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CONGENITAL MALFORMATIONS

OF THE

LOWER JAW.

BY

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CONSTITUTIONAL MEDICINE

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THE subject of Congenital Malformations of the Lower Jaw has hitherto attracted but little attention. A few isolated cases are to be found here and there in medical books and magazines, and one or two imperfect attempts to collate them and bring the matter into a definite shape exist, chiefly in foreign literature. The difficulties inherent in the subject are twofold. In the first place, cases of these malformations are very rare, forming a marked contrast in this respect to those of the upper jaw, so fully studied and so usual in the experience of every surgeon; and, in the second place, the cases which have been put on record by no means harmonise, at first sight, among themselves, and have even been deemed capable of very different explanations.

The following attempt to bring what is known of these malformations in a connected form before the profession, has been dictated, not by the expectation of clearing off all the obscurity of the subject, but by a desire to lay before English readers in a form sufficiently complete for use, the scattered records which exist, and to claim for the subject

the attention it deserves. Its imperfections will be forgiven by those who know the difficulties besetting a provincial practitioner in his attempts to obtain the complete literature of any medical question.

The immunity of the lower jaw from deformity, already alluded to, seems to be as marked a feature in its later as in its earlier stages of development. It is found that irregular position of the teeth (a mere mechanical accident), and the formation of tumours,* are equally common in both jaws; but what may be called vital processes, such as the malformations of congenital syphilis, and the deformities specially connected with mental development,† are most marked and most frequent in the upper jaw.

The congenital malformations, which are alone treated of here, exist in various forms and degrees.

I.—NON-DEVELOPMENT OF THE INFERIOR MAXILLA

has never been recorded in man, except where the cranium was at the same time deficient, but it has occasionally been noticed in the lower animals, as in the following instances. Vrolik‡ depicts the head and skull of a new-born rabbit, the subject of cyclopia, though with two eyeballs, where there existed no trace of a mouth. A single optic nerve supplied a branch to each eyeball. A small fleshy tubercle took the place of the tongue. There were no traces of an inferior maxilla, although the zygomatic apophyses of the temporal bones were present. The zygomatic arches were absent. The hyoid bone, larynx, trachea, and œsophagus were normal.

Also,§ the head of a new-born sow with cyclopia and absence of the inferior maxilla. The eyes were sufficiently apart for the snout to be situated between and above

* Otto Weber. *Krankheiten des Gesichts* (Pitha and Billroth's Surgery), page 261; and Magitôt, *Kystes des Mâchoires*. *Arch. Gén. de Méd.*, April, 1873.

† Langdon Down. *Relation of Teeth and Mouth to Mental Development*; *Transactions of Odontological Society*, Nov. 6, 1871.

‡ Vrolik. *Tabulæ ad Illustrandam Embryogenes in Hominis et Mammalium*, 1849. Tab. lviii. Figs. 1-5.

§ Vrolik, *Op. Cit.*, Tab. lviii., Fig. 6.

them. The upper lip ended in a long point partly supported by the upper jaw. Beneath this was the aperture of the mouth, directed backwards. The ears were natural in position.

And,* the skull and encephalon of a new-born sow with cyclopia and absence of the inferior maxilla. The two eyeballs were fused into one. There were four eyelids, and a proboscis above the eye, but no trace of a mouth. The tongue and hypoglossal nerve were wanting, but the larynx and oesophagus were normal.

Vrolik also,† quoting from Otto, Tab. III., fig 2, gives a drawing of the head of a new-born male lamb, which exhibited cyclopia, absence of the inferior maxilla, and no trace of a mouth. Here the trifacial nerve was small.

Further,‡ the head of a new-born lamb with acrania, cyclopia, and absence of the inferior maxilla, a small cutaneous papilla taking the place of a mouth.

And lastly,§ the head and skull of a lamb where absence of the lower jaw was conjoined with deficiency of the face.

II.—EXCESSIVE DEVELOPMENT OF THE LOWER JAW

has been observed in a few instances, where it appears to have affected both halves equally. The cases are:—

1. Otto|| briefly describes the skeleton of a human hemicephalic monster of the seventh month of pregnancy, which was further affected with spina bifida in the cervical region. The arch of the calvarium was wanting. The base of the skull was present. The roofs of the orbits were short and depressed. The facial bones were prominent. The palate was cleft at its back part between the palate bones, “mandibula maxillam superiorem longitudine multo superat.” All the cervical vertebræ, of which only four existed, and the upper five dorsal vertebræ, were cleft behind, and were

* Vrolik, Op. Cit., Tab. lviii., Figs. 7-10.

† Vrolik, Op. Cit. Tab. lviii., Fig. 11

‡ Vrolik, Op. Cit. Tab. lviii., Figs. 12 and 13.

§ Vrolik, Op. Cit. Tab. lviii., Figs. 14-16.

|| Otto, Monstrorum Sexcentorum Descriptio Anatomica, 1841, p. 36.

partly fused together. The dorsal vertebræ were twelve in number, but the upper ones were small and oblique. The left ribs were normal in number; the right ribs numbered nine, the upper ones being deficient.

2. Otto * describes another case exactly similar, but without the spina bifida.

3. And a third case,† concerning which he simply states, "*Mandibulæ, ut fieri solet, magnæ et prominentis synchondrosis abnormem continet nucleum osseum.*"

It must be admitted that these three cases are far from being a convincing proof of the existence of a congenital preponderance of size of the inferior maxilla. In all of them the increase may not have been absolute, but merely relative; the upper jaw may have been unusually small, and thus have given rise to the apparent magnitude of the lower. They are in the original mere sketches without minute details or plates, and although in the first it is expressly remarked that the facial bones were prominent, the suspicion arises that they may have been similar in their nature to the cases of which I now quote two for the sake of comparison, and where diminution of size or alteration of position of the superior maxilla gave to the lower jaw an apparent magnitude which did not really exist.

(a.) Vrolik‡ gives drawings and descriptions of the heads

* Otto, Op. Cit. Case lix, p. 37.

† Otto, Op. Cit. Case lx., p. 37.

‡ Vrolik, Op. Cit. Tab. liii., Fgs. 1 and 2; and Tab. liii. Figs 8 and 11.

PLATE I.

Fig. 1. Apparent increase of size of the lower jaw from imperfect development of the upper jaw.

(a) Membranous condition of the orbital plate of the frontal bone.

(b) Membrane representing the ethmoidal notch of the frontal bone and the deficient ethmoid bone.

(c) Malar bone.

(d) Zygomatic process of the temporal bone.

(e) Superior maxillary bones imperfectly developed and fused together.

Fig. 2. Apparent increase of size of the lower jaw from imperfect development of the upper jaw. Rudimentary condition of the nasal bones.

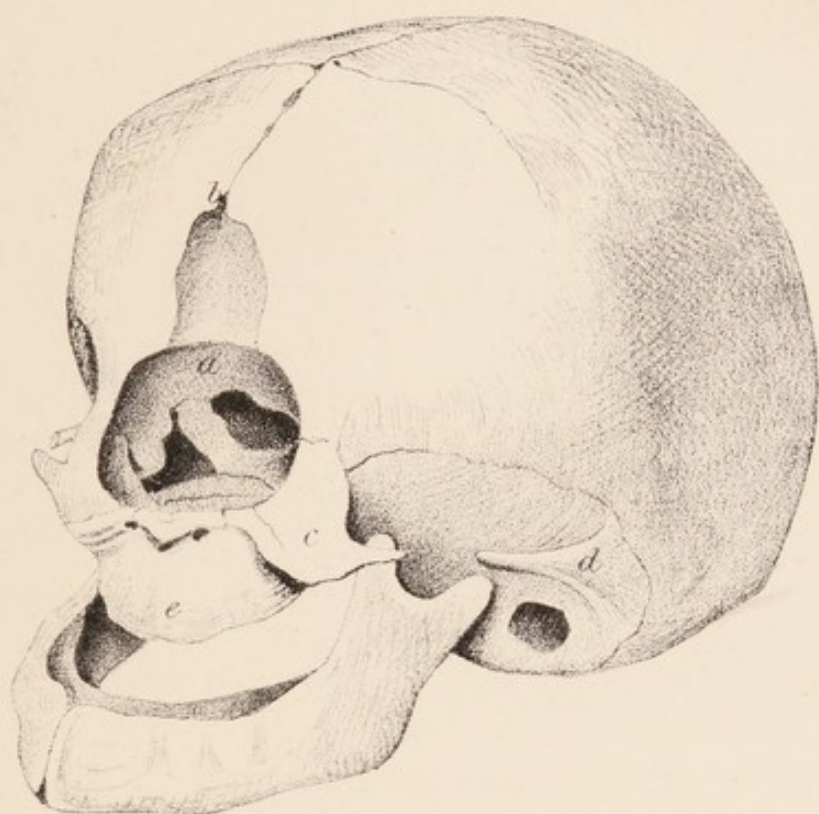


Fig. 1, after Vrolik.

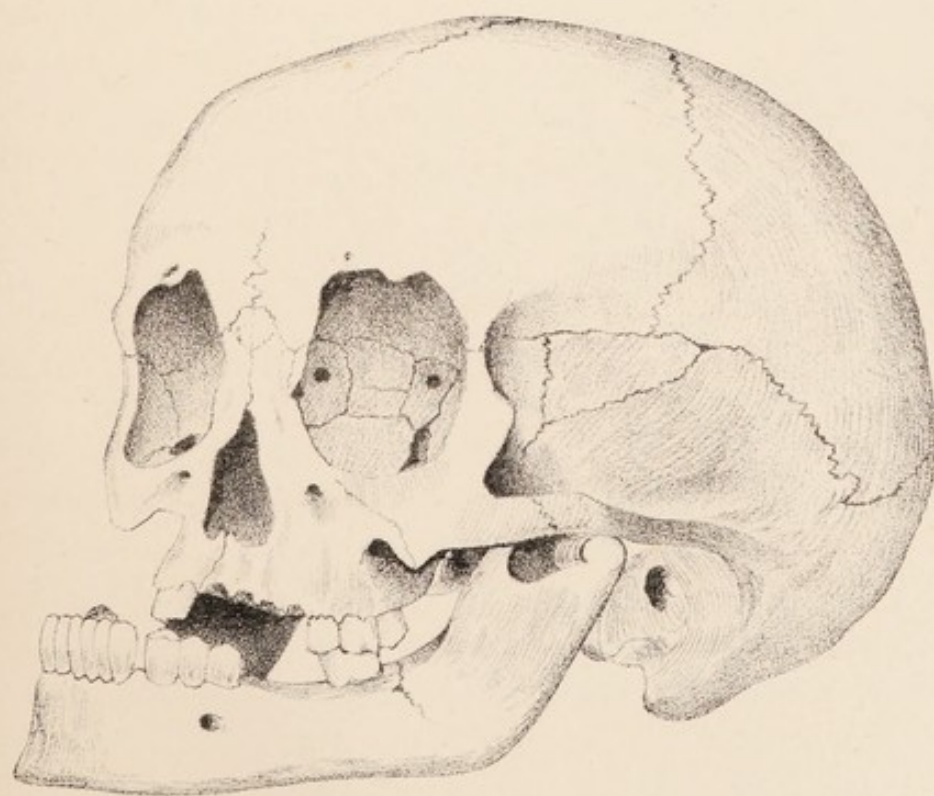


Fig. 2, after Vrolik.



