On irregular and defective tooth development / by Henry Moon.

On Irregular and Defective Tooth Development.

By Henry Moon.

Mr. President and Gentlemen,

The subject that comes before us this evening has received attention from such able investigators that it has become difficult to say anything new about it that is also true. On this account I should have brought under the notice of this Society, through "Casual Communications," some interesting specimens that I have here, had it not seemed to me that, though a paper might contain no novelties, yet, by inviting discussion, and perhaps by leading to concerted observation among us, it might serve to more clearly establish some truths, and clear up some doubtful points in Odontology.

Under the title of "Irregular and Defective Tooth-formation" I propose to consider two classes of cases, each of practical interest from a surgical or medical point of view. Under the one class I will range and glance at those cases in which excessive or erratic development has resulted in either the formation of supernumerary teeth, or in the abnormal developments known as Odontomes; and under the second class those vagaries of tooth-formation which result in deficient size,

or defective form, of any of the normal series of teeth.

It has appeared to me that these dental irregularities of excess and defect might have light thrown on them by being considered together with what may be called the normal architecture of the teeth.

The fact that the crowns of human teeth are formed around a single dentinal system, seems to have prevented the full recognition of this, I believe, other fact, viz., that the variety of form in the several classes of teeth (fitting them for the office which they have respectively to perform) is due to a multiplication and modification of a simple and elementary tooth-form. These elementary forms appear to *re-assert their autonomy* under disturbed conditions of development. One of these denticles is shown to us separate in the most common and simple supernumeraries, consisting of conical crown and tap-root. (Pl. IV., figs. 1 and 1A.)

Viewing the labial surface of unworn well-formed upper front teeth in man, we see in the Incisor,—by the three tubercles on its cutting edge, and sometimes by two vertical lines or slight depressions on its face,—that three lobes or columns of equal size go to build it up; while on looking at the Canine we see the central lobe of its labial surface magnified, while the side

ones are reduced. On the lingual surface of the incisors sometimes a central cusp, sometimes two side cusps, are more pronounced.

The form of the bicuspid shows the more even development of the lobes on its buccal and lingual aspects, while the molars (speaking very broadly) duplicate the pre-molars.

I might point to comparative dental anatomy to support the theory of a tendency to the separate development of denticles before they blend, *e.g.*, to the distinct plates in the molars of the capybara —to the molars of the elephant, with its transverse plates of dentine (which are probably each built up of many denticles, giving to it, by their conical points, its mamillated character), and which plates remain distinct for a time, but unite to form a common pulp-cavity; and also to the molar of the mastadon, transitional as this is in character, towards the elephant's molar, as pointed out by Mr. Charles Tomes, in his recent work on "Dental Anatomy." However, confining our attention to human teeth, the cases which we shall consider will, I think, show that the prominent points of the dentinal pulp first to be capped with dentine are liable to individual modifications as to form; while the fact that partially distinct denticles sometimes group themselves as the lobes are seen to be arranged in a normal tooth, gives a significance to such arrangement, and, at the same time,

points to a source of derivation for denticles which are developed separately. A fact which I observed a week or two ago will enable any one to easily satisfy himself as to the architectural nature of the incisor.

In the case of patients who possess transparent enamel, it will be found easy to see by transmitted light the outline of the dentine within. In some cases (and in the first case I noticed it was strikingly marked) the dentine of ivory-like colour showed through the pearl-like enamel in three separate circular-topped columns, which remained distinct for some little distance; in a second case, where, in place of the central tubercle of enamel, two smaller tubercles were present, I could distinctly see the corresponding division in the points of dentine. In others, the cutting edge of dentine presented an unserrated line. Individual denticles vary greatly in size, and under unusual conditions of growth would naturally be particularly prone to erratic development. To these causes I should be inclined to refer the eccentricities in form of supernumerary teeth, and of some odontomes.

