of form, harmonies of colour, and so forth. Dr. Goldschmidt's object appears to us to be to reduce all such harmonies to a common formula, and he considers that the different kinds of harmony are governed by a common law, the " law of complication."

As an example of the arguments employed, a series of numbers is obtained from the intervals of the musical scale which coincide with numbers in another series alleged to be obtainable from crystallography. But the numbers in the case of the music do not represent actual intervals, but are derived from them by a homographic transformation, according to which the keynote and its octave are represented by 0 and ∞ and the major fifth by 1, and the series is incomplete unless the minor seventh be included in the list. And the identity of the two series is by no means complete ; for there are terms in the series derived from music which are absent from that obtained from crystallography.

It is easy to find connections as close as those dealt with in the present work between phenomena which have nothing whatever in common. For a considerable period, the number of wranglers in the Cambridge mathematical tripos was observed to be intimately related to the frequency of sun-spots, and anyone who should seek to establish a connection between the notes of the musical scale and the courses of a *table d'hôte* dinner might easily make out a very strong case. What is most surprising is that the analogy which *a priori* exists between musical intervals and colour intervals, both of which depend on ratios of vibration-frequency, appeals but little to our senses, so little, in fact, that certain writers have even sought to establish relations between chords and colours quite independently of the known relations of pitch. As for the connection which no doubt exists between a love of music and a talent for mathematics, its cause is not difficult to find. A mind like that of Beltrami, who could discover in the purely abstract ideas of geometry and algebra truths applicable to spaces other than that in which we live, was necessarily well trained to appreciate that beauty of form dissociated from worldly matters which exists in the sonatas and symphonies of the older composers. In order, on the other hand, to make it more palatable to a mind that wants to grasp something tangible, music is commonly associated with such mundane ideas as love, vice, battle and murder, and sudden death, the triumph of the victorious, the wails of the vanquished.

Opere Matematiche di Francesco Brioschi. Vol. ii. *Opere Matematiche di Eugenio Beltrami.* Vol. i. Pp. 456 and 437. (Milan : Ulrico Hoepli, 1902.) Price 25 lire.

THE second volume of Brioschi's works contains thirty-five papers contributed to the *Annali di Matematica pura ed applicata*, series 1 and series 2, vols. i.–xiv., between the years 1858 and 1887. These papers have all been carefully revised by Profs. Cerruti (Rome), Gerbaldi (Palermo), Loria (Genoa), Pascal (Pavia), Pittarelli (Rome), Reina (Rome) and Tonelli (Rome). A considerable number of them deal with linear differential equations, but elliptic and hyperelliptic functions, curvilinear coordinates, binary forms and many other subjects are treated ; and the papers also include obituary notices of Borchardt and Chasles.

After the death of Prof. Beltrami, in 1900, the Faculty of Science of the University of Rome resolved to establish a memorial of the distinguished mathematician, and it was decided that the most fitting form for the memorial would be a complete edition of Beltrami's collected works ; to quote Prof. Tonelli, *monumentum aere perennius.* In this case, the work of preparing the volumes has been carried out entirely under the direction of Profs. Cremona, Castelnuovo and Tonelli, as representatives of the Roman Faculty of Science, who have been aided by the collaboration of Profs.

Bianchi, Burgatti, Cerruti, Dini, Pittarelli, Reina and Volterra. The order of arrangement differs from that adopted for Brioschi's works. Instead of being grouped according to journals, Beltrami's papers are arranged in strict chronological order, and this volume represents the work of eight years, from 1861 to 1868. That these first eight years of Beltrami's career as a mathematician were productive of work of great value is shown by the list of titles, which include researches on analysis applied to geometry, the flexure of ruled surfaces, resolution of the problem of transforming geodesics on a surface into straight lines in a plane, complex variables on any surface, fundamental theories of space of constant curvature, and last, but not least, the " Saggio d'interpretazione " of non-Euclidean geometry. The portrait of Beltrami which forms the frontispiece is due to Prof. Pittarelli.

Beltrami's works are published in uniform style with those of Brioschi, and both are printed by the Mathematical Press, of Palermo.

Handbook of the Trees of New England. By L. L. Dame and Henry Brooks. Pp. xv + 196. (Boston, U.S.A.: Ginn and Co., 1902.)

THE interest connected with the flora of the New England States lies in the fact that situated between Canada and the Alleghany Mountains they furnish the meeting point of a northern and a more southern flora. Since the book is limited to such a relatively small part of the country, it does not possess the general interest which would attach to one which included, for instance, the trees of all the eastern States. What it loses in comparative value, perhaps it gains in definiteness ; it contains useful and succinct descriptions, good illustrations specially drawn, and states the horticultural value of all the indigenous species. The Latin nomenclature is satisfactory and correct, except in the case of a species of Acer, and for *Quercus Muhlenbergii*, which is considered by some authorities to be a variety of *Quercus prinus* ; but the popular names are in utter confusion, and we cannot agree with the authors that it is wiser "to record what is, and not what ought to be." Taking *Populus balsamifera* as an illustration, the names recorded are "Balsam. Poplar. Balm of Gilead." Now this tree is certainly not a balsam, and *Populus candicans* is the real Balm of Gilead ; while the name balsam-poplar would be sensible and correct. Apart from this and within its limits, the book may be recommended either to enable one to identify the trees or to ascertain their characteristics. English readers will find that only about half-a-dozen species are the same as those indigenous to this country.

Lake-Country Rambles. By William T. Palmer. Pp viii + 334. (London : Chatto and Windus, 1902.) Price 6s.

MR. PALMER has here collected a series of papers he has from time to time contributed to various magazines. For many years the author has been a rambler in the lake-country, and has learned to love its inhabitants and to study its varied scenes. The essays are good examples of descriptive writing, but the aspects of nature and the incidents of outdoor life are treated rather from the point of view of the general observer than that of the inquiring naturalist.

Junior Arithmetic Examination Papers. Arranged by W. S. Beard. Pp. vi + 106. (London : Methuen and Co., 1902.) Price 1s.

THE ninety examination papers contained in this collection cover all the parts of arithmetic generally studied in schools. The first third of the papers gradually increase in difficulty from paper 1, on the first four rules, to paper 30, on the mensuration of rectangular solids. The remaining papers are made up of mixed questions and are all well graduated. The questions should be useful to teachers.