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and skulls of two infants born with cyclopia, where the superior maxillary bones were small, and the inferior maxillæ correspondingly prominent. From his Plate LIII. Fig. 2, I have copied the skull of the former of these, as it is more characteristic than any description (*see Fig. 1*). The orbital part of the frontal bone (*a*) was absent, and replaced by a membrane. The ethmoid bone was absent, and the ethmoidal notch (*b*) of the frontal bone was replaced by a membrane. The zygomatic process of the malar bone (*c*) was not in contact with the zygomatic process (*d*) of the temporal bone. The two superior maxillary bones (*e*) were imperfectly developed and fused into one. The vomer, nasal, and turbinated bones were wanting, "Maxilla inferior valde eminent."

(*b.*) Still more marked is the case* given by the same author, the drawing of which I have reproduced in Fig. 2. Here the lower jaw is much too long for the upper, and has its angle unusually obtuse. The nasal bones are mere rudiments placed between the frontal and superior maxillary and the nasal processes of the latter bones are broad, so as to meet each other in the mesial line, where they are fused together. The bodies of the superior maxillary bones are small, and their alveolar processes appear to contain one molar tooth less than usual, while the inferior maxilla has space for the full complement.

III.—CONGENITAL SMALLNESS OF THE LOWER JAW.

The cases of this on record are more numerous than those of the deformities already discussed, and they have received a larger share of attention, although the views held by the various authors regarding their causation have been unsatisfactory, and even contradictory.

Before passing on to consider more closely the forms in which congenital smallness has been met with, it will be well, as a help towards a better understanding of them, to bear in mind the knowledge we possess regarding the normal development of the inferior maxilla. More light has been

* Vrolik, Op. Cit. Tab. lxi. Fig. 5.

thrown on this by Hüter* than by any other recent author. He has shown that there is little increase of size, between birth and adult development, in the portion bearing the incisor and canine teeth, while the segment bearing the bicuspid and molars is enormously developed in proportion to the rest of the jaw during the like period of time, and this fact has to be kept in mind in the study of congenital smallness, as it is of consequence to observe what relation the jaw bears in each to the number and size of the teeth. Hüter is of opinion that the increase in the number of the molar teeth at the second dentition, is the cause of the increased growth of the molar segment; while the incisor segment, having always the same number of teeth, does not grow in the same ratio. The ingenuity with which he supports his conclusions does not however blind us to the fact, that the lower border of the molar segment, though not influenced by the teeth in any way, grows equally with the upper border, and that the influence of the teeth, if acknowledged as a sufficient cause, would lead us to expect an increased obtuseness of the angle of the jaw, instead of the diminished obtuseness which is observed between infancy and manhood. Hüter attributes the production and growth of the angle of the jaw to the resistance offered to its elongation by the temporal bone at one end, and the muscles and integuments of the chin and lower lip at the other, an explanation similar to that which he has applied to the ribs. But the bend produced in the lower jaw is invariably an angle, not a curve, as such pressure would lead us to expect, and takes place at a definite point, a fact which his hypothesis of increased periosteal activity on the lower, and diminished activity on the upper margin, does not make in the least more intelligible. Of all Hüter's observations, the greater development of the molar than of the incisor portion is the one which chiefly concerns us. Congenital smallness of the lower jaw has been found affecting one or both halves, and these two series of cases will be considered separately.

* Hüter, Virchow's Archiv. Bd. xxix., p. 21.

A.—Congenital Smallness of both halves.

Vrolik* mentions this as occurring in animals, and in the human subject it is said to have been noticed in new-born children by Moschner, Schubarth, and others.† The works of these latter authors are inaccessible to me, but I have collected the following series of cases illustrative of the above deformity, from the works which I have been able to obtain.

1. Otto‡ gives a drawing and description of a seven months' foetus, the subject of hydrancephalocoele, concerning whose maxillæ he remarks,§ "os apertum et eo valde deturpatum est, quod margo superioris maxillæ sex lineas præ margine inferioris maxillæ et mento prominet, ita ut labium superius inferiori non sit impositum sed propositum." From the drawing it seems probable that the inferior maxilla was here of unusually small size.

2. The same author,|| in describing an infant that lived three hours, and possessed supernumerary fingers and toes, remarks "Maxilla inferior paullo brevior est, cæterum normalis," and

3. In describing¶ a monstrous new-born infant with incurved upper extremities, says, "labium superius et maxillæ superioris margo dentalis bene se habent; palatum bene fornicatum atque latum est. Mandibula autem tam brevis et parva est, ut mentum ceteroquin satis rotundatum, limbus alveolaris inferior et lingua nimis retro posita sunt. Itaque maxilla superior præ inferiore dimidium pollicem prominet. * * * nervi hypoglossi, glossopharyngei et rami linguales quinti paris non sunt imminuti, quamvis parva sit lingua. Mandibula brevissima, sed dura et crassa et in synneurosi sua nimis ossificata est; protuberantia ejus mentalis simul est eximia et in acutum quasi marginem desinet." This description leaves no room to doubt that Otto is describing an abnormally small lower jaw, though cases 1 and 2 are so incomplete as to be open to some doubt.

4. Vrolik** reproduces a case described by Von Am-

* Vrolik, Op. Cit., Pl. lix.

† Weber Op. Cit., p. 292.

‡ Otto, Op. Cit., No. lxxiii., Tab. ix., Fig. 3.

§ Otto, Op. Cit., p. 47.

|| Otto, Op. Cit., p. 271.

¶ Otto, Op. Cit., pp. 322-323.

** Vrolik, Op. Cit., Pl. lvii., Fig. 18.

mon * where diminutive size of the mouth and lower jaw coincided (*see Fig. 3*). Both lips were laterally contracted, and too small. At the same time the inferior maxilla was too short, a vice of conformation which was also present in all the sisters of this infant. At first the child could not open the mouth, but prepared sponge was with difficulty introduced into it, and it was at length dilated to such an extent that the child could take the breast. There existed a cleft palate "to an extent remediable by staphyloraphy."

5. A case similar to the above in its nature has come under my own observation, the details being as follows.

The wife of a merchant in Aberdeen gave birth, on the 28th April, 1869, to a female child. She had previously given birth to two perfectly formed children, and has since borne two others, also perfectly formed. Neither she nor her husband was affected with any deformity; they were not related to each other before marriage, and no malformation or mental disease was known to exist, or at any time to have existed, among their relations. At the time of the child's birth nothing unusual was observed about it, until its inability to swallow was observed by the nurse and the physician in attendance. The child could not swallow nourishment either from the spoon or breast, and fluids put into its mouth regurgitated through the nose. The physician in attendance having his attention awakened, had now no difficulty in observing a markedly diminutive size of the lower jaw. An eminent surgeon, whom he called in consultation, confirmed his observation, but discovered nothing else. The child died of starvation on the 1st May, having lived only four days. I was requested to make a post-mortem examination, which I did, in the presence of the medical attendant and of the surgeon who had been called in consultation.

The child was an unusually large female infant, somewhat emaciated, but presenting otherwise nothing notable externally save in the region of the lower jaw. This bone was disproportionally small. The upper lip was more in front of

* Von Ammon, Angeborene chirurgische Krankheiten. Taf. iv., Fig. 15.

the lower lip than usual, and in the central line the margin of the upper gum was a considerable distance in front of the margin of the lower gum. The lips were well formed, and the tongue was natural in size and position. There was no hare-lip, but both hard and soft palates were wanting, and the vomer ended inferiorly in a rounded margin continuous in front with the alveolar process of the upper jaw. On either side of the vomer the absence of the palate afforded a free view of the three turbinated bones and meatuses of the nose. The nasal cavity thus exposed was normal, except in so far as the absence of the palate deprived it of its floor, and allowed the freest communication with the mouth, the two forming but one single cavity. No other abnormal development was remarked in the child.

After preparation of the inferior maxilla its condition was found as follows: Its two halves were still ununited, save by a cartilaginous seam, in which a centre of ossification existed in the form of a perpendicular plate, extending from the lower border of the symphysis upwards for two-thirds of its vertical measurement. Each half contained the full number of tooth sockets present in the normal infantile jaw. The whole bone was well formed, well proportioned in its several parts, and quite symmetrical, but unusually small. Its measurements were considerably less than those given as normal by Hüter.* I give them in the decimal system for contrast with his figures:—

	Centimetres.	Centimetres.
From angle to symphysis, external measurement ($1\frac{3}{8}$ in.),	3.4	instead of 4.0
Length of the lower border of the bone from angle to angle, external measurement ($2\frac{1}{6}$ in.),	6.8	„ 8.0
From the angle to a line passing perpendicularly downwards from the posterior part of the condyle, the bone resting on its horizontal rami ($\frac{1}{2}$ in.),	1.3	„ 1.5
From angle to condyle, external measurement ($\frac{5}{8}$ in.),	1.6	„ 1.8
From one canine angle to the other, external measurement ($1\frac{3}{8}$ in.),	2.1	„ 2.5
From canine angle to root of coronoid process, do. ($\frac{3}{4}$ in.),	1.8	„ 2.2
From front of symphysis to middle of a line joining the angles ($1\frac{5}{8}$ in.),	2.4	
From front of symphysis to middle of a line joining the back parts of both condyles ($1\frac{3}{8}$ in.),	3.5	
From condyle to condyle, external measurement ($2\frac{1}{4}$ in.),	5.7	
From angle to angle, external measurement (2 in.),	5.1	

* Hüter, Op. Cit.

All the other parts of the child were well formed, no want of symmetry of the cranium was observed, although this was not especially looked for.

In all the above cases the diminutive size of the lower jaw was accompanied by symmetrical deformity elsewhere, although none of them give the slightest clue towards the discovery of its causation. It will be observed that in cases 3 and 5, the only ones given much in detail, and probably also in the others, the malformation of the lower jaw was confined to a diminution of its size as compared with that of the upper jaw, without any alteration of the outlines or proportions of the different parts of the bone. That such alterations are occasionally met with, however, the following observations, the only ones recorded, convincingly prove.

6. Vrolik* gives a description and plates of the skull of an adult male from his own museum, where the lower jaw is too short, and at the same time removed too far backwards. In the skull (*see Figs. 4 and 5*) the greater wings of the sphenoid were so expanded, and the temporal bones were placed so far back, that the articular surfaces for the inferior maxilla, and the lower jaw itself, lay far back towards the posterior part of the head. Hence the lower maxilla was too short to correspond with the superior maxillary bone. To this disposition of parts was added a sinking downwards of the occiput, and a consequent elevation of the central portion of the base of the skull, so that the alveolar ridge of the upper jaw, sloping downwards in front, occupied an oblique position, and the base of the skull appeared shortened and contracted. This formation of the skull exerted an influence

* Vrolik, Op. Cit. Tab. lx., Figs 2, 3, and 4.

PLATE II.

Fig. 3. Mouth and nose of a child born with deficient size of the mouth and lower jaw, and described by von Ammon. Case 4.

Fig. 4. Congenital shortness of the lower jaw and other deformities of the skull. Case 6.