A remarkable case, reported and figured in Tomes's "Dental Surgery," tends, I think, strongly to support the view I have advanced. A cyst containing twenty-eight or more separate dental formations (some of which were single denticles, while others consisted of an aggre-

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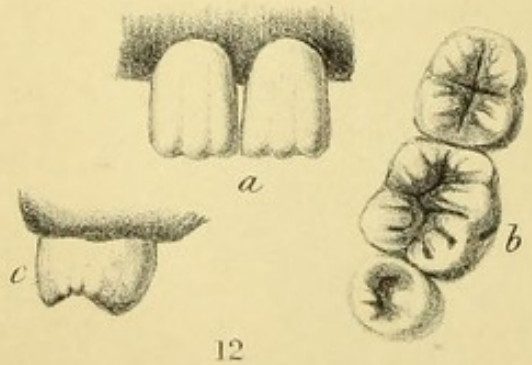

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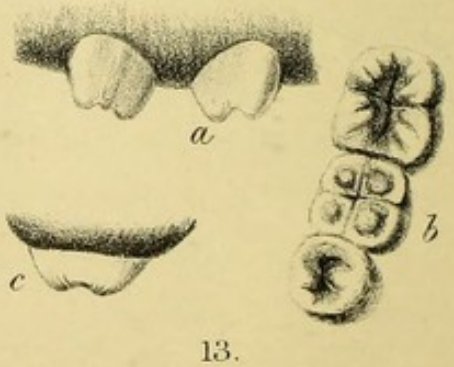

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PLATE IV.

Represents specimens referred to in accompanying Paper.

Figs. 1 and 1a. Separate Denticles of the simplest form.

Figs. 2, 3, and 4. Denticles united with teeth.

Fig. 5. Two Supernumeraries of bicuspid form in complete union with a lower wisdom-tooth.

Fig. 6. A two-cusped Supernumerary, blending at one point with a molar.

Fig. 7. Lingual surface of a so-called cubic tooth.

Fig. 7A. A T-shaped temporary Incisor, viewed from its cutting edge.

Figs. 8 and 9. Two specimens from the same mouth, consisting of irregularly bundled-together denticles, which held the place of upper incisors. In Fig. 9 the root expands into a radicular odontome.

Fig. 10. Radicular Odontome of simplest form, resulting from hypertrophied dilated condition of root. The position held by this tooth in the mouth is shown in fig. 1, Plate V.

Figs. 11 and 11a. Two Odontomes, which were the representatives of an absent lateral incisor and a canine, and gave rise to two distinct dentigerous cysts.

Figs. 12 and 13. A slightly diagramatic representation of the differences between normally-formed teeth and those that are malformed through inherited syphilis: *a*, upper incisors; *b*, first lower molar; *c*, first upper molar, viewed from mesial aspect.

gation of these elementary forms) occupied the place of the absent canine, bicuspid, and molar. Some specimens of erratic and excessive dental development I have had here figured (Pl. IV.), that I may direct your attention to them *seriatim* as illustrations of my remarks.

As, however, I find that my paper would extend to most inordinate length if I entered on the discussion of these specimens generally, I will only refer to those that bear on the question of individual denticular development, and leave the consideration of odontomes for another occasion, which I hope may be provided by my friend, Mr. Charles Tomes, giving us the results of his investigations into the nature of a radicular odontome, of which he has recently made a section.

In Plate IV. Fig. 1 represents the simplest and common form of supernumerary ; in fact, a denticle or most elementary tooth-formation. The enamel in such a conical tooth ceases all round the neck at an equal distance from the apex of the crown ; in other words, by a line free from undulations.

Fig. 1A is a smaller denticle of the simplest form.

Fig. 2 (taken from Specimen No. 374 in the museum of the Society) shows an enamel nodule attached to a molar at the point corresponding to the bifurcation of its roots. Mr. Salter has ranked such a nodule among odontomes, and has

shown that it consists of enamel thickly capping a cone of dentine, and is, in reality, a submerged cusp, which to my mind means a denticle developed in an unusual situation, perhaps to be explained by the mutual attraction which enamel and dentine seem to have for one another.

Fig. 3 represents another specimen from the museum (No. 373). In this, apparently, a large cusp of a supernumerary tooth is attached to a molar, at the neck of the latter. The frequency of the occurrence of this junction at the neck of the tooth, or at the bifurcation of the roots, suggests that a cessation of the tooth-sac, as such, at this point, has something to do with such localization.

