with a register foot joint and a cork nut-screw at the head joint. This instrument met all requirements. He was even against the use of the keys for C♮ and C♯, because they altered the recognized quality of tone of the instrument. When Tromlitz published his method, the family of flutes had become modified. It compre­hended only the typical flute in D, the flûte d’amour a minor third lower, a “third” flute a minor third higher, and, finally, the little octave flute.

While Tromlitz was struggling in Germany with the idea of augmenting the compass of the flute downwards by employing open keys for C♮ and C♯, an Italian, Giovanni Batista Orazi,@@1 increased the scale of the instrument downwards by the application of five new keys, viz., B, B♭, A, A♭, and G. At the same time that he produced this invention@@2 he conceived the plugging of the lateral holes by the valve keys then recently invented by Potter. But it was hardly possible to obtain a perfect plugging of seven lateral holes with the aid of as many keys, for the control of which there were only the two little fingers, and therefore this invention of Orazi proved a failure.

In 1808 Frederick Nolan,@@3 of Stratford, near London, conceived an open key, the lever of which, terminating by a ring, permitted the closing of a lateral hole at the same time the key was being acted upon. The combination in this double action is the embryo of the mechanism that a little later was to transform the system of the flute. Two years later Macgregor,@@4 a musical-instrument maker in London, constructed a bass flute an octave lower than the ordi­nary flute. The idea was not new, as is proved by the existence of the bass flute mentioned above. The difference between the two instruments lies in the mechanism of the keys. That employed by Macgregor consisted of a double lever, a contrivance dating from before the middle of the 18th century, of which the application is seen in an oboe of large dimensions preserved in the National Museum at Munich.@@5

About 1830 the celebrated French flautist Tulou added two more keys, those of F♯ and C♯, and a key, called “de cadence,” to facilitate the accompany­ing shakes.

To increase the number of keys, to improve their system of plugging, and to extend the scale of the instrument in the lower region, —these had hitherto been the principal problems dealt with in the improvement of the flute. No maker, no inventor whose labours we have called attention to, had as yet devoted his atten­tion to the rational division of the column of air by means of the lateral holes. In 1831 Theobald Boehm, a Bavarian, happening to be in London, was struck with the power of tone the celebrated English performer Charles Nicholson drew from his instrument. Boehm learned, and not without astonishment, that his English colleague obtained this result by giving the lateral holes a much greater diameter than was then usually admitted. About the same time Boehm made the acquaintance of an amateur player named Gordon, who had effected certain improvements ; he had bored the lateral hole for the lower E, and had covered it with a key, while he had replaced the key for F with a ring. These innova­tions set Boehm about attempting a complete reform of the instru­ment.@@6 He went resolutely to work, and during the year 1832 he produced the new flute which bears his name. This instrument is distinguished by a new mechanism of keys, as well as by larger holes disposed along the tube in geometrical progression.

Boehm’s system had preserved the key of G♯ open ; Coche,@@7 a professor in the Paris Conservatoire, assisted by Auguste Buffet the younger, a musical-instrument maker in that city, modified Boehm’s flute by closing the G♯ with a key, wishing thus to render the new fingering more conformable to the old. He thus added a key, facilitating the shake upon C♯ with D♯, and brought about some other changes in the instrument of less importance.

Boehm had not, however, altered the bore of the flute, which had been conical from the end of the 17th century. In 1846, however, he made further experiments, and the results obtained were put in practice by the construction of a new instrument, of which the body was bored cylindrical, but the head was modified at the embouchure. The inventor thus obtained a remarkable equality in the tones of the lower octave, a greater sonorousness, and a perfect accuracy of intonation, by establishing the more exact proportions which a column of air of cylindrical form permitted.

The priority of Boehm’s invention was long contested, his detractors maintaining that the honour of having reconstructed the flute was due to Gordon. But an impartial investigation

vindicates the claim of the former to the invention of the large lateral holes.@@8 His greatest title to fame is the invention of the mechanism which allows the production of the eleven chromatic semitones intermediate between the fundamental note and its first harmonic by means of eleven holes so disposed that in opening them successively they shorten the column of air in exact propor­tional quantities.@@9 Boehm@@10 has published a diagram or scheme to be adopted in determining the position of the note-holes of wind instruments for every given pitch. This diagram gives the position of the intermediate holes which he had been enabled to establish by a rule of proportion based on the law of the lengths of strings.

