The disease was considered to be an acute febrile erythema, which, as pointed out by Dr. Ricketts,¹ is not necessarily symptomatic of any acute specific fever.

As nothing remained but the discoloration under the skin, and the patient appeared to be quite well, she was discharged on April 1st, after a week's stay in hospital, and returned to her home in Somerset, where she remained until April 14th, when she returned to service in Bristol.

On April 21st her brother, a miner, fell ill with semiconfluent small-pox, from which he recovered, and on April 23rd her father fell ill with haemorrhagic small-pox, which proved fatal. Allowing the usual twelve days for incubation, these attacks were both contracted on or about April 9th to 11th, at which time the girl was at home.

There was no small-pox in the town where they lived, but scattered cases had occurred in the immediately adjoining parts of Gloucestershire during March and April, and had been carried thence as far as Yeovil. The brother had ceased work the day before Good Friday (April 8th), and on Easter Monday attended the sports at Wells. In Bristol, too, cases of small-pox had occurred at intervals since the beginning of January, and a contact of a Bristol case (a driver) was due to pass through their home on or about April 11th.

When at home the girl was seen by Dr. Costobadie, who informs me that there was then slight desquamation about the forearms and on the legs below the knees, but no evidence of any sore or abrasions of the skin.

On April 24th, after her return to Bristol, Dr. Myles again examined the patient. She was then apparently in good health, and on examining her skin he found the discoloration persisting over the spots and patches where the rash had been, and in places, particularly over the deltoids, there was a brownish mottling; three of the discolorations on the forearms appeared to be slightly depressed. On May 1st the discolorations over the deltoids had faded considerably, and that over the forearms had disappeared, leaving no trace. A test revaccination performed on this day gave no result.

Upon returning to service this girl slept with a fellow-servant vaccinated in infancy but not revaccinated; this fellow-servant remained perfectly well, and on May 3rd was revaccinated, and took in two places quite successfully. The rest of the master's family, who were revaccinated in March, also remained in perfect health.

It is important to determine whether, as suggested by the time-coincidence of the attacks of this patient's brother and father, her febrile erythema was a manifestation of the small-pox poison in her system; if so, it is quite unique in our experience.

The opportunities of infection in the city were at the time very slight, and at the date when she should have contracted the infection there were no known cases at large; furthermore, she enjoyed few opportunities of visiting friends, and those whom she knew and visited were not ill and did not live in an infected district.

The onset of her illness was not so sudden and definite as the onset of small-pox, however modified, usually is; neither were the course of the temperature nor the appearance, distribution, and development of the rash at all characteristic of modified, minimal, or abortive small-pox, of which very numerous examples have fallen under our observation at the city hospitals during the past quarter of a century. A fine branny desquamation is in no sense suggestive of any known form of small-pox.

On the other hand, the type of small-pox introduced into Bristol and the neighbourhood, apparently from the Sea of Azov, during the winter of 1908-9, has presented many features not only of malignancy, but of eccentricity. No less than 6 cases out of 35 occurring within the city have assumed a fatal haemorrhagic type sooner or later, the incubation stage has been in some cases prolonged to fifteen or sixteen days, the usual interval between sickening and development of the papular eruption has been unduly prolonged, and in three instances the disease has apparently made an unsuccessful attempt to break down the resistance afforded by recent revaccination in the case of nurses, who, however, suffered no harm beyond a two or three days' fever, followed by no eruption, and ending in speedy convalescence.

One of these nurses, returning to duty in the wards of a general hospital into which small-pox had been inadvertently introduced, appears, however, to have herself been in the condition of an "acute carrier," and to have infected a patient in the wards, who subsequently developed a fatal haemorrhagic attack.

The dull colour of the immature papular rash in S. C. its failure to form a true papule, and the subsequent dull and persistent staining suggest what is almost a contradiction in terms—a benignant haemorrhagic attack. If this is possible, as it may be in the case of a singularly searching and virulent infection acting upon a highly

resistant individual, the experience is worth recording for the guidance of others.

REFERENCE.

¹ *The Diagnosis of Small-pox.* By T. F. Ricketts, M.D., B.Sc. M.R.C.P. Cassell and Co., Limited. 1908.