Fig. 4, also taken from a specimen in the museum, shows a small supernumerary tooth or denticle attached to, and doubtless blended with, a molar.

This gemination of teeth involves a commingling of the dentine of the united teeth; and, looking at this specimen, at the two last-mentioned, and at the next to be noticed, it seems hard to draw a line between them, and to say one is an odontome and the others are geminated teeth: the same remarks may possibly apply to some of the projecting masses which have been called coronary odontomes.

Fig. 5 represents a lower wisdom, with two supernumerary teeth of true bicuspid form blended

with it. It was extracted under chloroform by me, at Guy's, from a man who was suffering from chronic spasm of the masseter, and from local suppurative inflammation set up by this triplet's presence, and its ineffectual attempts at complete eruption. This man had the largest teeth I have ever seen; he was not particularly hirsute. The specimen tells its own formative history.

Fig. 6 shows a two-cusped supernumerary that blends with the lower part of the crown of an upper molar, and then, bending on itself, develops its root in a bold outward curve. Instances of the development and perfect blending of an extra half-cusp on the buccal and lingual surfaces of upper molars are familiar to us all, and also, probably, the flattened form of the small separated Supernumerary sometimes found in these positions. (Specimens shown.) Supplemental teeth, undistinguishable from the normal incisors and canines, are, as we know, developed in the front of the mouth sometimes, and a pair of teeth, called cubic, occasionally behind the incisors.

Fig. 7.—The characteristic difference of these so-called cubic teeth from the normal incisors is seen to be a flattening of the labial surface, together with the greater vertical development of the lingual lobes, approximating the masticatory surface to that of a bicuspid; and, remarkably

enough, we sometimes find in them a greater development of the central lingual denticle or cusp, and sometimes of the two lateral ones; thus increasing the likeness, in the one case, to a first, and in the other, to a second lower premolar. The breaking up of these teeth into their elementary forms may account for the numerous separate supernumeraries of simpler form occasionally met with in the incisive region. (Model shown of a case.)

Fig. 7a.—A temporary tooth extracted by myself, showing the T form noticed by Mr. Tomes in writing of the various forms that supernumeraries take, its peculiar form being the result of the abnormal development of its lingual central cusp.

Figs. 8 and 9 are from specimens kindly lent me by my friend Mr. Pedley, of Guy's. They were extracted by Mr. Pedley, senior, and held the place of upper central incisors. The separate denticles forming the crown are in both specimens bundled together without any traceable order, and in one specimen the compound root has spread out into a radicular odontome.

Fig. 10 represents in vertical section a radicular odontome of the simplest kind, produced by a general axial dilatation of the pulp of the root. This case, I believe a unique one, is exactly described by the name of "hypertrophied dilated tooth-fang." An uncalcified pulp occupied the

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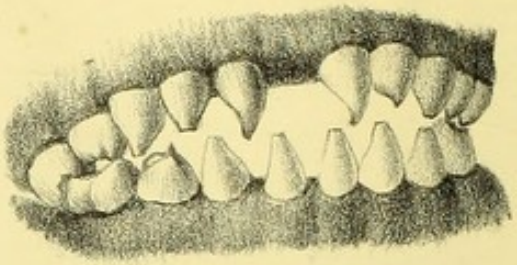

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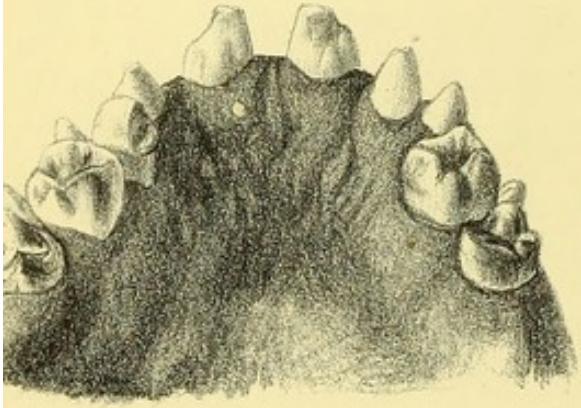