Fig. 5. Base of the above skull, lower jaw removed. Case 6.



Fig. 3, after Vrolik.

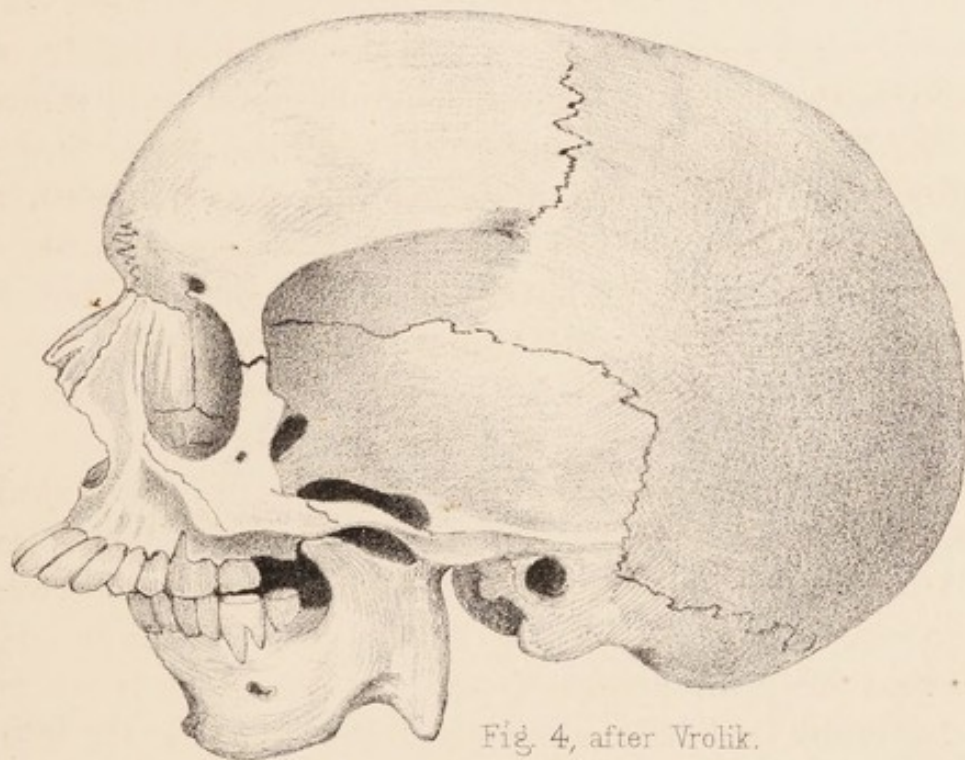


Fig. 4, after Vrolik.

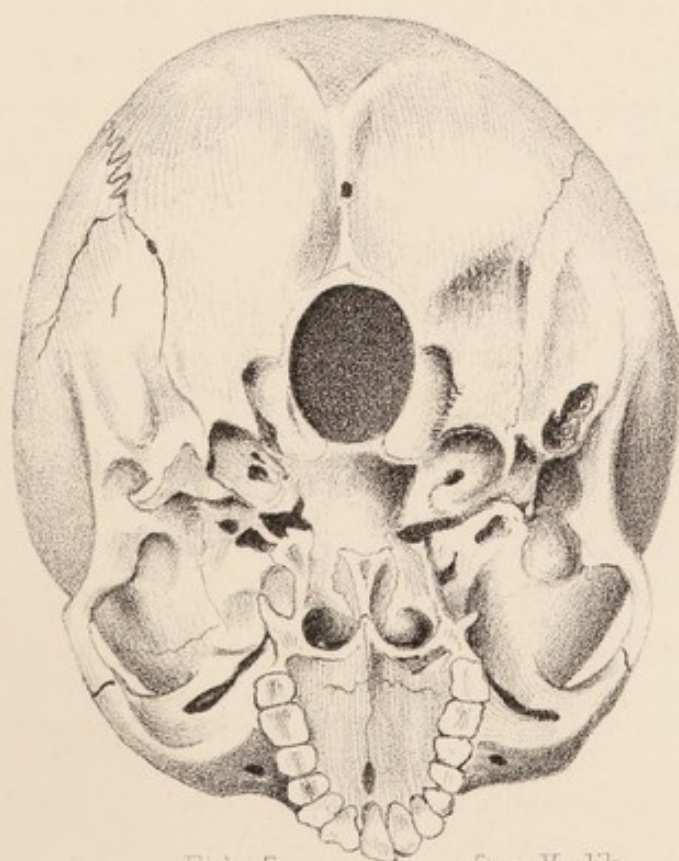
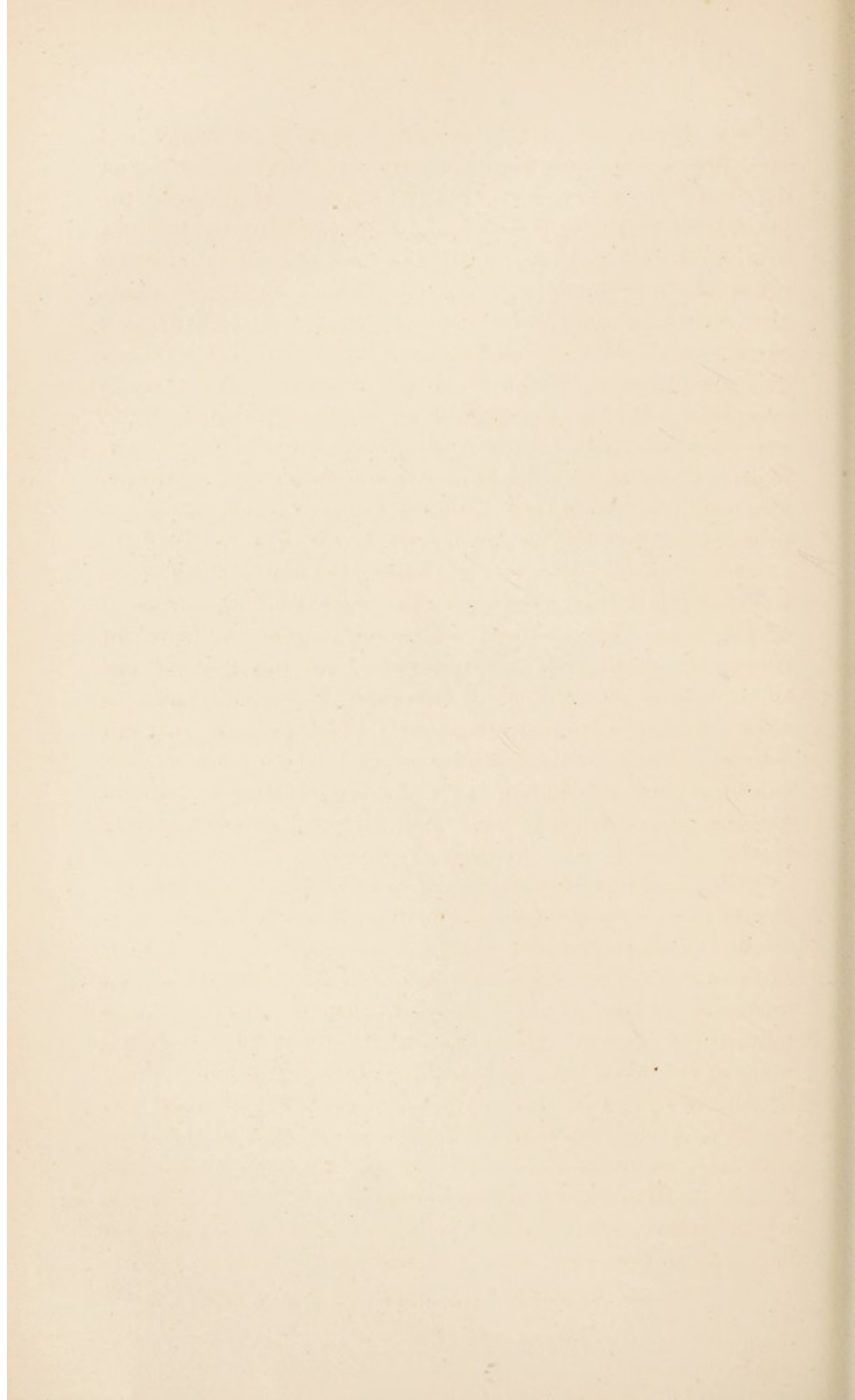


Fig. 5, after Vrolik.



on the zygomatic arch, the middle portion of which was moved upwards. Consequently the temporal and superior maxillary bones were mutually approximated, and the foramen magnum of the occipital bone was situated far back in the centre of the base of the cranium. The alveolar processes of both superior maxillary bones were very small, and contained only four molar* teeth each, which number corresponded with the shortness of the palate, and with the diminished length of the alveolar processes. The alveolar processes of the inferior maxilla (*see Fig. 6*) were equally short and contained likewise only four molar teeth each. The incisor teeth of the upper jaw were directed unnaturally forward, and when the lower jaw was drawn as far as possible backwards, its incisor teeth reached only to the canines of the upper jaw, the posterior molar tooth on each side being left free. Owing to the backward displacement of the lower jaw, the want of prominence of the chin, the projecting position of the upper incisors, and the flat and sloping forehead, the skull acquired a bestial character, which, during life, must have given the face an unpleasing aspect. The angles of the lower jaw terminated on each side in a point continuous with the perpendicular posterior margin, and which was bent outwards and separated by a semilunar notch from the inferior margin.

"The cause of this change of form," adds Vrolik, "is the greater force required to enable the masseter to bring forwards the lower jaw. The same cause has changed the form of the coronoid processes of the lower jaw. These project forwards, ending in an acute point, whence their posterior has rather become their superior margin. The temporal muscle exercised its action principally on this margin, and hence the apices of the coronoid processes are directed forwards and bent inwards. They therefore assume the same direction as in the rodents. From the same cause the condyles of the lower jaw are changed into oblong eminences, which cannot effect an arthrodia, but which can be thrust forwards and drawn back with great ease. Hence it follows

* Vrolik included the bicuspid among the molar teeth.

that the glenoid fossæ of the temporal bones must accommodate themselves to this disposition of the lower jaw. They have lost their transverse direction, and are changed into longitudinal grooves. But all these alterations are not congenital, but have probably arisen in the course of time from the constant backward and forward motion which the inferior maxilla underwent in order to suit its front teeth to those of the upper jaw. From the repeated impulsion of the lower against the backs of the upper incisors, the latter have assumed their marked direction forwards. From the same cause a groove has been worn in the centre of the crowns of the molar teeth similarly to what is observed in the Rodents. Thus the peculiarities of this skull are dependent on each other, and have one common cause, viz., the congenital shortness of the lower jaw."

It may at once be admitted that Vrolik's explanation is probably correct so far as regards the form of the lower jaw, the position of the upper incisors, and the temporo-maxillary articulation, but there is more in the above case than can be thus explained, for the greater arching of the base of the skull and the asymmetry of the cranium (which, though not mentioned by Vrolik, is shown in his plates to have been present) cannot have been thus produced. The want of symmetry of the cranium is found in other cases to be a usual accompaniment of malformations of the lower jaw, and seems in the above case to have been coetaneous with the deformity of the jaw rather than to have been produced by it. The absence of the four wisdom teeth may have had something to do with the shortness of the alveolar circuit in both upper and lower jaws, and so far would bear out Hüter's views, but it is difficult to see how any more extensive bearing can fairly be claimed for it on this case.

