rails, locomotives, mining machinery, steam-boilers, stoves, carriages, edge-tools, &c. A public library, a theatre, an academy of music, a hospital, a public hall, a driving park, a Roman Catholic cathedral, a home for the friend­less, and a museum of Indian stone relics are among the more prominent features of the place. The population was 9223 in 1860, 35,092 in 1870, and 45,850 in 1880.

Slocum Farm, as the site was called subsequent to 1798, saw its first blast-furnace erected in 1840 by George and Selden Scranton, who soon added a rolling-mill and the manufacture of rails. The opening of the railway in 1856 gave a great stimulus to the new town (1854), which obtained a city charter in 1866. It is divided into twenty-one wards, of which the 4th, 5th, 6th, 14th, 15th, and 18th are known as Hyde Fark, the 1st, 2d, and 3d as Providence.

SCREAMER, a bird inhabiting Guiana and the Amazon valley, so called in 1781 by Pennant *(Gen. Birds,* p. 37) “ from the violent noise it makes,”—the *Palamedea cornuta* of Linnæus. First made known in 1648 by Marcgrave under the name of “ Anhima,” it was more fully described and better figured by Buffon under that of *Kamichi,* still applied to it by French writers. Of about the size of a Turkey, it is remarkable for the curious “ horn ” or slender caruncle, more than three inches long, it bears on its crown, the two sharp spurs with which each wing is armed, and its elongated toes. Its plumage is plain in colour, being of an almost uniform greyish black above, the space round the eyes and a ring round the neck being variegated with white, and a patch of pale rufous appearing above the carpal joint, while the lower parts of the body are white. Closely related to this bird is another first described by Linnæus as a species of *Parra* (Jacana, vol. xiii. p. 531), to which group it certainly does not belong, but separated therefrom by Illiger to form the genus *Chauna,* and now known as *C. chavaria,* very generally in English as the “ Crested Screamer,” @@1 a name which was first bestowed on the Seriema *(q.v.).* This bird inhabits the lagoons and swamps of Paraguay and Southern Brazil, where it is called “ Chajá ” or “ Chaka,” and is smaller than the preceding, wanting its “ horn,” but having its head furnished with a dependent crest of feathers. Its face and throat are white, to which succeeds a blackish ring, and the rest of the lower parts are white, more or less clouded with cinereous. According to Mr Gibson *{Ibis,* 1880, pp. 165, 166), its nest is a light construction of dry rushes, having its founda­tion in the water, and contains as many as six eggs, which are white tinged with buff. The young are covered with down of a yellowish brown colour. A most singular habit possessed by this bird is that of rising in the air and soar­ing there in circles at an immense altitude, uttering at intervals the very loud cry of which its local name is an imitation. From a dozen to a score may be seen at once so occupying themselves. The young are often taken from the nest and reared by the people to attend upon and de­fend their poultry, a duty which is faithfully @@ 2 and, owing to the spurs with which the Chaka’s wings are armed, successfully discharged. Another very curious property of this bird, which was observed by Jacquin, who brought it to the notice of Linnæus, @@3 is its emphysematous condi­tion,—there being a layer of air-cells between the skin and the muscles, so that on any part of the body being pressed a crackling sound is heard. In Central America occurs another species, *C. derbiana,* chiefly distinguished by the darker colour of its plumage. For this a distinct genus, *Ischyrornis,* was proposed, but apparently without neces­sity, by Reichenbach *(Syst. Avium,* p. xxi.).

The taxonomic position of the *Palamedeidæ,* for all will

allow to the Screamers the rank of a Family at least, has been much debated, and cannot be regarded as fixed. Their Anserine relations were pointed out by Prof. Parker in the Zoological *Proceedings* for 1863 (pp. 511-518), and in the same work for 1867 Prof. Huxley placed the Family among his *Chenomorphæ* ; but this view was contravened in 1876 by Garrod, who said, “ The Screamers must have sprung from the primary avian stock as an independent offshoot at much the same time as did most of the other important families.” Accordingly in 1880 Mr Sclater regarded them as forming a distinct “ Order,” *Palamedeæ,* which he, how­ever, placed next to the true *Anseres,* from the neighbour­hood of which, as has been already stated (Ornithology, vol. xviii. p. 47), the present writer thinks the *Palamedeidæ* can hardly be removed. (a. n.)

