cross-bar, upheld by two arms springing from the body of the in­strument, the strings at first bridged an open space for greater convenience in twanging them with both hands. The gradual closing up of this open space marks the various steps in the transition from cithara to fiddle. In the Egyptian cithara the harp-like arrangement of the strings was maintained by making the cross-bar oblique. In the Assyrian and later in the Greek and Roman citharas and lyres all the strings were of the same length, difference in pitch being secured by varying the thickness of the strings.

A later development consisted in discarding the open space altogether, whereby the third method of stretching the strings was evolved. In these new instruments the strings lay over the sound-chest, raised on bridges which determined their vibrating length according to the method of stringing the harp, or the cithara. As examples of this type may be cited the psalterion or psaltery and in the middle ages the zither.

The addition of a keyboard to the psaltery, as a means of in­creasing its scope, created a new class of instruments of which the principal members were the clavicymbalιιm, the virginal, spinet and the harpsichord. In these the principle of plucking the strings by means of a plectrum or quill was preserved, but the quill was fixed in the pivoted tongue of a piece of wood, known as a "jack,” which rested on the end of a balanced key. The jack worked easy through a rectangular hole in the soundboard, and when the key was pressed down the jack was, thrown up, the quill catching the string and plucking it. The string thus plucked vibrated over the whole length from hitch-pin to belly-bridge (cf. the effect of the tangent in the clavichord).

When the principle of stopping strings by pressing them against a fingerboard in order to obtain several sounds from each had been discovered and applied by adding a neck to the body, a new sub­division was created in this class of instruments. The exact division of the strings necessary to produce the required intervals was measured off and indicated, by ligatures of hide or gut (called frets), bound round the neck, against which the strings were pressed by the fingers. This principle involved a very great advance in technique, and produced the two great families of guitar and lute. During the middle ages, the bass lute (theorbo or barbiton) and the double- bass lutes (archlute and chitarrone) had, in addition to the strings stretched over the finger-board, for which the pegs were placed half-way up the neck, a complement of bass strings stretched *à vide* from the bridge tail-piece to the end of the neck, where a second peg-box was provided. In the chitarrone these bass strings, each of which produced but one note, were about 5 ft. long; the archlute of similar construction was in size between the former and the theorbo.

The plectrum was used to pluck the strings in classic Greece and Rome, in order to provide an additional effect of brilliancy for joyous or martial themes. If the music gained in brilliancy, the instru­ment lost the power of expressing the performer’s emotions. During the middle ages the use of wire and spun strings in some instruments, such as the mandola, rendered the use of the plectrum a necessity.

2. *Strings struck by Hammers or Tangents.—*The earliest known instrument thus played was the Assyrian dulcimer, or *pisanlir,* represented on some of the stone slabs brought by Sir A. H. Layard from the mound of Kuyunjik, and preserved at the British Museum among scenes from the history of Sardanapalus; it is the instrument erroneously rendered *psaltery* in Dan. ιii. 5, while the instrument rendered dulcimer in the Authorized Version of the Bible should be bagpipe.

In the dulcimer the strings, as in the psaltery, were stretched over a rectangular or trapezoid sound-chest, the vibrating length being determined by means of two bridges. The strings were struck by means of two curved sticks, or by hammers, with an elastic wrist action, which produced clear, bell-like tones. The dulcimer has survived in the *cembalo* or *cimbalom* of the Hungarian gipsies. The application of the keyboard to the dulcimer produced the clavichord and later the pianoforte. In the earliest clavi­chords, known as fretted (Ger. *gebunden),* one string was made to do duty for several notes. The tangent or upright blade of brass tapering towards the bottom, where it was, fastened into the end of the key, replaced the hammer of the dulcimer, for which it was hardly a substitute for the, following reason. The function of the tangent constitutes the main technical innovation; instead of giving a sharp blow and rebounding instantly from the string, like the hammer on the strings of the dulcimer, the tangent remained on the string as long as the key was pressed down, and as it rose cloth dampers stopped the vibration. It is usual to compare the tangent of the clavichord to the hammer of the dulcimer, but the action of the tangent more nearly resembles the pressure of the finger, on the string of the violin. Just as the finger determines the vibrating length of the violin string from the bridge, so the tangent, sets the string vibrating from the point of impact to the belly-bridge. By twisting the key levers, the tangents belonging to three or four different keys were brought to bear on the same string or group of unisons at different points, all the strings being of the same length. It was not until the 18th century that fret- free or *bund-frei* clavichords were invented; they had throughout the compass a key and a tangent to each pair of unisons. The action of the hammer of the dulcimer reappeared in the pianoforte. Owing to the peculiar action of the tangent it was possible to produce on the clavichord the *vibrato* effect *(Bebung)* as in the violin, an effect which is impracticable on any other keyboard instrument.

