low altitudes in summer, but less in the winter season. In the high mountain valleys in spring the changes are much smaller than on the neighbouring plains.

In the British Isles, Mr. Scott found that the number of rises exceeding 5° between any two consecutive days was greater than the number of falls of the same amount, and also that the mean value of the rises exceeds that of the falls. In Austria, also, except in the Southern Tyrol and on the coasts of the Adriatic, rapid rises are greater than rapid falls in the winter, and less in the summer; but on the whole the former preponderate. In the south, however, rapid falls are greater than rapid rises at all times of year, and therefore also on the mean of the year. This peculiarity is a still more marked characteristic of lower latitudes, since in Northern India it was found that rapid falls are about three times as numerous as rapid rises, and on the whole greater in amount.

The duration of rises of temperature is somewhat greater than that of falls, and both are rather greater at mountain stations than at low levels. Thus the passage of a wave of temperature, on the mean of the two stations Klagenfurt and Salzburg, occupies, on an average, $4^{\circ}56$ days, on the Sonnblick $4^{\circ}93$ days; or, in other words, $6\frac{1}{2}$ waves pass within the month at the higher and 7 at the lower stations. The longest period of continuous cooling that occurred at any station was ten days at the mountain observatory of Hoch Obir, and the longest continuous rise of temperature ten days at Klagenfurt. There is a marked annual periodicity in the length of the temperature waves, with two epochs of maximum, viz. in March and September, and two of minimum, in July and December. From the data afforded by certain stations in Austria and Saxony, Dr. Hann computes the following formula for their annual variation in Central Europe—

$$4.813 + 0.138 \sin(26^{\circ} 45' + x) + 0.164 \sin(318^{\circ} 27' + 2x).$$

The last subject investigated in Dr. Hann's memoir is the question whether the inter-diurnal changeableness of temperature shows any periodical variation during the sun-spot period; for which purpose he takes the 90 years' registers of Vienna, Wilna, and Warsaw. He finds that on the mean of these stations a certain minute variation is indeed apparent, but it is one of two maxima and two minima, and the whole range is so small that it is doubtful whether it is other than fortuitous.

In the foregoing paragraphs only a few of the more important results of Prof. Hann's investigation have been noticed. His memoir contains many others of interest, well worthy of study, and forming important contributions to general climatology; and like the original memoir, published seventeen years ago, it will doubtless stimulate others to prosecute the subject. It is especially import-

ant from a medical point of view that the statistics of all health resorts should be analyzed in the manner of which Prof. Hann has here given so admirable an example.

H. F. B.

FORESTRY IN AMERICA.¹

IT cannot be said that, as far as the issue of reports and pamphlets on forestry is concerned the Agricultural Department at Washington has been idle; if only this activity would resolve itself into the establishment of a State Forest Service, and the formation of State forests out of the wreck of the former forest wealth of North America!

An important series of papers on forest matters has come to hand, and though they date as far back as 1889, they are probably new to many of the readers of NATURE.

The first paper is by Dr. James, Professor of Public Finance and Administration in the University of Pennsylvania, and is entitled "The Government in its Relation to Forests." The Professor has evidently studied his subject thoroughly, and the remedy he proposes is the exact counterpart of that which has been so successfully applied to the forests of India. He commences by stating that the forests of any large country not only constitute a large portion of its wealth, but form the indispensable basis of a flourishing manufacturing and commercial industry. They are also one of the most important elements in determining the climatic conditions of a region, and, through these, the distribution of the population, of industrial pursuits, and of disease and health. He states that the value of the forest crop in the United States in 1880, the census year, was 700,000,000 dollars (= £140,000,000), and that if the value of the total annual output of the mines, quarries, and petroleum wells were added to the estimated value of all steamboats and other craft on American waters, it would still be less than the value of the forest crop, by a sum sufficient to purchase all the canals, telegraph companies, and construct and equip all the telephone lines in the States.

He then shows how Government has fostered agriculture by offering land on easy terms, by establishing model farms and agricultural schools, by improving the breed of stock, by free distribution of seed, and in many other ways; it has also assisted manufactures by the protective tariff, bounties, and exhibitions, &c.; and that vast sums have been spent by the State on improving rivers and harbours, and on the general means of communication—railroads and roads. Game and fish are also protected by the State, but although from their forests the Americans have been drawing more natural wealth than from all other sources together, yet practically nothing has been done to preserve them from the devastations of selfish people. Besides the great demands on the forests for timber, three-fifths of the people in the States use wood for ordinary domestic fuel, and the value of the wood fuel annually consumed is placed at 325,000,000 dollars.

Prof. James then treats at length of the vast indirect value of forests in maintaining a steady supply of water in rivers, and preventing floods. He shows that the maintenance of a system of factories and mills dependent on a watercourse becomes impossible when the stream is converted into a mountain torrent for one quarter of the year and is all but dry during another quarter; and instances the River Schuylkill, from which Philadelphia draws its water-supply, where the current has become too shallow and sluggish to carry off the ever-increasing

¹ "Department of Agriculture, Forestry Division. Bulletin No. 2.—Report on the Forest Condition of the Rocky Mountains, and other Papers." With a Map showing location of Forest Areas. Second Edition. (Washington: Government Press, 1889.)

quantity of impurities which pour into it, and consequently the quality of its water is steadily deteriorating.

The Professor considers it proved by European experience that a certain percentage of forest land is indispensable for any civilized country, and that when the forest area sinks below that percentage, through carelessness, or a selfish desire to get all the advantages from the resources of a country for the present generation, regardless of the interests of posterity, the result can only be an impaired industry and declining prosperity. He asserts that in the United States nothing is being done to cultivate forests, whilst vast areas, besides those which fall under the axe, are being wasted by fires and by unregulated grazing; so that, to put it mildly, the Americans are using up their forests at a much greater rate than they are replacing them, and are changing the character of their streams, soil, and local climate. Emphasis is laid on the fact that *tree-planting* is not *forest-culture*, and based on the experience taken from European countries, Mr. James insists that only the State can insure the preservation of the forests of America, and that private enterprise is powerless to prevent their eventual destruction.