7. Von Langenbeck* has recorded the following interesting observation:—He was consulted by a young man, aged 18, who presented the undermentioned condition of the lower jaw. The three molar teeth were absent on each

* Langenbeck. Archiv für Clinische Chirurgie. Bd. I. Heft II. pp. 450-56. Taf. V. Figs. 1-3.

side, the bicuspid were present, and the jaw itself was considerably smaller than usual. Its incisor teeth stood so far back in relation to those of the upper jaw, that the latter were anterior to the lower lip. The development of the inferior maxilla was less imperfect in its lateral than in its antero-posterior dimensions, for the masticating surfaces of the right bicuspid were in intimate contact with the teeth of the right upper jaw, and the left lower bicuspid were separated from the teeth of the left upper jaw by only a narrow fissure. The angles of the jaw were considerably more obtuse than is usual in the adult. There existed also a faulty direction and length of the coronoid processes, which, when the mouth was attempted to be opened, became so locked or jammed against the posterior surface of the zygoma that the teeth could not be separated. The want of proper nourishment to which this state of matters gave rise was telling on the condition of the patient. The coronoid process on each side was reached by Langenbeck from the cheek and sawed through, with the result of completely remedying the closure of the jaws, and restoring to them their proper mobility.

The cases adduced above, which are all, or almost all, that have been recorded, are too few in number to enable any very valid deductions to be drawn. So far as may be judged from them, however, *congenital smallness of the lower jaw does exist*, though rarely, and is *usually conjoined with symmetrical deformities elsewhere*, such as cleft palate, &c. In some cases *the jaw so affected carries a diminished number of teeth*, in others *this is not the case*, and at all events the absence of some of the teeth is more probably a consequence of the cause which has produced the smallness of the jaw, than itself capable of explaining the origin of the smallness. It seems further justifiable to conclude that, *where the subjects of this deformity survive to adult life, they are not unlikely to become affected by such superadded deformity as was present in Vrolik's case (Figs. 4, 5, and 6), or the form of locked jaw described by Langenbeck (Case 7.)*

B.—Congenital Unilateral Smallness of the Lower Jaw.

Only two cases of this peculiarity are to be found in medical writings, and I am fortunate in being able to contribute a third.

Before entering on the subject, it may be well to consider the results likely to be produced by such a peculiarity, on the form and position of the lower jaw as a whole. These might be expected to vary to some extent according to the time of foetal life when retarded development of the one half began to exercise its influence on the other half, and also according as the difference in size of the two halves was greater or less. If the disproportion between the two sides were very considerable, and made itself felt before the formation of the articulation of the condyle with the temporal bone, it might be expected that, in spite of *compensatory deviation of the unaffected half*, the continued growth of the latter would to a certain extent pull its smaller neighbour out of position, and by drawing it forwards detach it from its relations with the glenoid cavity so as to *prevent the formation of an articulation with the temporal bone* at all. Where on the other hand the disproportion was to a less extent, it might occur that a slight *displacement of the sound half* towards the affected side would suffice to leave the malformed half in its proper relations, and even allow an articulation with the corresponding glenoid cavity to be established.

Of the former class of cases, where the disproportion has been too great to be compensated by a deviation of the unaffected ramus towards the affected side, and hence the affected ramus has been drawn away from the glenoid cavity of the temporal bone so that no articulation exists, only a single example (Case 2) has hitherto been met with, and it was named by the author narrating it *congenital luxation of the lower jaw*. A study of the case will, however, show that this name has been badly selected, and we will take occasion to point out, farther on, that this has been acknowledged by the author himself.

Case 1 is similarly the only instance known of the slighter

form of the affection where the malformed half maintains its relation to the glenoid cavity.

1. Vrolik* describes a new born infant where the following deformities co-existed. The forehead was depressed, and the vertex of the skull high. The eyes were sunken, and concealed by the closely contracted lids. Beneath the nose, which was very broad, was the aperture of the mouth with the lower lip inverted. The chin was drawn far back. The ears were almost flat, and each provided with an incurved edge; they were folded inwards nearly to the membrana tympani; but, beyond the above, they possessed neither concha, tragus, nor antitragus, although a sort of lobule existed below. The neck was short and the thorax broad. The extremities were short and furnished with superfluous digits: the hands bearing six fingers besides the thumb, and the feet six toes each. The umbilicus was midway between the sternum and the pubis. Genitals malformed (spurious male hermaphrodism), testicles retained. A previous child of the same mother was said to have been similarly deformed.

The skull and lower jaw when prepared showed the following peculiarities (*see Figs. 7, 8, and 9*). The cranium was not symmetrical, having a direction obliquely from right to left, so that on the left side the exterior was more convex and regular than the right side, which was, so to speak, flattened, and recovered its globular form only in the region of the parietal tuberosity, where it was even a little elevated. The face was also oblique. The orbital margins (*Fig. 7 a.*) were compressed from above downwards, hiding the deeply placed eyes. The nasal bones (*b*) were broad and convex. The superior maxillary bones (*c*) were short and narrow. The inferior maxilla was so retracted (*Fig. 7 d and Fig. 8*) that it scarcely reached half-way forwards on the palate. It had an abnormal shape, and was composed of only one bone, the right ramus of which was one-fourth longer than the left (*Figs. 8 and 9*), rendering the whole maxilla oblique. The chin was not straight in the middle,

* Vrolik, Op. Cit., Tab. LX., figs. 4 and 5; and Tab. LXI., figs. 1, 2, and 3.

but was deflected to the left side where it terminated in a point. At the external surface of the angle the bony margin was broad and turned outwards. At the posterior and internal surface, near the posterior maxillary foramen, a short and thick piece of bone (*Fig. 9 a a*) was situated, though its nature was not easy to determine. The condyles (*Fig. 9 b b*) were more broad than round, and were horizontal in direction. The coronoid processes (*Fig. 9 c c*) were much everted. In the base of the cranium the following points were specially remarkable, viz., the broad and almost horizontal pterygoid processes, the very broad alæ majores of the sphenoid (*Fig. 7 e*), and the backward direction of the temporal bones (*Fig. 7 f*), by all which the base of the skull was increased in length, and the occipital foramen pushed too much backwards and downwards.

A glance at figure 8 will show, I think, that the size of the right lower maxilla is almost or nearly normal, that it would, if properly placed, occupy a normal position in regard to the right superior maxillary bone, and that it is mainly the brevity of the left lower maxilla which causes its deviation to the left of the mesial line, since it is compelled to contribute more than its due share to the completion of the circuit of the alveolar ridge. We have here to do with an asymmetrical skull, with deficient development of the left lower jaw (the right lower jaw being unaffected or less affected), a state of matters entitling the case to rank as a less marked example of those which I shall next adduce. It is further noteworthy that the condition of the coronoid processes and angles of the lower jaw is similar to those in Cases 6 and 7.

2. Professor Robert William Smith, of Dublin,* has put

* R. W. Smith, M.D., on Fractures in the Vicinity of Joints, and certain Accidental and Congenital Dislocations. Dublin, 1847. Chap. ix., pp. 273, &c.

PLATE III.

Fig. 6. Lower jaw of Fig. 4 detached from the skull. Case 6.

Fig. 7. Congenital unilateral smallness of the lower jaw; side view. Case 1.

Fig. 8. The same seen from below.

Fig. 9. Lower jaw of the same.

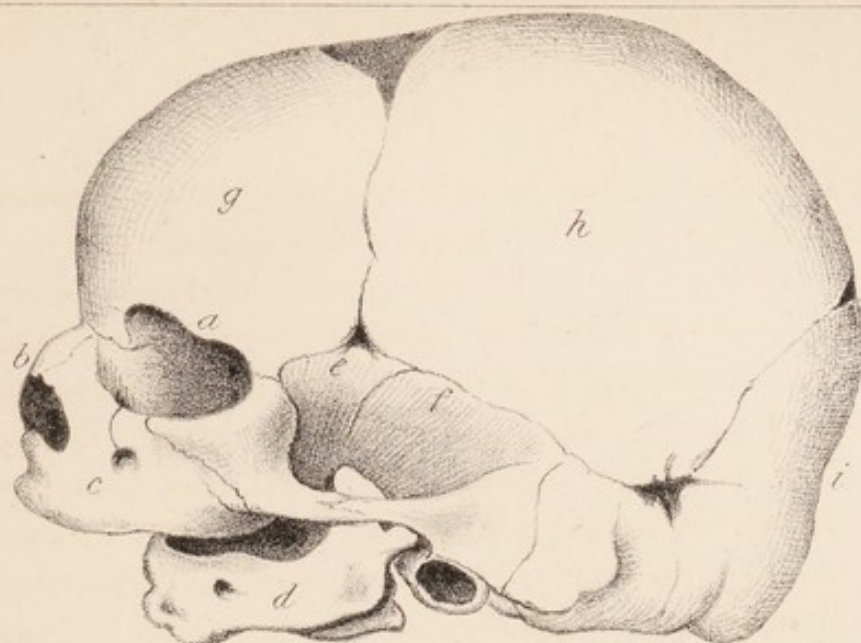


Fig. 7, after Vrolik.

a, contracted orbits. *d*, retracted and deformed lower jaw. *g*, frontal bone.
b, broad and convex nasal bones. *e*, broad alae majores of sphenoid bone. *h*, parietal bone.
c, short and narrow superior maxilla. *f*, temporal bone drawn backwards. *i*, occipital bone

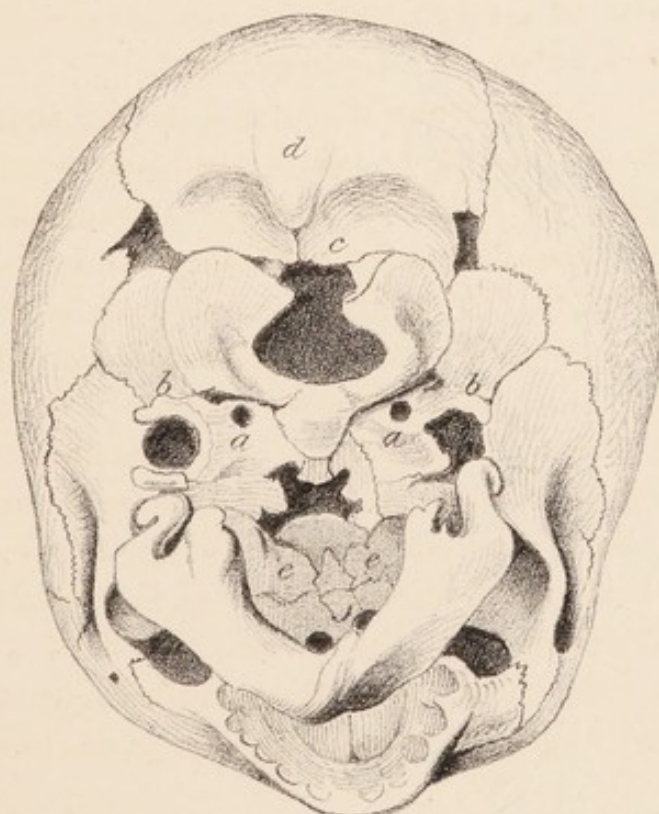


Fig. 8, after Vrolik.

