

antiquarians and lovers of natural history. The collections owe much to the care and interest of Dr. E. F. Astley, the hon. curator. The assistant curator will be glad to afford visitors every assistance. The anthropological collection, though small, is interesting, and contains a valuable feathered cloak from the Sandwich Islands, a Maori's head, and many war trophies from New Zealand. The "Plomley" collection of British birds, presented by the late Dr. Plomley, is specially rich in local specimens. The collections have been enriched by many gifts from the Hon. Walter Rothschild, who takes considerable interest in the Dover Museum. There is a good collection of British birds' eggs, including those of the peregrine falcon, once common on the Dover cliffs, but now becoming exceedingly rare. Pre-historic and local antiquities are well represented. The collections of shells, insects and fossils are also noticeable.

VISIT OF THE FRENCH ASSOCIATION TO DOVER.

On Saturday, September 16, the members of the Association Française pour l'Avancement des Sciences will visit Dover. On their arrival, about 9.30 a.m., they will partake of a light repast at the Lord Warden Hotel. At eleven o'clock there will be a reception at the Town Hall, when addresses of welcome will be delivered. Afterwards various Sectional Meetings will be visited. At 1.30 there will be luncheon in the marquee in the College Grounds. Tickets for the luncheon (price 15s., including wine) will be on sale at the Reception Room. In the afternoon the members of the French Association will visit the Castle and other objects of interest in Dover.

VISIT OF THE BRITISH ASSOCIATION TO BOULOGNE.

On Thursday, September 21, the members of the British Association will visit Boulogne. A special boat will leave Dover about 8.30 a.m., arriving at Boulogne about ten o'clock. After a reception, the various sections will be visited, and subjects mutually interesting to the two Associations will be discussed. At 12.30 the Municipality of Boulogne will entertain the Associations to lunch. The luncheon will be followed by a Reunion with addresses. In the afternoon a plaque to the English poet Campbell will be unveiled, and a statue to the French man of science, Duchenne, will be inaugurated. The afternoon will be spent in visiting the town of Boulogne. In the evening those members of the British Association who do not intend to take part in the five days' excursion will leave for Dover. Sleeping accommodation will be provided in Boulogne for those who intend to visit the towns of Northern France and Belgium on the excursion commencing the following morning (Friday).

HANDBOOK.

The Local Committee have prepared a special handbook to Dover and the neighbourhood, containing articles on the history and antiquities, the geology, the entomology, the vertebrate fauna, the botany, the climate, the river and tides, the docks and other engineering works, the trade, commerce, and industries. This book is illustrated with maps and plans, some of which contain new work. The information given in the maps and plans and the articles, written by specialists on the subjects they deal with, will, it is hoped, render the work not only useful on the occasion of the British Association's visit, but also of some permanent value.

EXCURSIONS.

Wednesday, September 20.—Excursion to Canterbury. The Mayor of Canterbury and the Corporation invite the members, associates and holders of ladies' tickets to Canterbury in the afternoon, to meet the President and one hundred members of the French Association. Special facilities will be given for visiting the various places of industry in the city. The Dean and Chapter will receive the guests at the Cathedral after the Mayor's reception at the Royal Museum.

Thursday, September 21.—(1) Visit of members, associates, and holders of ladies' tickets to the Association Française pour l'Avancement des Sciences at Boulogne. A special steamer will leave Dover at 8.30 a.m. (2) Excursion to Chatham Dockyard and Rochester Cathedral. Limited to 200. (3) Excursion to Wye Agricultural College, to inspect experimental farm. Luncheon will be provided by the Principal, Mr. A. D. Hall. Guests limited to eighty. (4) A circular tour through the Weald of Kent, including stoppage at about five

towns between Dover and Tunbridge Wells, and extending over two days. Limited to fifty persons.

Friday, September 22.—There will be a five days' excursion in France and Belgium, to Abbeville, Amiens, Arras, Brussels, Antwerp, Ghent, and Ostend, at the conclusion of meeting. The excursion will start from Boulogne on Friday morning, September 22, when sleeping accommodation will be provided for those not returning to Dover after the visit to the French Association.

CHURCH SERVICES.

There will be special services at most of the churches on Sunday, September 17. At St. Mary's there will be a special service for members of the Association at 11 a.m., when the Rev. Archdeacon Wilson, D.D. (late Headmaster of Clifton) will preach.

The railway companies will afford facilities for those wishing to visit Canterbury on Sunday. The Very Rev. Dean Farrar (Vice-President of the Association) has arranged the following special services:—

10.30 a.m.—The sermon will be preached by the Lord Archbishop of Armagh.

