

The English inch is equal in length to 3 barleycorns set end to end. The barleycorn, as a measure, is forgotten, but on a shoemaker's tape the sizes of boots and shoes increase by a barleycorn, or $\frac{1}{3}$ inch, for every size. For example: size No. 8 of a man's boot measures 11 inches; size No. 9, $11\frac{1}{3}$ inches; size No. 10, $11\frac{2}{3}$ inches, and so on. One would have thought that the sizes would increase by one quarter of an inch at a time, but the barleycorn has held its place to the present day.

The palm, which was originally composed of 4 digits or finger breadths, and, since the time of the Romans, of 3 inches or thumb breadths, is no longer used in England, and its place has to a certain extent been taken by a measure called the hand, composed of 4 inches and employed in measuring the height of horses.

Prior to the thirteenth century, the length of the foot in England was uncertain; but, by the ordinance known as the Statute for Measuring Land, enacted in the reign of King Henry III., the relations of the inch, the foot, and the cubit to one another were definitely fixed, and have never since been altered. The cubit of this statute is the double cubit, afterwards called the yard. A translation of the Latin words of the statute, describing the different measures, is as follows:—

"It is ordained that 3 grains of barley, dry and round, make an inch; 12 inches make a foot; 3 feet make a cubit; $5\frac{1}{2}$ cubits make a perch; 40 perches in length and 4 perches in breadth make an acre.

"And it is to be remembered that the iron cubit of our Lord the King contains 3 feet and no more; and the foot must contain 12 inches, measured by the correct measure of this kind of cubit; that is to say, one thirty-sixth part of the said cubit makes one inch, neither more nor less. And $5\frac{1}{2}$ cubits, or $16\frac{1}{2}$ feet, make one perch, in accordance with the above-described iron cubit of our Lord the King."

It is interesting that, in this statute, the double cubit, thus accurately described, should have been called the cubit of the King, just as the longer cubits of Babylon and of Egypt were called Royal cubits to distinguish them from the shorter cubits of those countries. In the Latin original of the ordinance the word used is "ulna," the usual word for cubit. The word "yard," to signify the English double cubit, occurs for the first time in the laws of England in a statute of 1483, which is written in French.

The two measures, the acre's breadth, afterwards called the chain, and the acre's length or furlong, have also been used from a very early period. The former is equal to .44 single cubits, 22 yards, or 66 English feet, while the latter is exactly ten times this, 440 cubits, 220 yards, or 660 feet. The furlong is the modern representative in our system of the ancient stadium, which had a length of 600 Greek feet, or $607\frac{1}{2}$ English feet, but the reason for its being longer than the stadium has, so far as I know, not been satisfactorily explained. But the change may have been due to the fact that other measures of distance were in use in England prior to the present statute mile, which varied in different parts of the country, and the mean of these was approximately equal to the Gallic league of 12 stadia or 7,290 English feet. One-eleventh of this, 663 English feet, is approximately equal to the English furlong, and eight of these measures, following the Roman system, were combined to form the English statute mile.

But whether this is the origin or not, there appears little doubt that the mile, furlong, and chain, or acre's breadth, were in use in England in Anglo-Saxon times, as there is a law of King Athelstane, who reigned A.D. 925-940, in which it is enacted:—

"Thus far shall be the King's grith from his burgh gate where he is dwelling, on its four sides; that is three miles, and three furlongs, and three acres' breadths, and nine feet, and nine palms, and nine barleycorns."

The length of the measure called the King's grith, or King's peace, was the distance from his house within which peace was to be maintained, and it is evident that in this law an attempt was made to express the distance in terms of ordinary measures.

The terms acre's length and rood are no longer used, and this measure is now known as the furlong, while the acre's breadth has been called the chain since the beginning of the seventeenth century, when it was divided into 100 links instead of 66 feet. The chain, which was the invention of Prof. Gunter, has proved very convenient for the measurement of land acres, and is now always used.