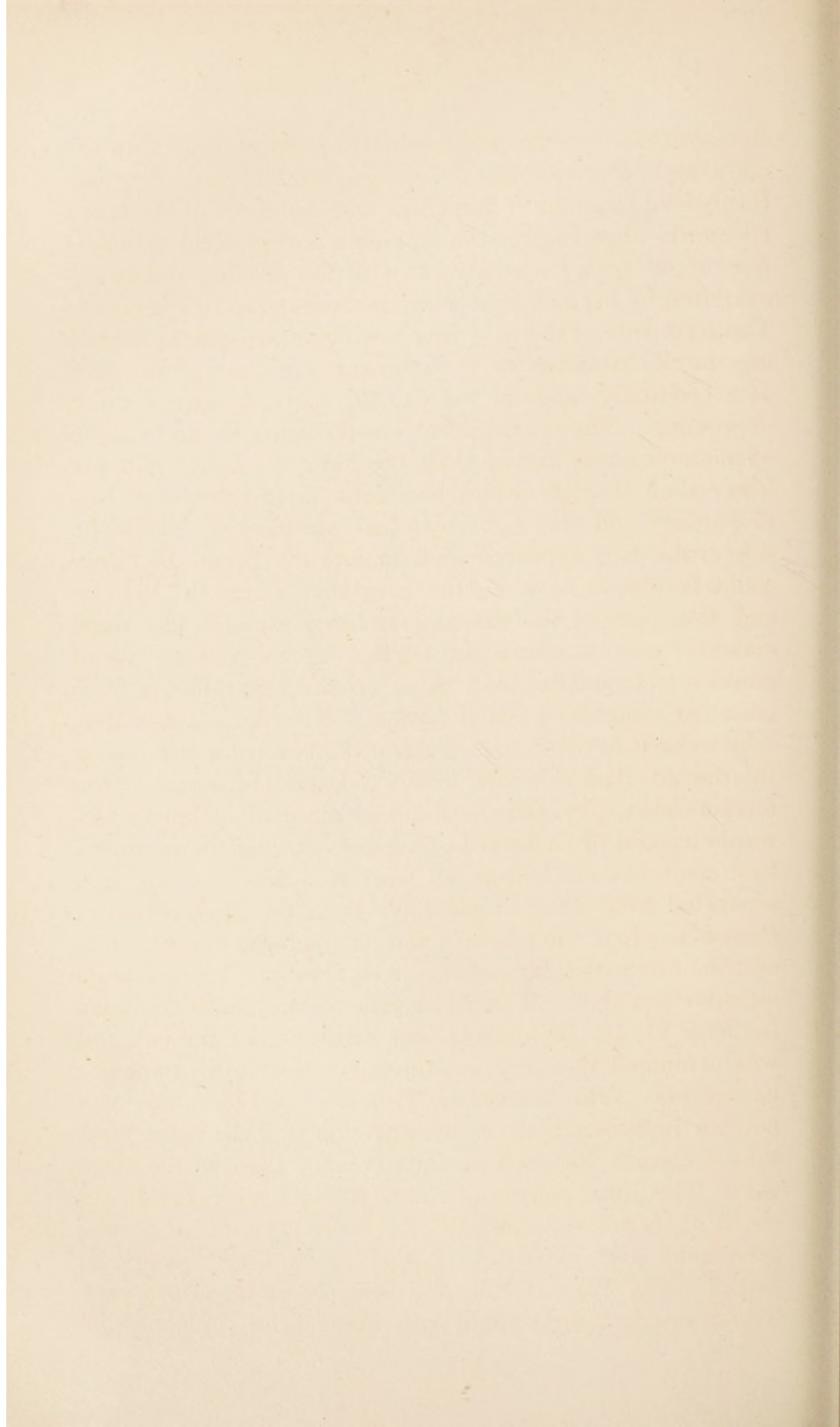
aa, petrous portions of temporal bones. *c*, foramen magnum.
bb, tympanic rings. *d*, occipital tuberosity.
cc, wormian bones

Fig. 9,
after Vrolik.

aa, bony prominences of doubtful nature.
bb, condyles.
c, everted coronoid processes



Fig. 6, after Vrolik.



on record this carefully and minutely observed case. Edward Lacy, aged 38, the subject of congenital idiocy, died in the Hardwicke Hospital of bronchitis and gangrene of the lung. Dr Smith, when engaged in making a post-mortem examination of his body, was struck with the peculiar deformity exhibited by his face, and which is represented in Figure 10. The right side of the face was small and atrophic, presenting, in the situation of the zygoma, a concavity in place of a convexity, and, in the parotid space, a very distinct depression. The countenance was crooked; the right angle of the mouth was higher than the left; the right orbit was lower than the left orbit; the right superciliary arch less projecting, and the right eye less prominent. The right side of the face appeared sunk in, and the tip of the finger could be placed between the parotideal margin of the jaw and the front of the external auditory canal. The right masseter was atrophic; the right temporal and pterygoid muscles were smaller than those on the left side, but their muscular structure seemed normal. No appreciable difference existed between the nerves of the two sides of the face. On the affected side the external lateral ligament of the temporo-maxillary articulation was directed obliquely forwards instead of backwards, and was attached to an imperfect condyle, which was at least a quarter of an inch separated from what should have been the glenoid cavity. Periosteum took the place of the cartilages of incrustation, and the inter-articular cartilage was absent. There was no capsular ligament. The right side of the maxillary bone (*see Figs. 11, 12, 13, and 14*) was smaller than the left, and was atrophied in every measurement from the symphysis backwards. The transverse diameter of the ramus was half an inch less than on the left side, and the right parotidean margin was half an inch shorter than on the other side. The lower margin of the right half presented a concavity at its posterior part (*Figs. 11 and 12*); the angle was prominent and excurved (*Fig. 11*); and the parotideal margin (*Fig. 12*) was thin and concave at its upper part, formed nearly a right angle with the body of the bone, and

terminated above (*Fig. 14*) in a small curved process, directed nearly horizontally inwards, its superior surface being turned slightly outwards, and its inferior surface slightly inwards. This process, in form somewhat resembling the coracoid process of the scapula, was the only vestige of a condyle, but was destitute of cartilage. The external pterygoid muscle was attached to its anterior and inner part, and the external lateral ligament to its outer surface. The coronoid process was thin and small, and the sigmoid notch could scarcely be said to exist. On the right temporal bone the zygomatic process (*Fig. 12*) was arrested in development; the articular eminence was absent, and instead of it there was merely a flat surface destitute of cartilage. The superior or longitudinal root of the zygoma was present, and at the place where it normally meets the articular eminence or transverse root (in other words, at the tubercle of the zygoma), the temporal was joined to the malar bone, the suture connecting them being distant only half an inch from the circumference of the external auditory canal, while on the opposite side the interval amounted to an inch and a half (*Figs. 12 and 13*). The glenoid cavity was absent, and in place of it was merely a flat quadrilateral surface, the inner portion of which alone was concerned in the motions of the jaw, and presented a shallow sulcus antero-posterior in direction. This sulcus formed a segment of a large circle, in which the curved and atrophied condyle moved. The non-articulating portion of the right temporal bone posterior to the Glasserian fissure was not deformed, but the entire bone was smaller than its fellow, had no groove for the lateral sinus, and the right jugular foramen was scarcely half the size of that on the opposite side. The malar bone was small, thin, and concave on its facial surface, but possessed a zygomatic process of extraordinary length, which formed the entire

PLATE IV.

Fig. 10. Unilateral congenital smallness of the lower jaw. Front view of the face. Case 2.

Fig. 11. Front view of the skull of the above.

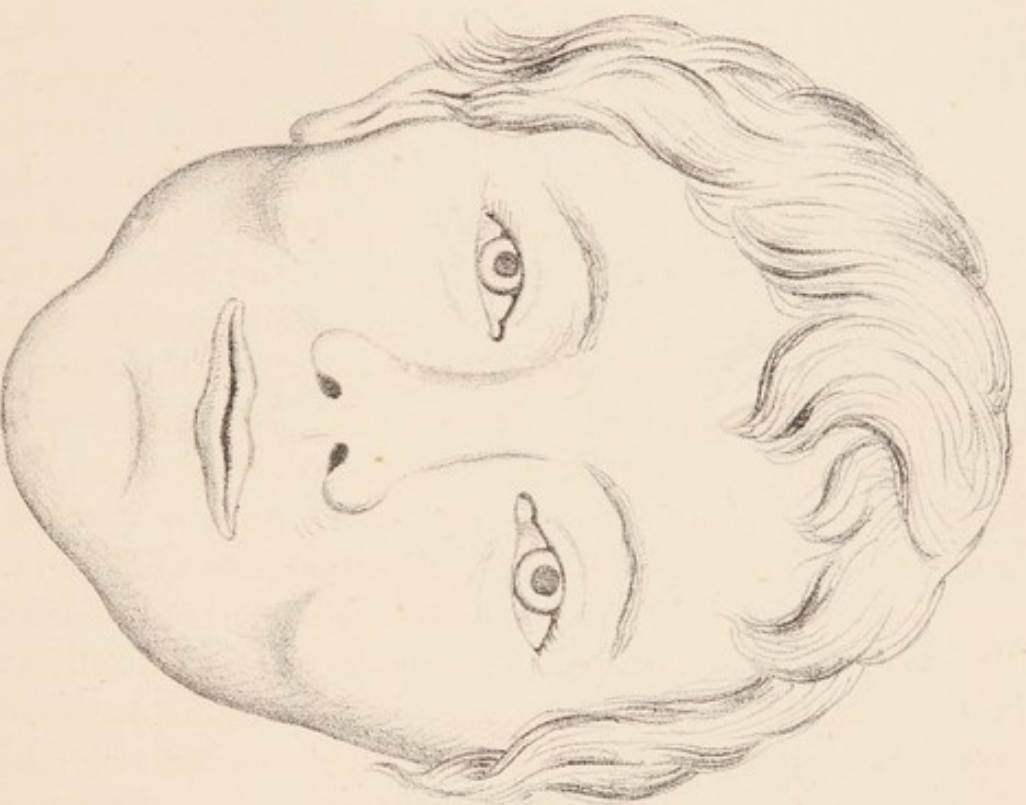


Fig. 10, after Smith.

