Seven species of pine are known from our British Eocenes. They are enumerated here for the first time :—

P. Prestwichii, sp. nov. mihi ... ... *P. macrocephalus*, (Lind. and Hutton) *P. ovata*, (id.)	Woolwich and Reading Beds.
P. Dixoni, Bowerbank	Bracklesham to Bembridge.
P. Bowerbankii, Can.	London Clay to Bracklesham.
P. Plutoni, Baily ... ... *P. Graingeri*, id.	Eocene of Antrim.

I am not sure that the two latter may not be identical with species already described abroad, but they seem distinct from the other British species.

It will be remarked that all the English species are from marine or estuarine deposits, and it is a singular fact that no trace whatever of leaves or fruit of the Abietineæ have been found in those plant beds of freshwater origin in England, which have recently yielded such exceedingly rich floras. It is equally strange that all our Eocene cones from the London clay and strata beneath have been imbedded before shedding their seed, while those from the Middle and Upper Eocenes are gaping and seedless. If inference upon such slender ground were permissible, it would seem as if those that were imbedded during the cooler Lower Eocene period had grown near to where they were imbedded, and their leaves may yet be found in our little-known Lower Eocene floras, while those that were imbedded during the hottest Eocene periods had drifted a long way. The well-ascertained absence of pine foliage during the Middle Eocene in England, and the constantly-decayed condition of the cones, are the data upon which this view may be grounded. Farther north, at Antrim, as we should anticipate, the cones seem more perfect.

It appears desirable to test the relative length of time that ripe and unripe pine cones, seeds and foliage will float, especially in sea-water, and the length of time required to reduce them to the decayed condition of the Barton and Bracklesham specimens, and it is to be hoped that some one possessiug facilities, will undertake experiments.

It will also be interesting to trace out why cones so frequently fall in a closed unripe condition. A Bournemouth resident writes to me that it takes three years for the cone to come to perfection, and that if it remains on the tree all that time, the scales open wide as it hangs, beginning at the base, and making a plainly audible crackling noise as they separate. This occurs chiefly on sunny summer days. The seeds being liberated, either fall or are picked out by tom-tits.

CEDRUS.—Only four species, or varieties according to some, are known—the Himalayan, Lebanon, Atlas, and Cyprus cedars. The cones are globose and erect on the upper side of the branches. The scales are thin, leathery, and closely pressed together, and persist for some time after the seeds are shed. The cones break up on the trees, and fall piecemeal, the scales falling separately, except near the apex, where they remain together as a rosette. This habit may account for the absence of fossil cedars in the Tertiaries, the older forms from the Greensand of Shanklin and Maidstone having possibly possessed a different habit.

PICEA has twelve to twenty-four species. The leaves are solitary, acicular, and more or less in two rows, while the cones somewhat resemble those of the cedar. They inhabit temperate regions throughout the northern hemisphere, almost to the confines of vegetation. Two Gault forms from Hainault are doubtfully referred to the genus, while fossil species are met with in Iceland and Greenland, the Wetterau, the amber-beds, and a few other Miocene localities.

TSUGA possesses five species. The leaves are not very different to those of Picea, and the cones are like those of Cedrus, but pendent and terminal, persisting for several years, and with scales more loosely imbricated and persistent. They inhabit Japan, the Himalayas, and North America, and have been found fossil in the same beds as Picea. *Pinus Crameri*, Heer, related to Tsuga, is the most widely-spread fossil in the Arctic Cretaceous.

PSEUDOTSUGA has only one species, inhabiting from Mexico to Oregon.

ABIES contains eighteen species. The scales are leathery, loosely imbricated, and fall with the seeds and the leaves, as in Tsuga. It extends over the northern temperate regions of both hemispheres, chiefly in mountainous districts. It is known from the Wealden, and even Jurassic, and from Greenland, Iceland, and in European Miocenes.