Since the introduction of the chain, the perch or rod has been less employed in connection with land measures, but is still used by builders for the measurement of brickwork. The common English stock brick is half a cubit in length, one-quarter of a cubit in width, and one-sixth of a cubit in thickness, or rather less than these dimensions, to allow for the thickness of the mortar joints, while a rod of brickwork, which one rod or 22 bricks in length, one rod or 66 bricks in height, and three bricks in thickness. The perch or rod of brickwork contains 4356 bricks.

The English sea mile is exactly the same as the geographical mile of the Babylonian system, and its tenth part, the cable length, is identical with the stadium. In these measures there has been no change, and the only difference is that the cable length is 405 English cubits, whereas the stadium was 400 original cubits.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The next combined examination for entrance scholarships and exhibitions, at Pembroke, Gonville and Caius, Jesus, Christ's, St. John's, and Emmanuel Colleges, will be held on Tuesday, December 5, and following days. Mathematics and natural sciences will be subjects of examination at all the above-mentioned colleges. Most of the colleges allow candidates who intend to study mechanical science to compete for scholarships and exhibitions by taking the papers set in mathematics and natural sciences. A candidate for a scholarship or exhibition must not be more than nineteen years of age on October 1, 1916. Forms of application for admission to the examination at the respective colleges may be obtained from the masters of the several colleges.

Mr. S. W. Cole, of Trinity College, has been appointed University lecturer in medical chemistry, and Mr. C. S. Gibson, of Sidney Sussex College, has been appointed assistant to the professor of chemistry; both appointments are for five years.

The Smith's prizes are awarded to H. M. Garner, St. John's College, for two papers on orbital oscillations about the equilateral triangular configuration in the problem of three bodies, and to G. P. Thomson, Corpus Christi College, for four papers on aeroplane problems. A Rayleigh prize is awarded to W. M. Smart, Trinity College, for an essay on the libration of the Trojan planets.

The General Board of Studies does not propose to appoint a lecturer in animal embryology to succeed the late Dr. R. Assheton, and advises that the balance of the benefaction to the lectureship should be used for the completion and publication of the embryological work upon which Dr. Assheton was engaged.

OXFORD.—The Committee for Geography will shortly proceed to the appointment of a reader in geography at a stipend of 300*l.* a year. The reader will also hold the post of director of the School of Geography at an additional stipend of 200*l.* a year. The appointment is for five years from October, 1916, and the holder of the post will be re-eligible. Candidates are requested to send in their applications, with such evidence of their qualifications as they may desire to submit, to the assistant registrar, University Registry, Oxford, so as to reach him not later than Wednesday, May 31. Six copies of the application, and of testimonials, should be sent, and at least one copy of any published work to which it is desired to direct the attention of the Board of Electors.

THE Board of trustees of the Ohio State University has ratified the proposal made by President W. O. Thompson for the establishment and maintenance of research professorships. According to *Science* the plan provides that men of recognised ability may be relieved from teaching to devote their entire time to scientific research.

THE Education Department of the County Council of the West Riding of Yorkshire has arranged to hold a vacation course for teachers at Bingley Training College from August 2-16 next. The aim of the course is to stimulate teachers and to give them opportunities of studying new methods of teaching various subjects. The following courses will be included among those offered: a course on education, by Prof. John Adams; the teaching of handwriting, by Miss Suddards; animal life, by Prof. W. Garstang; and plant life, by Dr. O. V. Darbishire. The syllabus, containing time-tables and full particulars, will be issued shortly, and can be obtained upon application to the Education Department (Secondary Branch), County Hall, Wakefield.