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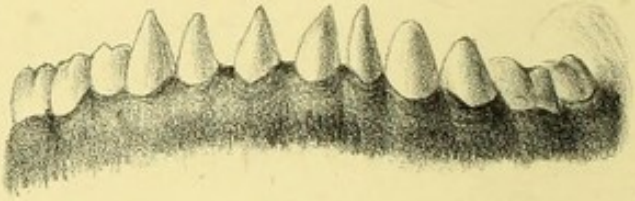

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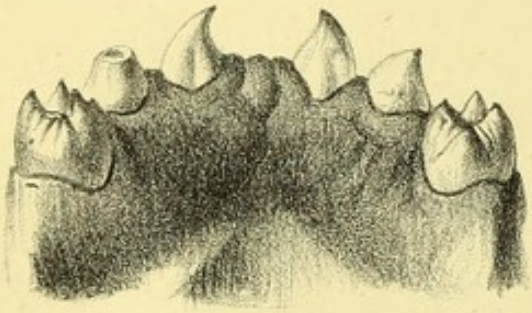

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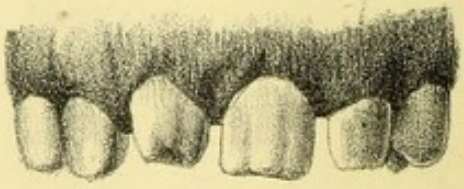

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PLATE V.

Representing cases referred to in accompanying Paper.

Fig. 1 Shows tumour produced by the hypertrophied dilated tooth-root, shown in fig. 11, Plate IV. The central incisors have crowns of slightly-marked syphilitic form.

Fig. 2 Represents the teeth of E. W., æt. 11.

Figs. 3 and 3a Represent the teeth of R. W., æt. 15; sharp points have been filed off the upper central incisors, and the temporary molars are being succeeded by single-cusped pre-molars.

Fig. 4 Represents the teeth of Thomas B. at the age of nine. A possibility of syphilitic history is attached to this case.

Fig. 5 Represents the upper teeth of C. L. S., æt. 16, and shows one central incisor of perfect form, and the other of typical syphilitic shape. See Paper with reference to teeth of other members of family.

largely-expanded pulp-chamber, which terminated in a very large foramen, protected by a cowl-like projection. The case has been reported by Mr. Salter in the Guy's Hospital Reports for 1876, and I will only very briefly touch on its main features. The Boy, æt. 11, from whose mouth the tooth was removed, came into Guy's under the care of Mr. Bryant. He had for about three years noticed a swelling in the front of the upper jaw, but had suffered no pain from it. The tumour figured in Plate V., fig. 1, was red, soft, and had a slight tendency to bleed. It looked like an epulis; the downward projection of the left central incisor and its separation from the lateral, being however, marked features. The form of the crown of the central incisor led me to suspect inherited syphilis; and though no history of it could be obtained from the parents, and the boy presented no other sign, his elder sister had become deaf, and had suffered in sight from inflammation of syphilitic origin.

Before leaving this part of our subject, I would say that perhaps some light may be thrown upon the formation and direction of normal tooth-roots by the theory of tooth architecture advanced, while the singleness of the roots of compound supernumeraries may be partly explained by the fact that they are intruders in the jaw, and, consequently, have stinted accommodation for their implantation.

Figs. 11 and 11a.—The tendency of the dentine and its pulp to break up into smaller dentinal systems under disturbed conditions of development may help to explain also the structure of coronary odontomes. The two small odontomes here figured, represent a lateral incisor and a canine, and gave rise to two distinct dentigerous cysts. They were extracted by Mr. Cooper Forster, at Guy's, from the mouth of a girl æt. 13, and were found by Mr. Salter to consist of enamel dipping down between dentine, as figured by Heider & Wedl in their Atlas.

We now pass to the consideration of some cases in which the teeth present great peculiarity of form, produced by a remarkable development of the central cusp or denticle, and a diminution or suppression of the others.

