The maxillary bones, while their processes are increased in length, are moved bodily forward, the rate of growth keeping pace with the increase at the tuberosity. Coincident with development, the modelling of certain parts by superficial absorption is carried on. By this process, the anterior surface of the lower border of the malar process is removed, and thus thrown backward. In the seven-years' specimen, it lies immediately above the anterior third of the first molar; at twenty-one it holds a similar position with respect to the second molar, thus showing a recedence equal to the width of one tooth.

As respects the changes of form and position which the glenoid cavity undergoes during growth, but little need be said. Here we have articular cartilage, beneath which the required amount of bone is slowly developed in the same manner as in the sub-articular cartilage of the lower jaw.

The growth of the alveolar process need not be again referred to.

After the teeth are lost, the upper jaw undergoes great change both in size and in form, not, however, from what is called interstitial absorption, but simply from progressive superficial absorption. The alveolar processes are gradually lost, and the whole bone is reduced in thickness. The pterygoid plates of the sphenoid bone become greatly diminished in size and strength, while the glenoid cavity loses its strongly-pronounced margin, and hence becomes flattened.

Certain forms of irregularity in the conformation of the jaws being closely connected with deviation from the normal arrangement of the teeth, will be considered in connexion with the latter subject.

Irregularity of the Permanent Teeth.—Hitherto the description of the permanent teeth has been confined to their evolution when those general laws which regulate the time of appearance, the position, the form of the individual members, and the implantation of the whole set, have operated without interruption.

The deviations from the normal conditions as respects arrangement, number, form, and the period of eruption, have yet to be considered before we come to the conclusion of that division of the subject which has been placed under the general head of teething. The divisions of this subject will be treated in the order in which they have been enumerated.

But before passing to the consideration in detail of these several irregularities, it will be interesting to inquire into the conditions under which deviations from a normal type occur. In a very considerable number of cases the whole abnormality is caused by purely mechanical agencies, such as the undue retention of temporary teeth, and may be almost regarded as accidental in their origin. The crowns of the teeth in such cases deviate from their normal position far more considerably than their roots, the apices of which will very generally be found to occupy their proper places.

But it is far from uncommon for the alveolar border or even the whole jaw, to be malformed, so that the whole length of the implanted portions of the teeth will participate in the irregularity.

The origin of such malformations must be sought at a period long antecedent to the eruption of the permanent teeth; they are, in fact, often congenital, and traceable to hereditary tendencies.

It must not however be supposed that because an abnormality is slight, and is apparently due to some mechanical cause, it may not have been inherited.

There is no lack of evidence to prove that variations in the position or number of teeth which might at first sight seem accidental are transmitted from parents to children; of this Dr. M'Quillen gives some striking examples.(1) Thus, he found the upper lateral incisors biting inside the corresponding lower teeth in a gentleman, and in three out of four of his children; the fourth child had not cut these

(1) Dental Cosmos, vol. xii., p. 75, et seq.

teeth at the time when the observation was made. In another family a gentleman, his son, and his grandson alike never had any lateral incisors in the upper jaw; a second son of the same gentleman had them exceedingly dwarfed, and in some of his children these dwarfed lateral incisors had been so unsightly as to lead to the teeth being extracted and artificial substitutes put in their place. In a later number (1) of the same journal a family is mentioned as well known to American dentists, in whom no permanent teeth at all are found.

An instance of the congenital absence of bicuspid teeth is given by Mr. Heath, (2) and in my own practice I have lately met with an example of the absence of the left upper lateral incisor in three sisters; on the right side these teeth are present.

Irregularities apparently most trivial may be, in fact, congenital: thus I have lately seen an instance in which, although there is no crowding in the jaw sufficient to account for it, the right upper central incisor is to a slight extent twisted on its axis, and lies a little behind its fellow tooth: precisely the same irregularity exists in the father of the child, and will apparently be repeated in another child, in whom the tooth is as yet only partially erupted. A case is quoted by Mr. Sedgwick in which, *during both dentitions*, a double tooth took the place of the left lateral incisor, this peculiarity being inherited from a paternal grandfather. (3)

Numerous other examples might be collected, but the foregoing will sufficiently serve to illustrate that strong tendency to hereditary transmission of peculiarities which is found to exist, and to serve to cause dental irregularities.

Correlations of growth are found to exist between parts of the organism, which, so far as we know at present, have little or nothing to do with one another; but in other

(1) Dental Cosmos, vol. xiii., p. 123.
(2) Injuries and Diseases of the Jaws, p. 185.
(3) British and Foreign Medico-Chirurg. Review, April, 1863.

examples of this concomitant variation some homological relation can be traced between the varying organs. Such is the case with hair and teeth, which in their origin are closely similar, and which only become strongly differentiated in their after development.

For example, the hairless, naked Turkish dog is extremely deficient in its teeth, often having none except one molar on each side, and perhaps one or two imperfect incisors; (1) and the same fact has been observed in a hairless terrier. Inherited baldness has been found associated with inherited deficiency of the teeth, and it is stated by Mr. Sedgwick (2) that in rare cases where the hair has been renewed in old age this has usually been accompanied by a renewal of the teeth.

Mr. Craufurd, as quoted by Mr. Darwin, states that at the Burmese Court there was a man covered with straight silky hair, which on the spine and shoulders was as much as five inches in length. He had no molar teeth, and the incisors were very small; his daughter inherited the peculiarity of a hairy skin, her face, even including the nose, being covered with silky hair, and, like her father, she had neither molar nor bicuspid teeth.

These hairy persons did not present any marked peculiarity at birth, save that there was a little hair about the ears, whence it spread all over the body; and it is a significant fact that there was nothing abnormal in their milk dentition. In the case of Julia Pastrana, rendered famous by the exhibition of her stuffed skin after her death, the forehead and the chin were densely covered with hair, and there were so many supernumerary teeth in the mouth that the appearance of a double row of teeth in each jaw was presented.

It is remarked by Mr. Darwin (3) that those orders of the

(1) Darwin, Animals and Plants under Domestication, vol. i., p. 34.
(2) British and Foreign Medico-Chirurg. Review, April, 1863.
(3) Animals and Plants under Domestication, p. 328.