As has already been reported in these columns, the foundation-stone of the new Hindu University at Benares was laid by Lord Hardinge, Viceroy and Governor-General of India, on February 4. The issue of the *Pioneer Mail* for February 12 contains a full account of the function. In his address to the Viceroy, the Maharaja of Durbhanga said the contributions of the people of India to the University funds now amount to close upon one crore of rupees (666,700*l.*), including the capitalised value of the annual grants, sanctioned by ruling princes, to which the Government has added an annual grant of a lakh of rupees (6667*l.*) The site selected for the University covers more than 1200 acres. Twenty-four donors gave a lakh of rupees each. Lord Hardinge, in his speech, pointed out that it is the declared policy of the Government of India to do all within its power and within its means to multiply the number of universities throughout India, realising that the greatest boon Government can give to India is the diffusion of higher education through the creation of new universities. "Many, many more are needed," he continued, "but the new universities to be established at Dacca, Benares, and Bankipore, soon to be followed, I hope, by universities in Burma and the Central Provinces, may be regarded as steps taken in the right direction." The University is to be a teaching and residential, as contrasted with an affiliating and examining university. It was announced at the meeting that the Maharaja of Jodhpur had endowed a chair of technology to which Lord Hardinge's name is to be attached. In addition to a lump sum grant, the Maharaja has promised an annual grant of 24,000 rupees (1334*l.*) for this purpose.

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SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 9.—Sir J. J. Thomson, president, in the chair.—Prof. J. W. Nicholson and T. R. Merton: The distribution of intensity in broadened spectrum lines. (1) Using a neutral-tinted wedge the actual distribution of intensity in broadened spectrum lines can be accurately measured. (2) With this arrangement quantitative measurements of the hydrogen line $H\alpha$ have been made, and quantitative observations of other lines of hydrogen, helium, and lithium. (3) The intensity-distribution of lines, broadened by condensed discharges and at high pressures, does not follow the well-known probability law known to obtain under certain specified conditions. (4) The broadening of $H\alpha$ is symmetrical. (5) The most general characteristic of all the curves obtained is that their curvature is away from the axis perpendicular to the wave-length scale. (6) The existence of more than one component accords with the view that electrical resolution of lines is the origin of their broadening. (7) On the supposition of several components symmetrically distributed about the centre, the only general law consistent with the distribution of curvature is that of a sum of linear exponential terms, one for each component. (8) It is shown that in these circumstances discontinuities in the slope of the curves must occur. Those found in the curve for $H\alpha$ are in quantitative accordance with those expected from available data with respect to electrical resolution. (9) Quantitative observations of $H\beta$, $H\gamma$, and the diffuse series of helium and lithium confirm the view that electrical resolution is the principal cause of the phenomena.—Prof. H. C. Plummer: Prof. Joly's method of avoiding collision at sea. This brief note adds nothing to the general principle on which Prof. Joly's method is founded, but aims at greater simplicity, both in idea and practical detail, by introducing the relative speed of the two ships. The speed and course of an approaching ship being communicated by wireless, the relative speed is easily obtained without calculation by a combination of scales, which is, in fact, identical with Prof. Joly's collision predictor. The one ship may then be considered stationary, and the locus of the approaching ship at successive signals becomes a series of concentric circles. In the case of impending collision the rate of approach is a maximum along a radius and equal to the relative speed. Two methods are suggested for comparing the indications of the signals as received with this critical speed, one involving the use of two direct-reading scales, the other an equivalent arithmetical operation of the simplest kind.—Prof. W. G. Duffield: Apparatus for the determination of gravity at sea. The development of the form of apparatus as finally adopted is described. It depends upon balancing a column of mercury against the pressure of a constant volume of air contained in a bulb. The whole apparatus is maintained at as constant a temperature as possible. The height of the column varies inversely as the value of gravity. The apparatus was tested on a voyage to Australia and modified in Adelaide in accordance with experience gained. It was further tested during part of a return voyage under very unfavourable conditions; nevertheless, the results indicate the suitability of this type of instrument for future observations of gravity at sea.

Geological Society, February 23.—Dr. Alfred Harker, president, in the chair.—H. Dewey: The origin of some river-gorges in Cornwall and Devon. In North Cornwall, near Tintagel, there is an area of peculiar topography characterised by the presence of an upland plain or plateau. This plateau is dissected by deep gorges, with their walls scarred by potholes through