3. *Strings set in Vibration by Friction of the Bow.—*Although used with various other instruments, such as the Oriental rebab and its European successor the rebec, with the oval vielle, the guitar- or troubadour-fiddle and the viols, it is with the effect of the bow on the perfected type represented by the violin family that we are mostly concerned. The strings in this case are all of the same length, difference in pitch being secured by thickness and tension. The fingers, by pressing the strings, produce a variety of notes from each string at will by shortening the vibrating section as the position of the fingers shift in the direction of the bridge. The friction of the bow on the string induces a twofold vibration, the actual longitudinal vibration of the string and the molecular, both of which are transmitted by the bridge to the soundboard, whereby they become intensified or reinforced. To this class belong also the Welsh crwth and the tromba marina.

4 *Strings set in Vibration by Friction of a Wheel.—*This class is small, being represented mainly by the organistrum and the hurdy- gurdy and a lew sostenente keyboard instruments. In these instruments the rosined wheel performs mechanically the function of the bow, setting the strings in vibration as it revolves. A row of ten or twelve keys controlling wooden tangents performs the function of the fingers in stopping the strings. Two or more strings outside the range of the tangents always sound the same drone bass, the, fingers playing the melody on the treble strings.

5. *Strings set in Vibration by the Wind.—*An example is the aeolian harp. Here the eight strings of different thickness, but tuned strictly in unison and left slack, are set in vibration by a current of air passing obliquely across them, causing the strings to divide into aliquot parts, thus producing various harmonics.

*Section B.—*There are, besides, certain structural features in the instruments independent of the strings, which influence the quality of tone to a greater or lesser degree. First, the construction of the sound-chest, the box form consisting of back and belly or soundboard, joined by ribs of equal width, giving the best results in classes 1 and 3. The sound-chest, consisting of a vaulted back to which is glued a flat soundboard, gives very poor results in class 3, but is eminently suitable for class I. The position and shape of the sound holes on each side of the strings for bowed instruments, and in the centre for those of which the strings are plucked, are not without influence on the tone. (K. S.)

**STRIP,** to remove or tear off the outer covering of anything, hence to rob or plunder; also a narrow long piece of stuff or material, or a mark or division narrow in proportion to its length distinguished from its ground or surroundings by colour or other variation of texture, character, &c.; a stripe; this last word is a variant of " strip,” a particular meaning, that of a stroke or lash of a whip, is either due to the original meaning of “ strip,” to flay, or to the long narrow mark or wheal left by a blow. The O. Eng. *strypan,* to strip, is cognate with Du. *stroopen,* Ger. *streifen,* and the root is possibly seen in " strike,” Lat. *stringere. "* To strip ” has many technical meanings, *e.g.* to separate the tobacco leaf from the stems, to remove the over- lying soil from a mineral deposit before opening and working it, to turn a gun-barrel in a lathe, &c. In architecture, a " strip­pilaster ” is a narrow pilaster such as is found in Saxon work and in the Italian Romanesque churches, " Stripling,” a youth, is apparently a diminutive of " strip,” in the sense of a young growing lad.

**STRODE, RALPH (*fl.*** ), English schoolman, was probably a native of the West Midlands. He was a fellow of Merton College, Oxford, before 1360, and famous as a teacher of logic and philosophy and a writer on educational subjects. He belonged, like Thomas Aquinas and Bonaventura, to that “ School of the Middle ” which mediated between realists and nominalists. Besides his *Logica,* which has not survived, he wrote *Consequentiae,* a treatise on the syllogism, and *Obliga~ tiones* or *Scholastica militia,* a series of “ formal exercises in scholastic dialectics.” He had some not unfriendly controversy with his colleague John Wyclif, against whom he defended the possession of wealth by the clergy, and held that in the Church abuses were better than disturbance. He also attacked Wyclif's doctrine of predestination. His positions are gathered from Wyclif's *Responsiones ad Rodolphum Strodum* (MS. 3926,