3 o'clock p.m.—The sermon will be preached by the Rev. Canon Mason, D.D. The sermon will be followed by an organ recital.

6.30 p.m.—The sermon will be preached by the Very Rev. the Dean. W. H. PENDLEBURY.

THE NEW PHILHARMONIC MUSICAL PITCH.

THE question of musical pitch has, through the action of some of the leading pianoforte makers, been again introduced into public discussion. That it should end in the general adoption of the French diapason normal hardly admits of a doubt, especially as it is in the United Kingdom only there remain any advocates for the high pitch formerly general. France introduced by law the diapason normal in 1859, and has been gradually followed by Belgium and Italy, Germany and Austria, Russia and the United States of America, leaving this country in musical isolation from which a great effort has yet to be made to bring it into uniformity with other musical countries, so that the note A will be approximately the same here as anywhere else, and not give the impression of a transposition. The difference of vibration number is not so very much; if it were a semitone, it might be easier rectified—at least in concert organs—it may be stated at $\frac{3}{5}$, or at most $\frac{2}{3}$ of an equal semitone. It is measurement and the important consideration of temperature that justify the admission of a subject, at the first aspect merely artistic, into the columns of NATURE. Temperature has as yet met with insufficient consideration. It is hardly alluded to in the "Sensations of Tone" by Helmholtz; it meets with a bare mention only, although somewhat extended in the footnotes of the English translator, the late Dr. A. J. Ellis, who refers (p. 90, second edition) to the experimental work in that direction of Mr. Blaikley.

It is well known that the Paris diapason normal is stated as A=870 vibrations a second at 15° C. As we reckon by complete vibrations, we take this number at one-half (435), with the temperature by the Fahrenheit thermometer (59°). Although this is a very good temperature for open-air music, as military bands, &c., it is not high enough for operas and concerts taking place in confined spaces with audiences and artificial lighting. The opera and concert orchestras have, therefore, everywhere to find their own pitch evolved from the Paris standard to suit an average increase of temperature. If the French Commission had decided upon 20° C. (68° F.), the necessity for an empiric proceeding would have been avoided. They might very well have adopted Scheibler's suggestion, made in 1834 at Stuttgart, of A=440. It is known that he worked at a temperature of about 70° F. To him we owe the only facile

tonometer, for which his pitch was really $A=439\cdot5$. It is as well to go back to the protocols of the Congress at Vienna in 1885, which led to the adoption of the French pitch in Austro-Hungary. After a unanimous acceptance of the diapason normal at 15°C . it was proposed that, in order to keep the wind instruments in performance to the initial standard vibration number $A=435$, the brass and wood wind instruments, and also the organ, should be made for 24°C . ($75\cdot2\text{F}$.)!—thus introducing a second standard to be used concurrently with the first, the necessity attributable to the vibration number being increased automatically by the heating and rarefaction of the air increasing its velocity, and with the orchestral wind instruments by the breath and handling of the players. Mr. Blaikley has shown the velocity of air in pipes is always less than in free air, possibly through the friction of the walls, but in the organ flue pipes it comes so near to free air that the organ may be almost regarded as a thermometer. So high a temperature as 24°C . was not left unchallenged; a wiser determination was urged of 20° , which in practice would have proved right. However the great differences likely to arise in average temperatures due to climatic conditions, and to warming and lighting apparatus, as, for instance, gas or electricity, prevented a decision from being arrived at; so that Vienna is now, as London was pending the decision of the Philharmonic Society, using a convenient empiric pitch of about $A=440$ for concert performances. Ingenious as the Viennese plan in 1885 would have been, it is wiser to have one standard with one note, A , for its expression, and one mean temperature. For brass instrument makers a B flat fork may be used, and to suit the old custom of organ-builders and pianoforte-makers, a C fork; but in preparing them equal temperament should be rigidly observed.