The Boehm flute, notwithstanding the high degree of perfection it has reached, has not secured unanimous favour ; even now there are players who prefer the ordinary flute. The change of fingering required for some notes, the great delicacy and liability to derange­ment of the mechanism, have something to do with this. In Eng­land especially, the ordinary flute retains many partisans, thanks to the improvements introduced by a clever player, Abel Siccama, in 1845.@@11 He bored the lateral holes of E and A lower, and covered them with open keys. He added some keys, and made a better disposition of the other lateral holes, of which he increased the diameter, producing thus a sonorousness almost equal to that of the Boehm flute, while yet preserving the old fingering for the notes of the first two octaves. But in spite of these improvements the old flute will not bear an impartial comparison with that of Boehm. (V. Μ.)

TRANSYLVANIA (Germ. *Siebenbürgen),* a mountain­ous principality (Gross-Fürstenthum) forming the extreme eastern portion of Austria-Hungary, is bounded on the W. and N. by Hungary proper, on the E. by Bukowina and Moldavia, and on the S. by Walachia. The German name is usually derived from the seven principal fortified towns or “ burgs ” founded by the German colonists, though some authorities prefer to connect it with the Zibin Mountains on the south frontier. The Latin name appears first after the 12th century, and signifies “beyond the woods,” *i.e.,* from Hungary ; the Magyar and Roumanian names (Erdély and Ardealu) both mean “ forest-land.” For all political and administrative ends, and in the official statistics and returns, Transylvania is now wholly incor­porated with Hungary *(q.v.),* and to all intents and pur­poses is a part of that kingdom. The principality has the form of an irregular circle, with an area of about 21,000 square miles, and is on all sides surrounded by mountain chains, while the interior is barred and striped with lower ranges. On the west or Hungarian side there are various wide and comparatively easy passes into the interior, but on the east and south frontiers the lofty bounding mountains present steep and rugged faces outwards, giving to Transyl­vania the general aspect of a huge natural fortress. These mountains are a continuation of the Hungarian and Galician Carpathians ; in fact, the mountains of Transyl­vania may be regarded together as forming the south­eastern main group of the Carpathian system. The loftiest and most rugged peaks are on the north and south boundaries. On the north the highest summit is the Pietross (7534 feet), one of the Rodna Alps ; on the south are the Butshetsh (8262 feet), the Königstein (7357 feet), and the Negoi (8340 feet). The east is bounded by several parallel chains, the highest peak in which is the Pietrossul (6910 feet) ; and on the west border the greatest height is attained towards the south, where several peaks reach 7200 feet. On the west are the Transylvanian Ore Mountains (Erzgebirge), with the curious Detunata (“ thunder-smit ”), and the Bihar group, with its numerous caverns. There are numerous valleys, ravines, and canons in the network of mountains covering the interior of the country, but it is only along the courses of the principal rivers that plains of any size are found. The chief rivers are the Aluta or Alt, which flows south, pierces the southern boundary mountains at the Rother Thurm Pass,

*@@@l Saggio per costruire e suonare un flauto traverse enarmonico che ha i suoni bassi del Violino,* Rome, 1797.

@@@2 The idea of this large flute was taken up again in 1819 by Trexler of Vienna, who called it the “panaulon.”

@@@3 Patent, No. 3183.

@@@4 Patent, No. 3349.

@@@5 Another specimen, almost the same, constructed about 1775, and called “ Basse de Musette,” may be seen in the Museum of the Paris Conservatoire.

@@@6 See *Ueber den Flötenbau und die neuesten Verbesserungen desselben,* Mainz, 1847; and W. S. Broadwood, *An Essay on the Construction of Flutes originally written by Theobald Boehm, published with the addition of Correspondence and other Documents,* London, 1882.

*@@@7 Examen critique de la Flûte Ordinaire comparée à la Flûte Boehm,* Paris, 1838.

@@@8 They existed long before, however, in the Chinese *Ty* and the Japanese *Fuye.*

@@@9 The reader may consult with advantage Mr C. Welch’s *History of the Boehm Flute* (London, 1883), wherein all the documents relating to this interesting dis­cussion have been collected with great impartiality.

@@@10 See the *Essay on the Construction of Flutes,* already cited.

@@@11 Patent, No. 10553.