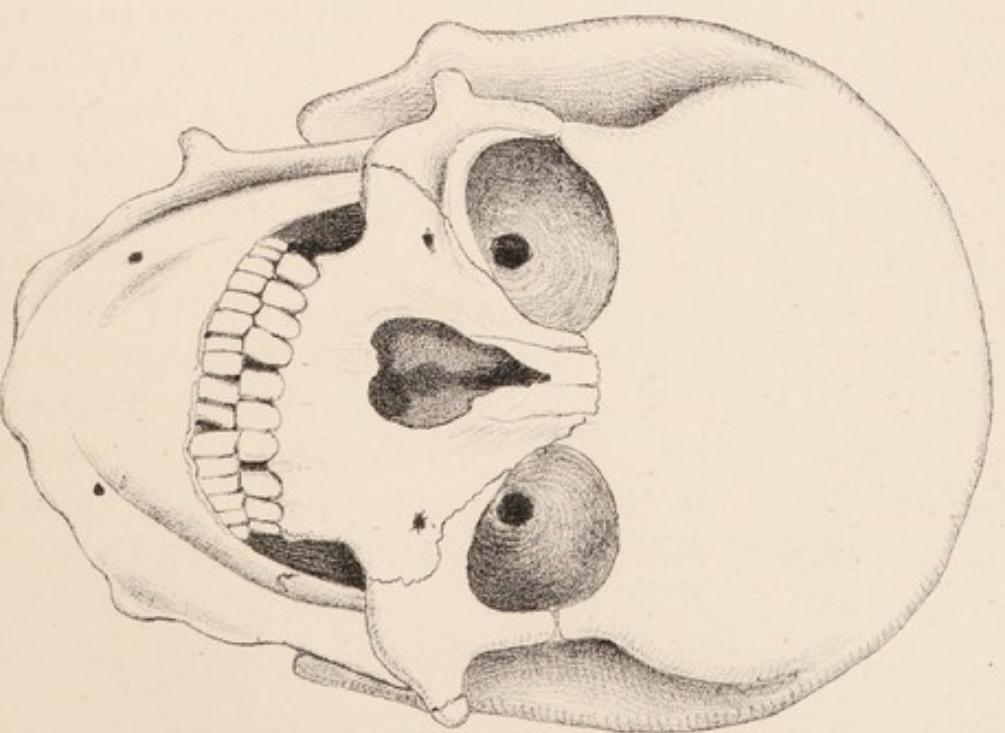
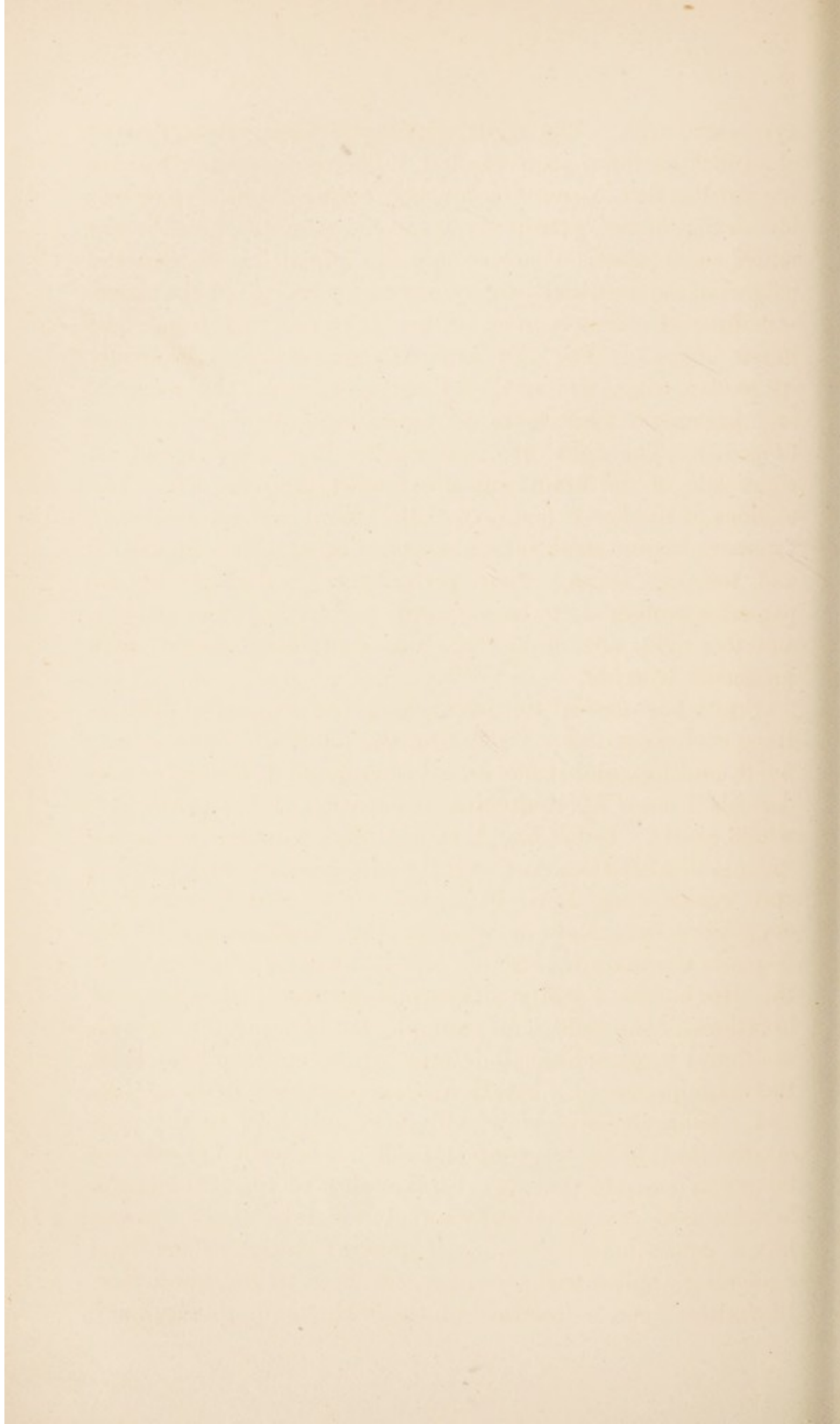


Fig. 11, after Smith.



zygomatic arch. The right zygomatic fossa was a quarter of an inch narrower than the left. The right superior maxilla was smaller than natural, its alveolar border did not descend so low as that of the opposite bone, and the suture by which it was united to its fellow did not occupy the mesial line, so that the palate did not consist of two symmetrical portions, but the suture was directed obliquely from before backwards, and from right to left (*Fig. 15*). The right half of the sphenoid bone, especially its greater wing, was smaller than the left, and the temporal and zygomatic fossæ were correspondingly diminished in size (*Fig. 15*). The right orbit was smaller than the left, and the right side of the brain was also smaller than the left. The motions of the lower jaw, especially lateral motion, were more extensive than normal, the right ramus being drawn backwards and forwards during their performance. During life the patient was observed to be constantly performing these motions, and the right side of his face was continually affected with spasmodic twitches.

Smith has classed this case among the congenital dislocations such as are found affecting the joints of the shoulder, wrist, and hip, and it has long been quoted as the only well-described case of congenital dislocation of the lower jaw which exists. But it has been doubted whether the name "Congenital Dislocation" rightly expresses its real nature; and considering how little we know of the causes of congenital luxations, or whether the displacement of the bones is the main feature of such, it must be admitted that the title has been badly chosen. In the so-called congenital luxations of the radius, for example, the bones of the forearm are found to present such deformities as could not have been the consequence of a luxation occurring early in foetal life, and a comprehensive view will inevitably lead to the conclusion that, in the present state of our knowledge, we are bound to concede that the displacement of the articulation is not the most important feature, but is indeed, not a cause, but a consequence of a more general cause. The same reasoning applies with even greater force to the lower jaw. In Smith's case, a luxation of the right temporo-maxillary

articulation at an early period of foetal life could not possibly have produced the existing asymmetry of the cranium and brain, and the atrophy of the facial bones of the right side. Smith's statements are so clear and distinct that there is no difficulty in summing up the case as unilateral arrested development of the head, having its culminating point in the right inferior maxilla, *which was atrophied equally from condyle to symphysis*, the whole being the result of some unknown cause.

It is, however, only fair to Professor Smith to state that, in spite of his classification of his case under the title of congenital luxation, he seems to have had a correct knowledge of its proper nature; for, after quoting the opinions enunciated by Ribes (in his Memoir on the Articulation of the Lower Jaw) concerning the formation of the glenoid cavity, which are briefly as follows, viz., that the growth, pressure, and movements of the condyle produce the glenoid cavity and articular eminence; and showing the bearings of these on his own case, Smith points out that there are many objections to the explanation of it by a supposed foetal displacement, and indicates his opinion that the deformity arose from congenital malformation, and was not the result of disease or accident. In other parts of the work from which the above case is copied, we find Smith holding equally broad and philosophical opinions concerning other so-called congenital luxations. In connection with that of the wrist joint and elsewhere, he speaks of "arrest of development" and "original malformation" as being the only possible means whereby such appearances can be produced, and adds * "I am wholly unprepared to offer any satisfactory explanation of the causes of original luxations; nor can any sufficient solution of the phenomena be arrived at, except by the examination of the foetus at the earliest periods of intra-uterine life."

* Smith, Op. Cit., p. 272.

PLATE V.

Fig. 12 Skull of the preceding plate, viewed from the right side.

Fig. 13. The same, viewed from the left side.



Fig. 12, after Smith.

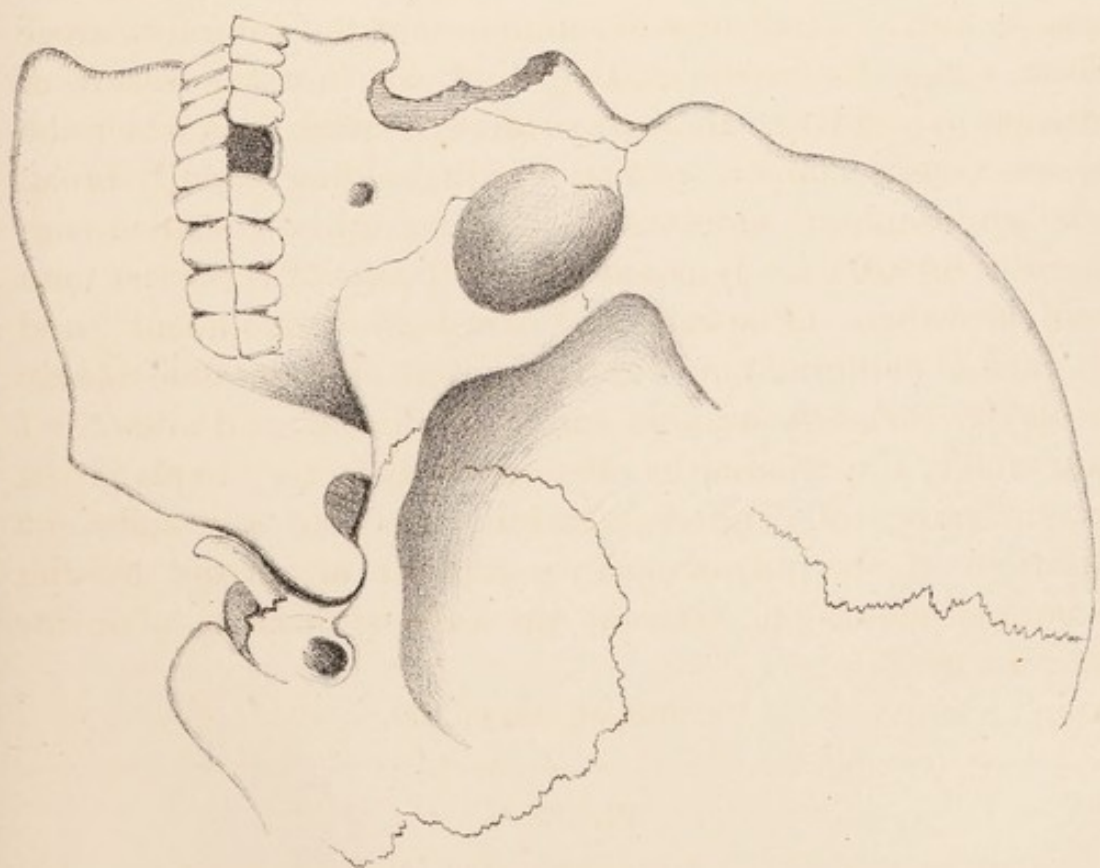


Fig. 13, after Smith.