SCREW. The screw is the simplest instrument for converting a uniform motion of rotation into a uniform motion of translation (see Mechanics, vol. xv. p. 754). Metal screws requiring no special accuracy are generally cut by taps and dies. A tap is a cylindrical piece of steel having a screw on its exterior with sharp cutting edges ; by forcing this with a revolving motion into a hole of the proper size, a screw is cut on its interior forming what is known as a nut or female screw. The die is a nut with sharp cutting edges used to screw upon the outside of round pieces of metal and thus produce male screws. More accurate screws are cut in a lathe by causing the carriage carrying the tool to move uniformly forward, thus a con­tinuous spiral line is cut on the uniformly revolving cylinder fixed between the lathe centres. The cutting t∞l may be an ordinary form of lathe tool or a revolving saw-like disk. (See Machine Tools, vol. xv. p. 153.)

*Errors of Screws.—*For scientific purposes the screw must be so regular that it moves forward in its nut exactly the same distance for each given angular rotation around its axis. As the mountings of a screw introduce many errors, the final and exact test of its accuracy can only be made when it is finished and set up for use. A large screw can, however, be roughly examined in the following manner. (1) Sea whether the surface of the threads has a perfect polish. The more it departs from this, and approaches the rough torn surface as cut by the lathe tool, the worse it is. A perfect screw has a perfect polish. (2) Mount upon it between the centres of a lathe and the slip a short nut which fits perfectly. If the nut moves from end to end with equal friction, the screw is uniform in diameter. If the nut is long, unequal resistance may be due to cither an error of run or a bend in the screw. (3) Fix a microscope on the lathe carriage and focus its single cross-hair on the edge of the screw and parallel to its axis. If the screw runs true at every point, its axis is straight. (4) Observe whether the short nut runs from end to end of the screw without a wabbling motion when the screw is turned and the nut kept from revolving. If it wabbles the screw is said to be drunk. One can see this error better by fixing a long pointer to the nut, or by attaching to it a minor and observing an image in it with a telescope. The following experi­ment will also detect this error. (5) Γut upon the screw two well­fitting and rather short nuts, which are kept from revolving by arms bearing against a straight edge parallel to the axis of the screw. Let one nut carry an arm which supports a microscope focused on a line ruled on the other nut. Screw this combination to different parts of the screw. If during one revolution the microscope remains in focus, the screw is not drunk ; and, if the cross-hairs bisect the line in every position, there is no error of run.

*Making Accurate Screws.—*To produce a screw of a foot or even a yard long with errors not exceeding 1/1000th of an inch is not difficult. Professor William A. Rogers of Harvard observatory has invented a process in which the tool of the lathe while cutting the screw is moved so as to counteract the errors of the lathe screw. The screw is then partly ground to get rid of local errors. But, where the highest accuracy is needed, we must resort in the case of screws, as in all other cases, to grinding. A long solid nut, tightly fitting the screw in one position, cannot be moved freely to another position unless the screw is very accurate. If grinding material is applied and the nut is constantly tightened, it will grind out all errors of run, drunkenness, crookedness, and irregularity of size. The condition is that the nut must be long, rigid, and capable of being tightened as the grinding proceeds ; also the screw must be ground longer than it will finally be needed so that the imperfect ends may be removed.

The following process will produce a screw suitable for ruling

@@@1 Under this name its curious habits have been well described by Mr W. H. Hudson (*Gentleman's Magazine,* Sept. 1885, pp. 280-287).

@@@2 Hence Latham’s name for this species is “ Faithful Jacana,”—he supposing it to belong to the genus in which Linnæus placed it.

@@@3 “Tacta manu cutis, sub pennis etiam lanosa, crepat ubique for­titer” *(Syst. Nat.,* ed. 12, i. p. 260).