LARIX possesses seven to ten species. The cones are small, with leathery persistent scales, and fall in clusters with the dead branches. The leaves are linear, solitary, or in bundles, and deciduous in all but one species. The larch extends over the colder regions of Europe, Asia, and America. But four fossil forms have been noticed—three from the Miocene of Francfort, and one from Austria.

The Abietineæ in the existing state in northern regions of Europe, Asia, and America, outnumber the broad-leaved trees by ten to one, for pine-barrens in North America stretch 300 to 500 miles uninterruptedly, and, in the Old World, form a nearly continuous belt from Scandinavia to the east coast of Asia.

Some grow to gigantic size. Sections from two American species of Abies, two of Picea, and one of Pinus, have been exhibited, and officially stated to have been cut from trees considerably over 300 feet in height. In the Himalayas, the cedar and *Pinus excelsa* exceed 200 feet, and other species almost rival these, and even in Europe the heights of several species have been stated at from 120 to 180 feet. The greatest longevity ascribed to any of the Abietineæ belongs to the cedars, which have been estimated at from 600 to 900 years old.

Many of the species are exceptionally hardy, and pass the Arctic circle, and the larch in Siberia extends, as a trailing shrub, to latitude 52°. In Mexico, pines grow at an elevation of nearly 13,000 feet, and in Central Asia, of 10,000 feet.

The economic value of the Abietineæ surpasses that of all other forest-trees, and they supply a very large proportion of the timber in use. Their wood is valuable for all purposes, and some of it is of immense durability, while the money value of that imported into England alone is 9,000,000*l.* per annum, exclusive of other products, such as pitch and tar, which reach nearly another million. The nuts of some species of pine are used as food, and the bark, woody fibre, and secretions are more or less utilised in different countries, and for most varied purposes. Only one species of the whole family is indigenous to England, *Pinus Sylvestris*, the common Scotch pine. the larch and the spruce having been introduced, though both were, I believe, indigenous here in the Pliocene age.

J. STARKIE GARDNER

THE BRUSSELS CHRONOGRAPH

ON November 18, 1880, a description was given in NATURE of certain great galvanic chronographs which were then being constructed by Messrs. E. Dent and Co., of the Strand and Royal Exchange, London. The second of these instruments—that for the Royal Observatory of Brussels—has now been completed. The arrangements for pricking upon the chronograph barrel are much improved, and as they overcome a serious constructive difficulty, we propose to give some account of them.

It will be remembered that the main feature in the chronographs referred to was a cylinder (or barrel) 12 in. in diameter, and 2 ft. 6 in. long. That cylinder, which was covered with paper, rotated once in two minutes Beneath it (see Fig. 1) was a pricker placed in electrical connection with the standard clock, and alongside another pricker placed in electrical communication with an observer at any of the instruments. At every second of the standard clock, the clock pricker rose and punctured the paper. Meanwhile, as the cylinder rotated, the carriage, K, on which the prickers were mounted slowly, travelled along the length of the cylinder; and this motion of K, combined with the rotation of the cylinder, caused the succession of clock pricks to arrange themselves around the cylinder in the form of a spiral. The time of any observation was reckoned by comparing the puncture