Hence, I think I am justified, looking at the subject from the stand-point of a monograph on congenital malformations of the lower jaw, in removing the above case of Smith's from under the heading of "Luxations" into that of "Arrested Development," and in quoting it as a case affecting one-half of the bone in question.

3. For an opportunity of studying this case, I am indebted to my friend, Mr De Lessert, dentist, Aberdeen:—

S—— S——, an unmarried female, domestic servant and cook, aged 40, seen by me in June, 1873, was the subject of the following deformities. She was unwilling to be examined, and it was with difficulty that she was persuaded to allow the requisite measurements and observations to be made. This difficulty was however sufficiently overcome for the following data to be obtained and verified on more than one subsequent occasion. I believe the following statements regarding her to be perfectly accurate and reliable. She was of ordinary health and conformation, and her mental faculties were perfect. The deformity of her face existed from birth, according to the statements of her parents, and she herself remembers its being remarked in her before she had reached the period of her second dentition. Her hands and feet are perfect and symmetrical, and she is positive in her statement that nothing unusual exists anywhere about her otherwise than in the face.

On looking her straight in the face the most striking feature observable is a strongly marked inequality of the two sides of the face below the level of the eyes (*Fig. 16*). The left malar bone is in size only four-fifths of that of the right malar bone, and the left side of the face beneath it is so diminutive that the measurement from the angle of the left lower jaw to the lower border of the left zygoma (or, in other words, the length of the posterior border of the left ascending ramus) is one and a-half inches, as against two and a-half inches on the right side. There exists a hollow where the prominence of the condyle of the left lower jaw should be felt. The left coronoid process, as far as can be ascertained by the touch, is small, but in tolerably perfect

condition. The breadth of the left ascending ramus is one inch, that of the right is one and a-half inches. The left horizontal ramus is smaller than the right, its length being three inches, while the right ramus is four and three quarter inches. The perpendicular depth of the horizontal rami is one and a quarter inches on the left, and one and three quarter inches on the right side. The central line of the jaw at the lower incisor teeth (*Fig. 17 a*) deviates a quarter of an inch to the left, the deviation at the lower border of the symphysis being one inch to the left, so that the left half of the bone is smaller in proportion along its lower than its upper or dental margin.

The teeth of the left lower jaw are somewhat smaller than those of the right. On the left side there exist two incisors, one canine, and two bicuspid; the first molar has been extracted, but the stumps of the second molar and wisdom tooth are still present, their direction, however, being so much inwards that it is evident these teeth had never been opposed to those of the upper jaw. Her complement of teeth in the left lower jaw had therefore been complete. In the right lower jaw all the teeth are present and entire, except the second molar, which has been extracted, the gap left by it still remaining (*Fig. 18*). The length from the mesial line to the canine angle is nine-sixteenths of an inch on the right side; the length from the canine angle to the anterior border of the ascending ramus is an inch and five-eighths on the left side, and one and three-quarter inches on the right side. In fact, the left side is atrophied in all its segments, and proportionally in all.

When the jaws are closed, a gap, one-twentieth of an inch wide, exists between the upper and lower teeth of the left side, but those of the right side are in close contact. The left teeth, both upper and lower show no attrition

PLATE VI.

Fig. 14. Lower jaw of the skull, from the preceding plate, seen from below.

Fig. 15. Skull from the preceding plates, seen from below.

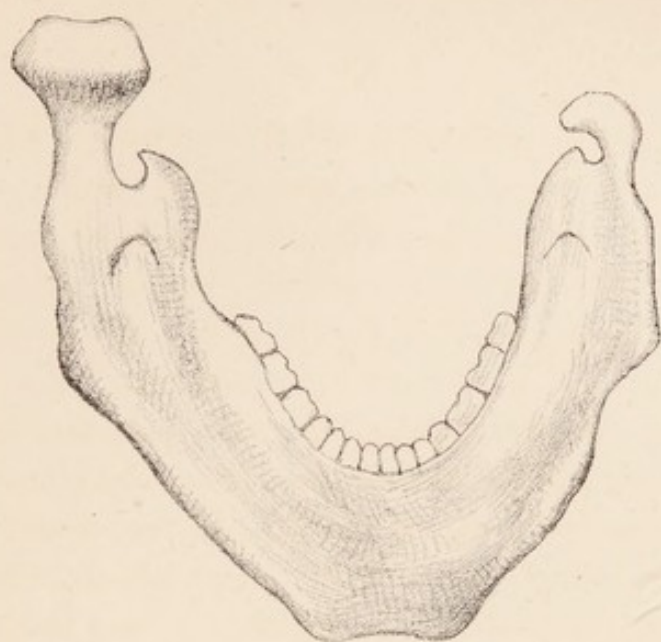


Fig.14, after Smith.

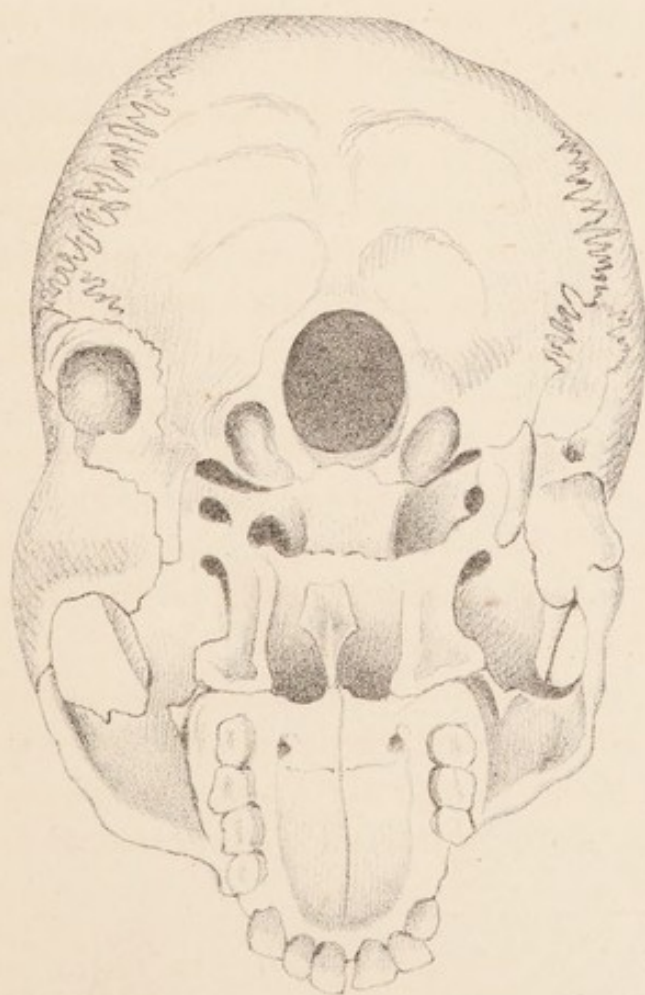
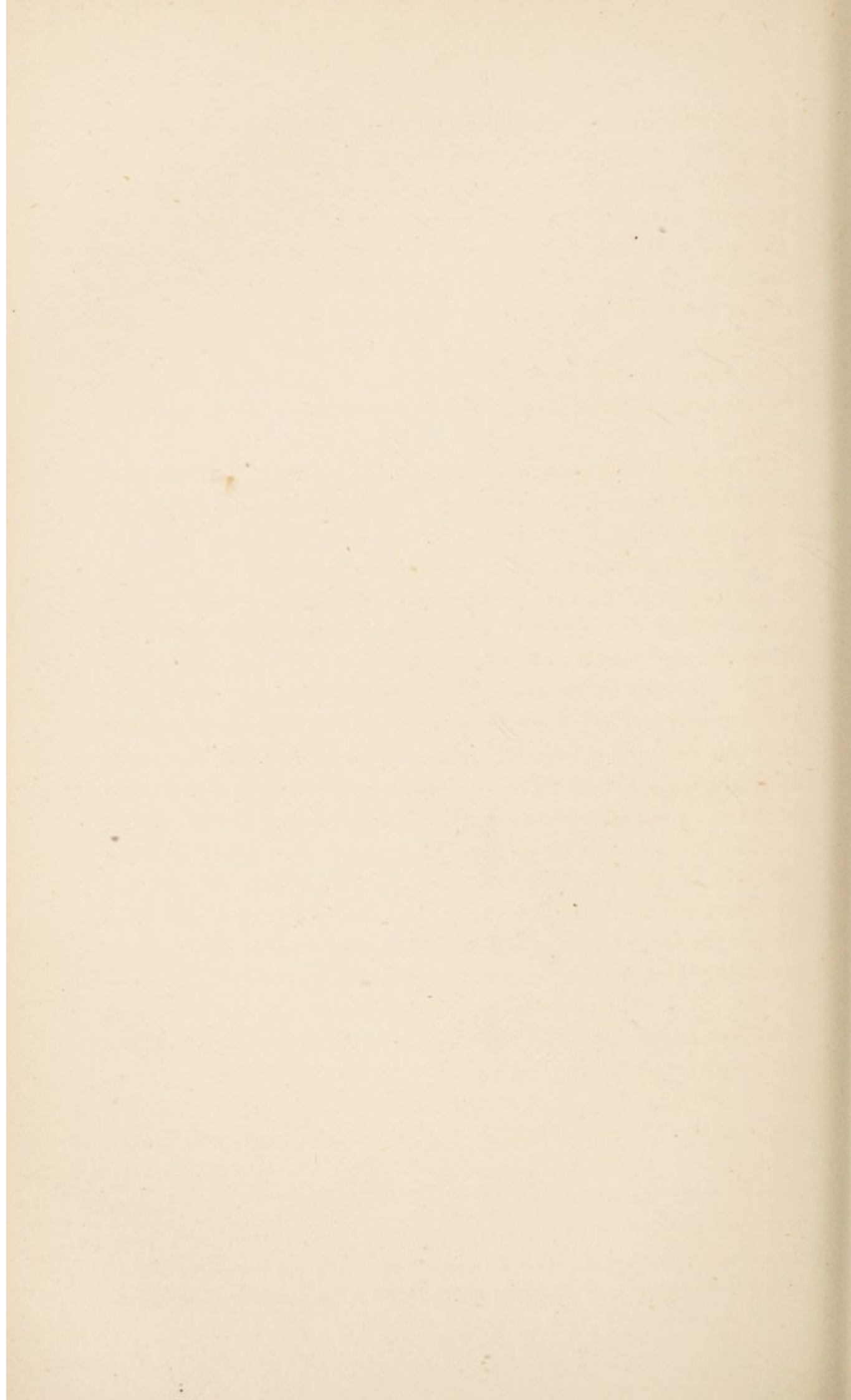


Fig.15, after Smith.



facets where they should exist, but these are present, as usual, on the right side, both above and below.