His proposals to remedy matters are therefore that the Federal and State Governments should remove timber lands from the list of lands for sale, and after a thorough examination as to what forests are of climatic and industrial importance, should retain them under the control of Government. He also advocates the establishment of a School of Forestry, where men could be trained to manage the extensive tracts of forest lands in the ownership either of private individuals or of the State; and calls for further legislation, and active enforcement of existing laws to protect forests from fires and browsing animals. Here we have in a nutshell a proper forest policy sketched out for the United States; and it remains to be seen whether there is sufficient patriotism in the leading men to carry it out, or whether the great power of the timber trade, which has always insisted on non-interference with their business on the part of the State, will still obstruct the road to progress.

There is not space for much more than mere reference to the other papers contained in the Bulletin, the first being a most comprehensive report, by Colonel E. T. Ensign, on the forest conditions of the Rocky Mountains, showing the estimated area of forest still existing in each county of the States of Idaho, Montana, Wyoming, Colorado, and New Mexico, in 1887. A coloured map of the area shows the position and extent of the forest tracts. This report concludes with a most useful tabular statement, giving the area of forest in each county and for each State, as well as the character of the forest growth, the uses made of the timber, the principal causes of destruction of the forests, chiefly fires. Measures are suggested for the adequate protection of the forest growth, and any noticeable changes in the flow and volume of water in streams are noted. Under this head, we find that the streams have diminished in volume and their flow has become more intermittent in one-quarter of the ninety-one counties referred to, which altogether comprise an area of 555,081 square miles, still containing 83,460 square miles of forests in 1887.

The other papers are: "The Forest Flora of the Rocky Mountain Region," by G. B. Sudworth, and "On the Climate of Colorado and its Effects on Trees," by G. B. Parsons. The latter ascribes the barrenness of the eastern slopes of the Rocky Mountains to the extremes of temperature, and to the desiccating power of the north and north-west winds, which are frequently powerful enough to bark young trees by pelting them with gravel.

The Bulletin closes with a valuable paper on "Snow Slides and Avalanches," by B. E. Fernow, the present Chief of the Forestry Division of the Washington Agricultural Department.

W. R. FISHER.

NOTES.

THE following are the members of the Royal Commission appointed to investigate the question of a Teaching University for London:—Lord Cowper (Chairman), Lord Reay, Bishop Barry, Sir Lyon Playfair, Sir William Scovell Savory, Sir George Murray Humphry, Mr. George G. Ramsay, Rev. Canon Browne, Mr. Henry Sidgwick, Mr. John Scott Burdon Sanderson, Mr. James Anstie, Mr. Ralph Charlton Palmer, and Mr. Gerald Henry Rendall. No one who has devoted serious attention to the subject is likely to be of opinion that the choice of Commissioners is satisfactory. It shows that the Government has not grasped the problem.

THE International Congress of Chemical Nomenclature at Geneva has been attended by many representatives from various European countries. The representatives from England are Prof. H. E. Armstrong, F.R.S., Dr. J. H. Gladstone, F.R.S., and Prof. W. Ramsay, F.R.S.

PROF. A. CHAUVÉAU has been elected to the presidency of the Société de Biologie, in place of Prof. Brown-Séquard, whose term has expired. The Société de Biologie was founded by Claude Bernard and a group of friends. Claude Bernard and Paul Bert were Presidents before M. Brown-Séquard.

A COMMITTEE has been formed to make preparations for the erection of a monument to Prof. de Quatrefages in his native village, Vallerangue (Gard).

WE regret to have to announce the death of Prof. Annibale de Gasparis, Director of the Observatory at Naples, which took place on the 21st of this month. Born in Bugnara, in the province of Aquila, on November 9, 1819, he passed the first few years of his youth in Tocco Casuria, where he studied classics. Going thence to Naples in 1838 he began the study of mathematics under Prof. Tucci, dealing specially with the problems relating to bridges and rivers. Afterwards he devoted himself to astronomy, in which he soon gained great celebrity. In 1840 he was appointed assistant at the Capodimonte Observatory, where he became a diligent observer and an industrious calculator. His discovery of the three minor planets—Hygieia, Parthenope, and Egeria—created a great stir in the scientific world, and secured for him the Royal Astronomical Society's medal. Nominated as Director of the Observatory in 1864, owing to the death of Capocci, he worked incessantly for the advancement of practical astronomy, and followed up his observations for the capture of small planets. Eunomia, Psyche, Massilia, Themis, Ausonia, and Beatrix were all discovered owing to his ever careful scrutiny. His theoretical labours included many on pure mathematics, while those on astronomy related principally to the best methods of determining the orbits of comets. The investigations he carried on from time to time were numerous, and the results appeared in many periodicals, of which we may mention the *Atti della R. Accademia delle Scienze Fisiche e Matematiche di Napoli* and the *Astronomische Nachrichten*. De Gasparis was naturally robust, and enjoyed good health until he was attacked by the maladies which killed him. His powers of work were tremendous; he was always making either some calculation or observation. Being taken ill rather suddenly, he went away to recruit, but he became worse and worse, until at last he could not move. The sad days of the last year of his life he spent in reading the classics which he loved best, until his sight failed him.

MR. JOHN HARTNUP, the Astronomer to the Mersey Docks and Harbour Board, met with a fatal accident on the 21st while performing one of his Observatory duties. It seems that he was accustomed to examine occasionally the anemometers