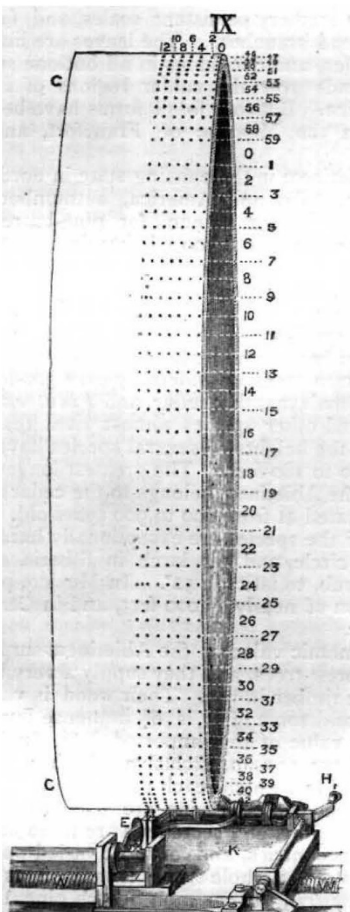
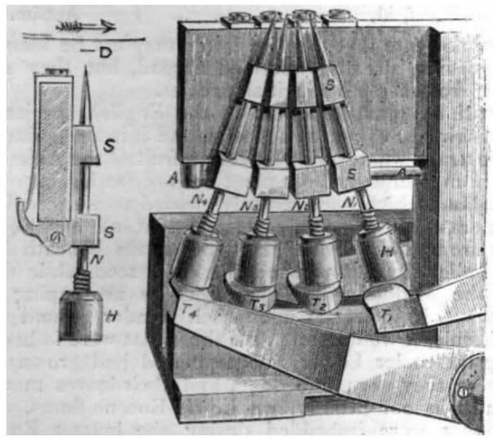


FIG. 1.

of the observation pricker with the two adjacent clock pricks. The distance between each successive turn of the spiral of clock pricks was $\frac{3}{20}$ inches, and it was within this space (which was limited by the consideration of the size of the cylinder, and the number of hours of observation it should contain) that the two prickers worked.

In the Brussels chronograph, by the directions of M. Houzeau, the Belgian Astronomer-Royal, provision had to be made for *three* observation prickers, in addition to the clock-pricker. The space available for the prickers to work in was only $\frac{1}{8}$in., and it was obviously impossible to place them side by side. The difficulty was surmounted by arranging them in the form of a fan, so that they should converge into the space, which then became amply sufficient for the disposition of the punctures.

N_1, N_2, N_3, N_4 (see Fig. 2), are the prickers. As may be seen, they take the form of pins with very large heads. Each is mounted in a sheath, S S. Each sheath is jointed (see side section), and swings about an axis A A. It is kept to its bearing by a spring. This arrangement allows the pricker to swing forward a little as it enters the moving paper. It corresponds to the action of the old form of pricker shown in Fig. 3. The pricker, however, that we are describing has an important advantage.



It might happen that an observer on pressing down the electric button which worked the pricker, would keep his finger on it. In that case, with the old form, the pricker would be kept against the paper, and would very likely cause damage. But in the new case nothing of the kind would happen, for each pricker, N_1, N_2, N_3, N_4, is *projected* by the blow of its corresponding striker, T_1, T_2, T_3, T_4, and travelling beyond the reach of the striker, pierces the paper by its own momentum only. On falling back,

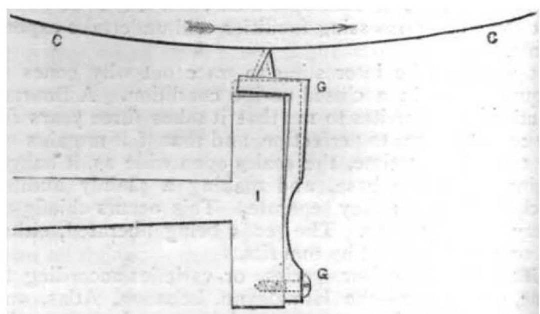


FIG. 3.

should the striker, T, be still kept raised, the pricker will rest upon it, but its point will be free of the cylinder, and at some distance, D, below it. The strikers, T_1, &c., are worked by electro-magnets: the spiral spring shown just above the head of each pricker, is compressed when the pricker is projected between the head and sheath, and assists in the disengagement of the pricker from the paper. The punctures of the prickers are very marked and distinct.

A NON-ELECTRIC INCANDESCENT LAMP

A BRIGHT light, easily obtained and sufficient for projections, has frequently been regarded as a *desideratum*, where it has been impracticable to procure either the electric or the lime-light. The French Minister of Public Instruction lately appointed a special commission to indicate the apparatus most suitable for projection in primary schools; and it appeared that while there was no lack of simple arrangements for the projection proper,