At the end of last year, my friend Mr. Bell (our late house-surgeon at the Dental Hospital) brought to my notice the case of the child Emma W., æt. 11, a model of whose teeth, taken at that time by Mr. Bell, I hand to you. This child, one of eleven, is of fair complexion; her hair short, fine, and scanty, used to come out. Her eyes, of grey colour, are remarkably small, and the sight of the left eye has been defective from birth. Mr. Hutchinson, who has kindly examined her eyes, will, I hope, tell us what defect he found in them. These more recent

models, taken after the lapse of several months (Pl. V., fig. 2), show an elongation of the central incisors, making their hooked character more apparent. Being informed that the eldest sister of this child had also peculiar teeth, I paid a visit to her mother's house at Harrow, and the following are some of the facts in the family history :— The father, at the age of 36, died last year, it is supposed of consumption. The mother, a tall, good-looking woman, whose remaining teeth (she has lost a good many) show no peculiarity, believes that her late husband's incisor teeth were pointed, and that he only had two upper incisors. Of the eleven children, two have recently died, apparently from phthisis.

The eldest of the family, Ruth W., æt. 15, a well-grown, rather good-looking girl, bears in general features a strong likeness to her sister Emma; her complexion is fair; the hair on the scalp is short and rather scanty, but very fine fair hairs are developed on temples and cheeks in more than usual number. Her eyes, of grey colour, used to become bloodshot. The models of her teeth are here (see figs. 3 and 3A, Pl. V.). She has only changed one lower tooth, an incisor. It will be noticed also that the temporary molars are being succeeded by pre-molars in form of a simple (curved) cone. Her central upper incisors had the middle cusp considerably pro-

longed, but just before my seeing her, she had filed it down to a level with the one on the mesial side.

Great dissimilarity exists among the children of this family. The eldest boy, who takes after his mother, is a dark, handsome lad, with a remarkably well-developed set of teeth.

Another sister, Alice, æt. 10, a very small child for her age, is not so fair as, and does not strongly resemble, her elder sisters. As will be seen in this model (model shown) her upper permanent central incisors are slightly abnormal, the central tubercle being represented by two small tubercles, which project beyond the level of the lateral ones. Her temporary upper incisors were pointed; her left eye (the lids, I am not sure about the pupil) is at least a third smaller than the right one, which is small also; her eyes are weak.

On seeing the teeth of these children I was struck with their similarity to those of a boy whom I had seen, between six and seven years ago, at the Islington Dispensary. This is the model of his upper jaw, taken by my friend Mr. Scully, and the following were my notes taken at the time:—

"Thomas B., æt. two years and nine months, an undersized child. Is he the subject of constitutional syphilis? Is hydrocephalic. Fontanelles but just closed. Hair absent for first year. Cut incisors at ten months of age, and molars appeared

six weeks back. No teeth or signs of them in lower jaw. *Family History* :—Mother has been married five or six years. Had first child ten months after marriage. It had the same constitutional taint, was hydrocephalic, and died at sixteen months of age, without teeth."

I have lately succeeded in finding this boy again, and the further facts obtained relative to him and his family are of interest.

Thomas B. had no toe or finger nails at birth. In infancy had snuffles (?), or sniffed in the same way as at present, and was sometimes nearly suffocated. When nine months old he had eczema (?) on scalp, and abscesses at back of head. He has twitchings of facial muscles, and has been threatened with chorea. Mother and neighbours say that he suffers intensely from hot weather, that he does not perspire (another canine characteristic), and that the veins stand out on the temples of his hydrocephalic head alarmingly. He has now on scalp more hair of light chestnut colour, but it is still scanty. No eyebrows, very small eyelashes, and small eyes. (A hard growth— nodular —the size of a small cherry, is to be felt at the junction of one of his ribs with its cartilage.) He is now nine years and two months old, and is small for his age. As will be seen by these models (models shown), he has cut four temporary canines, has changed his upper central incisors for two

longer, and yet more recurved and pointed teeth, and his only two molars, which are upper temporary ones, have their more prominent cusps long, pointed, and hooked. (See fig. 4, Pl. V.)

Family History:—The father is said to be a healthy man, and to have good teeth. The mother, a small pale woman, with dark brown hair, has her left upper lateral incisor somewhat peculiarly shaped, and conical, has never had right upper lateral; she says, to all appearance truthfully, that she has never had first lower molars, no second bicuspids in either jaw, nor wisdom teeth.