In 1879, at the instance of Mdme. Adelina Patti, the Covent Garden Opera adopted French pitch; a recent trial in performance satisfied me that it was at $A=440$, the temperature being about 70°F ., and that there had been no departure from the intention of using the French standard. Little notice has at any time been taken of this important change at the Opera; but when the Queen's Hall was opened in 1893, Mr. Newman, the manager, and Mr. H. J. Wood, the conductor, lost no time in introducing the diapason normal for all performances for which they were responsible; the proprietors going to the expense of having the organ, which had just been built at the high pitch, lowered. Mr. Henschel, in his symphony concerts at St. James's Hall, and in founding the Scottish orchestra, speedily followed. But the decisive point for this country was reached when, in July 1896, the Philharmonic Society, the most eminent musical institution in this country, elected to adopt the French diapason normal, and in the following November decided to have a standard tuning-fork for their concerts. Having consulted me, the directors accepted my suggestion for that pitch that it should be $A=439$ at 68°F . Forks made for the Society by Valantine and Carr, of Sheffield, were verified by me with the aid of the Scheibler tonometer in the Science Department, South Kensington, and besides the one retained by the Society, accurate copies were presented by the directors to the Science and Art Department, the Society of Arts, the Royal Academy of Music, the Royal College of Music, the Guildhall School, Trinity College, London, and myself; the last being accessible on all lawful days at Messrs. John Broadwood and Sons, 33 Great Pultney Street, W. The B flat is stated in the same minute of the Society as $=465$, the $C=522$; this last happens to be a just minor third above $A=435$, an accidental, although useful, coincidence.

The vibration number 439 is really the French standard raised to an average performing temperature, theoretically

by my coefficient of a thousandth part of a complete vibration a second for one degree Fahrenheit, so that for 435 the rise for the next degree is $\cdot435$. In a variety of ways I have sought an average concert temperature which I have finally taken at 68° , at which strings, wind, organ and piano should be in tune. According to my coefficient $A=435$ at 59° should be $A=438\cdot93$ at 68° . The round number 439 is more convenient. Briefly expressed, my coefficient is $\cdot5$ per degree for $C=500$; nearly, if not quite, the rise in free air. According to Helmholtz, the velocity of sound in dry air is at 0°C . (32°F .) 322 metres = 1089 \cdot 3 feet, say 1090; according to Dr. Ellis, at 60°F . the velocity is 1200 feet per second; with this my coefficient practically agrees. In further justification, I quote the Covent Garden $A=440$; the same vibration number for pianos, communicated to me by Herr Seuffert (Bösendorfer's), Vienna; the clarinet of Herr Mühlfeld, of Meiningen and Bayreuth, $A=439\cdot5$, it being understood when warm; a complete trial of all the wind instruments of Mr. Henschel's orchestra with a piano tuned to $A=439$ in a room exactly at 68°F .; and lastly, the crowning triumph of the Lamoureux orchestra from Paris joining forces with the Queen's Hall orchestra in London this year, the accuracy of pitch in the performance being unassailable, $A=439$! I should like to add for organs my trials of the St. James's Hall organ, at $52^{\circ}\text{C}=531$ and at $72^{\circ}\text{C}=541$, as one of many comparisons of this nature; and conclude with Prof. Blaserna's report of a trial at Vienna, 1885, when $A=435$ at 15°C ., warmed to 30°C ., became $A=457\cdot7$, equivalent to raising A to a tempered B flat. If a piano were supplied for a concert intended to be French pitch, at the standard fork $A=435$, in London or Paris, Berlin or Vienna, it would be too flat for performance. It would be a concession of great importance, which the musical world could not be too grateful for, if the Paris diapason normal were revised for the higher temperature, 20°C ., and legalised A.D. 1900, for France at $A=439$. Our Philharmonic Society has shown the way, the rest of the world would soon follow. Neither the stability of pitch of the tuning-fork nor that of a pianoforte during a concert need be considered. Dr. Ellis gives the flattening of tuning-fork as 1 in 16,000 per degree Fahrenheit; Mr. Blaikley and myself in one trial only of a concert pianoforte, $\cdot025$ per degree; but for the short time a concert lasts this must be imperceptible, the elasticity of the music wire having to be reckoned with against the least change of tension.

The objections to the $A=439$ that have been urged are that wind instrument makers may take it as a starting point for a lower temperature than 68° , but not if they are conscientious? We can legislate for this no more than we can for the tendency to exceed the present high pitch, as is shown by our military bands and the majority of the brass bands in this country, in spite of Kneller Hall, which is bound to maintain the old Philharmonic pitch until the War Office releases the army from it and provides or sanctions French pitch bands. Organ-builders who can work with accurate forks and a thermometer will have no difficulty with the French pitch—indeed, nearly all are in favour of it, as are the pianoforte-makers and dealers generally, but there are some who seem to fear their instruments will suffer in brilliancy of effect by the reduction. When, however, we consider the rise in the tension of pianos during the last thirty years, due to improvement in music wire and to a great change of construction, causing in grand pianos a rise in tension equivalent to a minor third in pitch, or more; and when we reflect that the difference of pitch proposed in tuning to the new Philharmonic is only $\frac{3}{5}$ of an equal semitone, we may see in the change more a gain than a loss by a possible increased fulness of tone-quality, and above all we shall have uniformity with the rest of the musical world.

A. J. HIPKINS.