The usual number of teeth have been present in both superior maxillæ; on the right side they are still perfect, excepting the first bicuspid, the stump of which remains; on the left side the canine has been extracted, the three molar teeth are represented by their stumps, and the other teeth are entire. But all the left upper teeth are smaller than those on the right side (*Fig. 17*). Nowhere, either in the upper or lower jaw, is there any undue crowding of the teeth.

The hard palate is more arched than usual, and the horizontal portions of the superior maxilla and palate bone are slightly smaller on the left side.

The soft palate is of a pale bluish purple colour, and well formed in both halves, though the left half is more flabby to the feel, and thicker in its perpendicular diameter (thickness) than the right half. The lower border of the left half hangs fully a quarter of an inch lower than the right, and by no mechanical irritation can any motion or elevation of the left half be caused, save that which it derives from the right half, the muscles of which react normally. The left levator and tensor palati are evidently absent, or rudimentary.

The tongue can be protruded without any deviation, but its bulk is less on the left than on the right side of the median raphe. The nose and eyes are quite symmetrical, although, from the smaller size of the left molar and superior maxillary bones, the measurement from the tip of the nose to the ear is four and three quarter inches on the left and five inches on the right side. The right ear is perfect, its perpendicular length being two and a half inches. The left ear (*Fig. 19*) is a mere elongated rudiment, formed apparently by the folding inwards of the imperfect pinna. Its length from above downwards is two inches, and its shape so irregular that it could hardly be described. I have therefore attempted, in *Fig. 19*, to convey an idea of its form. The left external auditory meatus is absent; its locality is indicated by one or two pits or fossæ of no depth, terminat-

ng in *culs-de-sac* immediately below the level of the skin. The left auditory region is sunk inwards, and much less developed than on the right side. The hearing of the right ear is perfect and the membrana tympani normal; the Eustachian tube can be inflated with ease in Valsalva's experiment. The tick of a watch is heard on being firmly pressed against the left ear; but when the watch is placed in contact with the teeth its sound is referred to the right ear and is increased when the meatus is closed with the finger.

The cranium is asymmetrical; although this is rendered less distinct, and satisfactory measurements are not attainable from her manner of dressing her hair. She obstinately refuses to undo her coiffure. The following points can nevertheless be clearly made out:—The left side of her cranium is somewhat smaller than the right, both in its horizontal and perpendicular measurements, a fact of which examination on three several days leaves no doubt. Horizontal measurements are not attainable, but from a point over the anterior end of the sagittal suture to the lower border of the zygoma, the measurement on the left side is five and a half inches, on the right side six inches. Another measurement from a point over the front of the sagittal suture to the angle of the lower jaw gives nine inches on the left and eleven inches on the right side.

The preceding observations, carefully made and noted down at the first visit, seemed to indicate the probable absence or rudimentary condition of the petrous portion of the left temporal bone; hence the condition of the facial and trifacial nerves, so far as these could be inferred from external examination, was next investigated with care.

PLATE VII.

Fig. 16. Unilateral congenital smallness of the lower jaw. Front view of the face. Case 3.

Fig. 17. Teeth of the same seen from the front. *a.* Space between the right and left central incisors in the lower jaw. *b.* Space between the central incisors of the upper jaws (from plaster cast).

Fig. 18. Lower jaw of the same seen from above (from plaster cast).

Fig. 19. Left ear of the same (from plaster cast).



Fig. 16.

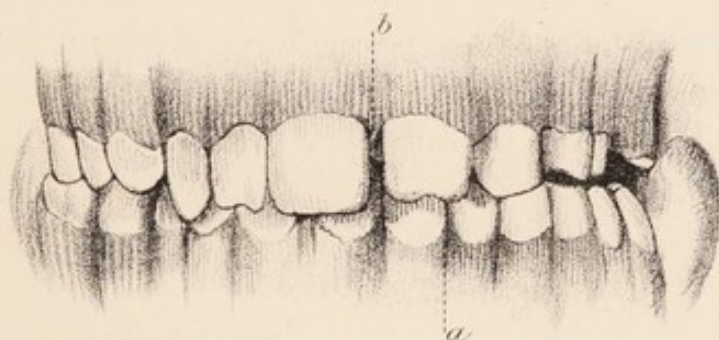


Fig. 17.



Fig. 19.

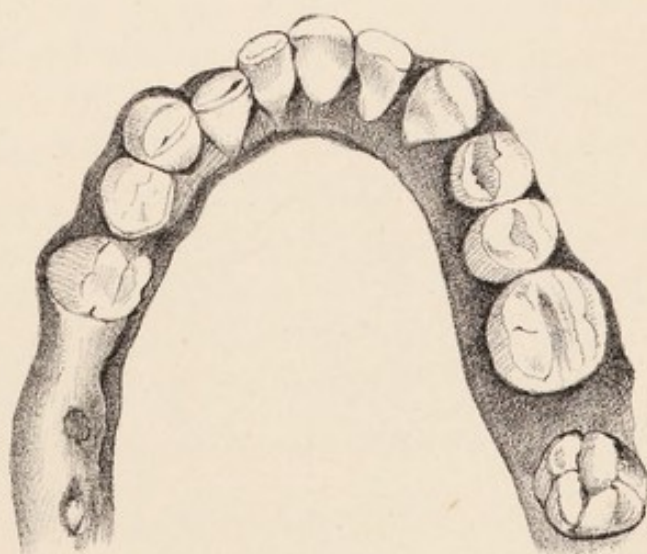


Fig. 18.

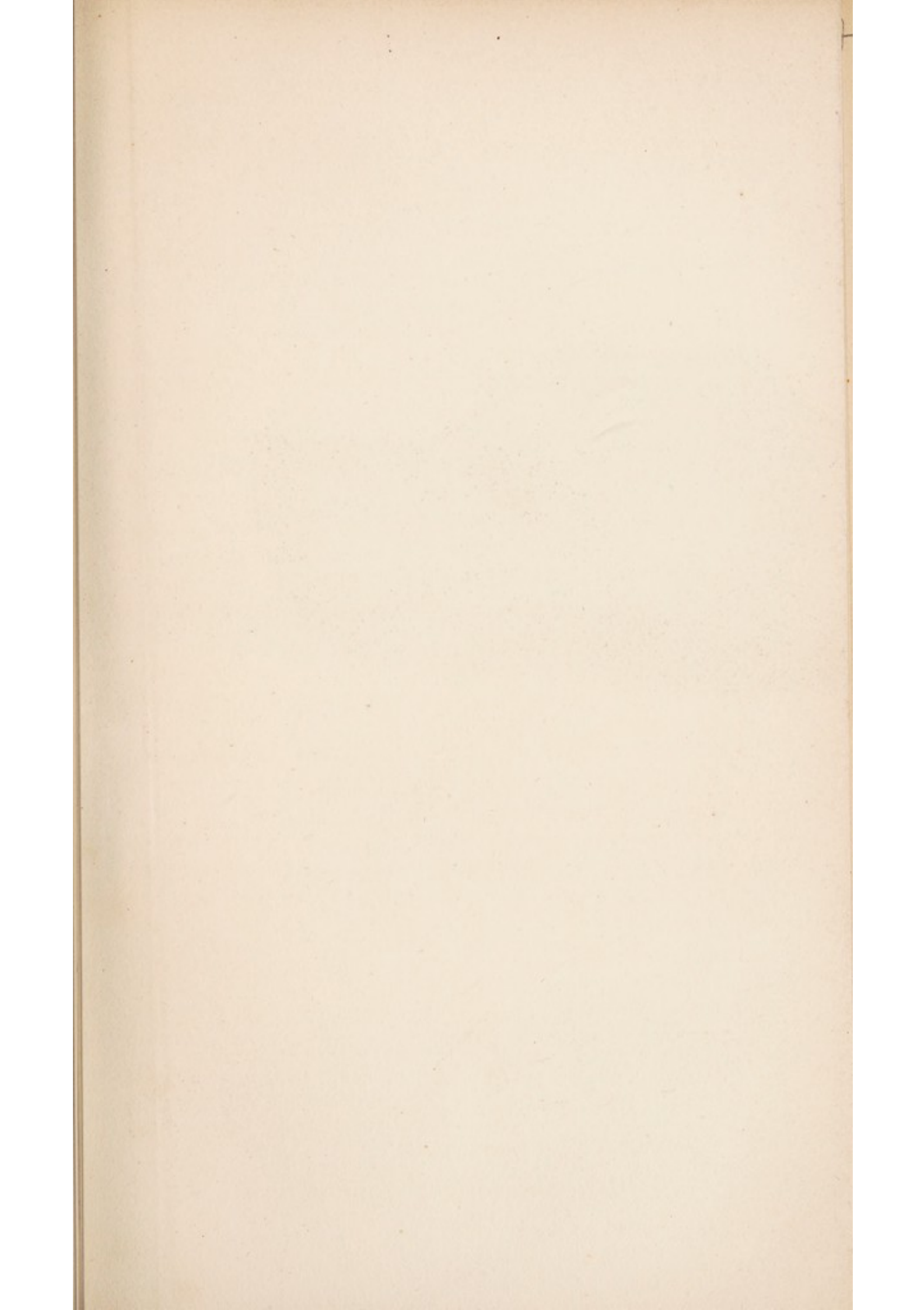
the elongation and diminished bulk of the temporals and masseters."

To enable a reliable opinion, therefore, to be formed as to the existence or non-existence of congenital luxation of the lower jaw, fuller details of Guérin's case, or fresh observations, are much to be desired.

CONCLUSION.

Having now given as complete a resumé as lies in my power of the various congenital malformations to which the lower jaw is subject, and interpolated, where it seemed necessary, explanations sufficient, I hope, to have rendered clear the views of these which we seem justified in adopting, it only remains for me to embody in a series of propositions the conclusions we seem warranted in drawing from our present knowledge of these deformities. These are as follows:—

1. Congenital deformities of the lower jaw are very rare.
2. Non-development of the lower jaw has been recorded in animals, but never in man.
3. Excessive development of the lower jaw appears to occur, though very rarely, and minutely recorded cases of it do not exist.
4. Preponderance of size of the lower jaw has been observed as the result of deficient development of some of the other facial bones.
5. Congenital smallness of the whole lower jaw occurs, and is generally associated with symmetrical deformities elsewhere.
6. Congenital smallness of the whole lower jaw may lead in after life to acquired deformities of the bones of the cranium and face.
7. Congenital unilateral smallness of the lower jaw has been found in one case with, and in two without, formation of the temporo-maxillary articulation of the same side, and coincided in all with asymmetry of the cranium.
8. Congenital dislocation of the lower jaw is said to have been met with in a single imperfectly recorded case.



OF BARNORCHAN'S CASE OF RESECTION OF THE ENTIRE ULNA.

DISEASED RIGHT ULNA, - EXACT SIZE,

FIG. 1.

Shows cleave, enlarged oval & round foramina, & acicular & mammillated formations, on the surface of the bone.



FIG. 2.

Right lateral section of the Ulna, showing caries, abscess, sequestrum & charnification of the bone in various parts.