The next child to Thomas, a pretty, dark little girl of eight, has conical lower central incisors, while her one erupted permanent upper central incisor is normal in shape, but has the three tubercles on its cutting edge particularly strongly marked. The next child, a boy, died at sixteen months, and was said to have teeth and hair normal. The next, a boy, was stillborn. The next, a girl, eighteen months old, has teeth normal, and hair curly and plentiful.

In the cases just related, the peculiarity of tooth-form appears referable to a lowered degree in the scale of development, which is shared in by the other dermal appendages. If further investigations as to the cause of these malformations in the case of Thomas B. go to show that they are not in any way due to syphilis, a note-

worthy fact appears for diagnostic purposes; for, in comparing these teeth with such as are more or less pointed through inherited syphilis, it is seen that in the teeth we have been considering the central cusps of the incisors and the prominent cusps of the molars are more pronounced than usual, while in the syphilitic tooth (about to be noticed) we find the exactly opposite condition to prevail.

We now pass to the consideration of the peculiarity in the form of the teeth which is indicative of inherited syphilis, and also to the consideration of the causes which induce the honeycombed condition of tooth-enamel.

It is now about twenty years since Mr. Hutchinson (in papers read before the Pathological Society and before this Society) published his views on the influence exerted by inherited syphilis upon the teeth. Knowing how many able men, who certainly are not accustomed to accept theories in pathology without investigating them, consider Mr. Hutchinson's views, in the main, as established beyond cavil, it was with considerable surprise that I read last year, in a report of a discussion which took place elsewhere (under your presidentship, Sir), that several gentlemen expressed doubts as to the diagnostic value of the tooth-malformation in question. My observations on this subject extend over some twelve years, and include some hundred cases; and although in

some details as to the manner of causation I may differ from the view published by Mr. Hutchinson (before knowledge on tooth-development was advanced as it is at present), yet I must coincide entirely with his general conclusions, and greatly admire the manner in which they were formed from carefully accumulated evidence, gathered, as few could gather it, from exact knowledge of special branches of surgery.

Mr. Coleman, who worked with Mr. Hutchinson in his original investigations, and who, from his connection with a large hospital, has had abundant opportunities of verifying his original opinions, said, on the occasion referred to, that he believed these peculiarly-formed teeth were almost invariably connected with syphilis, "though he fancied he had seen one or two exceptions, viz., in families where the elder children presented no symptoms of the disease at all, whilst the third or fourth child showed the typical teeth, and those subsequently born presented no sign of specific disease." With regard to these doubts, it might be that the elder children were born before their parent contracted syphilis, and that before the birth of the younger ones the disease had expended itself, or, at all events, was in abeyance.

The following instructive case bearing on this point was met with by me at Guy's. These models of it (see fig. 5, Pl. V.) show one upper central incisor to be perfectly well-formed, the

other to be a typical syphilitic tooth; the first molars to be characteristically affected, and the lower incisors narrowed, and showing evidence of obliterated notching. The notes of the case, taken at the time, are as follow:—

"Charles L. S., æt. 16; white, pasty complexion; depressed bridge of nose, had snuffles in infancy, corneitis five months ago. *Family history*:—Six brothers and sisters; next brother, æt. 14, has same complexion as Charles, has no bridge to nose, and suffers from headaches, for which he is attending at Guy's. His teeth are perfect in form. The next brother, æt. 11, has marked syphilitic teeth."

In the discussion alluded to, one surgeon—a high authority on syphilis—is reported to have used words to the effect, that because syphilis produced many symptoms that were also produced by other causes, therefore teeth showing this particular defect could not be held as diagnostic of syphilis.

Now the question really is this—Is there one peculiar conformation of the teeth due to inherited syphilis and not produced by any other cause? The evidence in favour of an affirmative answer to this question appears to me so strong that I think the onus of disproof rests with the sceptics. A doubt as to the diagnostic value of these teeth can only be raised by the bringing forward of cases, or the models of cases (showing the typical syphilitic teeth), accompanied by

conclusive evidence of the non-inheritance of syphilis.

I believe that, to a great extent, the doubts which exist on the subject are due to a vagueness of knowledge as to what typical syphilitic teeth are like, and to their being confused with teeth which simply show a defect in enamel, whether produced by mercury or otherwise.

A grave responsibility rests with any one who acts on a half-knowledge in this matter, as mistrust may be unjustifiably sown in families by unwarrantable inquiries; and patients likewise may benefit or suffer in proportion to the thorough knowledge of it possessed by their medical adviser.

A careful study of the plates Mr. Hutchinson has published, or the study of the mouths of patients who have undoubtedly inherited syphilis, will, I believe, establish the following facts, viz.:— That syphilitic teeth are seen in their most typical form, when they have been developed free from the influence of mercury; that in such teeth, the enamel to all appearance is evenly developed over the dentine (in a great many cases it may be less thick than normal over the point of the central lobe in the incisor and absent from a limited area on the masticatory surface of the first molars, but I am not sure mercury has not been administered in such cases). Where the enamel is evenly developed, the tooth is not affected as to colour. As originally observed by Mr. Coleman, the

affected teeth are almost invariably dwarfed, the distal edges of the upper central incisors are turned outwards, and in the front of the mouth the alveolar portion of the upper jaw is deficient in vertical development.

When the upper incisors are of typical form, I believe it is exceedingly rare for the lower incisors to be altogether unaffected, and the first permanent molars are exceedingly prone to be smaller and more dome-shaped than usual (Compare figs. 12 and 13 in Pl. IV.). My impression is, that it will be found that syphilis acquired shortly after birth may confer on the teeth that are later formed than the incisors a characteristic form, while the incisors escape, and that thus the deformity is not necessarily due to heredity.

A remarkably interesting case that my friend Mr. Ackery has taken models and notes of may throw light on this question.

I have not made a section of a well-marked typical syphilitic front tooth, not having met with one that I felt justified in extracting ; but, judging from their external form only, I believe their peculiar shape results from a stunted development of the first-formed portion of dentine,—in other words, a dwarfing of the cusps ; and that the single central notch on their cutting edge is due to a greater diminution in the size of the central lobe than in that of the lateral lobes.

The lesser width of the first-formed part of the

crown, as compared with the later-formed portion, the most distinctive feature of these teeth, is explainable in the same manner.

Two years back Mr. Hutchinson read a paper at the Pathological Society, on "Lamellar Cataract and Imperfect Teeth," and expressed the opinion that the honeycombed condition of the teeth was, in a large number of cases, produced by the administration of mercury in infancy. My observations on the subject did not lead me to the same conclusions until I found that Stedman's powders contained calomel. When I became aware of that fact, the cases I have noticed, both in private and hospital practice, lead me to agree with Mr. Hutchinson that in a large number of cases, mercury (in some form or other) administered in infancy, is the cause of this faulty development of the enamel of the teeth.

Mercury may be a necessary medicine for a child when suffering from some complaints; but it is certainly desirable that the effect it may exert on the teeth should be recognized by us and by the public, if Mr. Hutchinson's views, with which I quite coincide, are borne out by further observation. To, unnecessarily, give teething powders which may ruin the teeth is certainly not desirable.

Various opinions are held as to the cause of this enamel defect. Some regard it simply as a manifestation of depressed nutrition of the

general system at the time of tooth-formation, whether such condition be due to scrofula, or to the exanthemata, or any severe illness. Thrush in infancy is also considered a sufficient cause for its production.

Mr. Bridgeman last year started the theory, founded on the observation of one case, that honeycombing was due to an electro-chemical action on the teeth as they erupted. His views were discussed and answered at the Odonto-Chirurgical Society at Edinburgh.

As my paper has extended to a length much greater than I intended, I will conclude it by saying that it appears to me that syphilis, in its misshapement of the teeth acts, by disturbing the vascular supply of the pulp (and possibly also of the dental sac, as these structures derive their vessels from below), and that mercury expends its harmful force on the enamel, which may derive its nutrition partially from above, from vessels (as I understand Mr. Charles Tomes to say) common to it and to the gum; and that mercury, while it may prevent the development of the syphilitic type of tooth, may in its place produce the defect in enamel-formation.

Gentlemen,—Before taking my seat I must express regret for the crude form in which my ideas have been brought before you. I trust that the discussion which will follow, will more than make up for the shortcomings of the paper read.