FACIAL WRINKLES AND CHARACTER EXPRESSION,

WITH SPECIAL REFERENCE TO THE NASO-BUCCAL ANGLES.*

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FACIAL wrinkles may be defined structurally as persistent infoldings of the skin following the lines of greatest resistance to the mobile play of the features. They presumably mark the sites where in the adult the skin is more closely bound to the underlying structures than elsewhere. Since the subcutaneous tissues are from various causes most resilient in early life, and the frequent emotional brain-storms of babes are short lived and inco-ordinate in their action, the resultant facial contortions leave as a rule no permanent record of their movements on the surface of the skin. It is not till later in life that the concerted use of certain groups of facial muscles tend gradually to impress the features with individuality, and

Diagram of the chief facial wrinkles. *a*, Frontal; *b*, glabellar; *c*, *c'*, orbicular and maxillary branches of the tarsal; *x*, palpebral; *d*, alar; *e*, sardonic; *f*, masseteric; *g*, mental; *z* shows the position of the naso-buccal angle on the right of diagram. N.B.—Any one of the above wrinkles may be absent from a face, or it may be represented by two or more secondary wrinkles.

in this delineation the chief wrinkles take an active part. They usually become deeper as time goes on, and acquire a persistence, due to their fibrous substrata probably, and to the part they play as *points d'appui* to the neighbouring muscles. If we consider with Professor Metchnikoff that senility is a chronic disease characterized by an increased proliferation of large connective tissue cells, the deepening of the facial furrows in advancing age may be ascribed to the increase of the subcutaneous fibrous tissue by the macrophagic cells at the expense of the surrounding muscular elements. This, however, is as it may be.

The eight or nine chief wrinkles on either side of the mid-vertical map out the face apparently into zones or areas of co-ordinated muscular action. Some of these motor zones roughly correspond in shape and position to the "tender skin" areas of Head (see diagram). The relationship which both Dana¹ and Head² have shown to exist between some forms of visceral disease and disturbances of sensation in certain cutaneous areas suggests the existence of a similar linkage between the internal economy and these superficial motor zones; and it offers a plausible explanation why we aptly portray by facial expression the deep-seated malaise of a dietetic indiscretion.

* Read at a meeting of the Brighton Division of the British Medical Association.

The two most constant and, for other reasons, most important wrinkles are the *alar*—those which course across the cheeks in alignment with and just beneath each naso-labial fold. Except in the very young, they are rarely absent from the healthy face. The most attractive part of this inquiry consists in ascertaining by angular measurements the variable obliquity of these wrinkles upon different faces. From its gristly origin beside the nostril each alar furrow passes directly downwards and outwards for at least 1 cm. (In my experience it passes otherwise only in a fractional percentage of cases.) If this line is prolonged until it cuts a horizontal passing through the oral angles, the included angle is the naso-buccal (N.B.) angle required. Actual measurements have shown that the acuity of the N.B. angle when the features are in repose may vary in different persons from a little over 20 degrees to upwards of 70 degrees.³ I shall now consider the etiological factors which may determine this wide range of obliquity in the alar wrinkle.

Anatomically the mandible (inferior maxilla) is probably the most important factor in this respect. The bone, as is well known, markedly alters its shape during dentition; and so far as the width of the jaw angles is concerned, may revert in the edentulous adult to the condition of early infancy.⁴ The modern dentist, by mechanical dentures and other devices to assist mastication, both lessens the distress which loss of teeth entails and checks the atrophic changes in the mandible above alluded to. We seldom now see the "nutcracker" jaws caricatured by Gilray and other gross humorists of the eighteenth century. The extremely acute N.B. angle above noticed was, however, from a face of this type—from an old lady of the great age of 109 years. On the other hand, the cast of features characterized by a powerful masticatory apparatus—the "square jaws" of conventional language—often associated in the elderly adult with hypertonic *depressores anguli oris*, has naturally a wide N.B. angle, that is, one of 60 degrees and upwards. In such cases the free ends of the alar wrinkles drawn downwards along with the corners of the mouth convey an aspect of dogged determination to the face which the strenuous careers of many of the individuals so endowed as a rule historically confirm.*

In my store of adult portraits the type of face showing

* Among the faces of this type were included portraits of a President of the United States, a President of the Royal Society, a celebrated judge, a great lawyer, and a Governor of a great Indian Presidency; among the women was a well-known Doctor of Medicine.

the widest N.B. angle is quite unlike that just described. There are a few measurements among that collection of angles of 70 degrees and upwards. These wide angles are, in my experience, found upon the faces of young and popular women, actresses, dancers, society brides, and so forth. We may well inquire why the small bow-shaped mouth and rounded chin of a beautiful woman should be

identified with a width of the N.B. angle even greater than that which so fittingly stamps the square-jawed visage of a self-willed man. I must therefore ask you to bear with me whilst I recapitulate some further details regarding the growth and development of this part of the face.

In infancy the orbicularis oris muscle, the great sphincter of the mouth, is largely concerned in the act of sucking. By its rhythmic contractions the close apposition of the mucous membrane of the lips and the surface of the teat is ensured. With the aid of the antagonistic buccinators and lingual muscles a partial vacuum in the anterior part of the mouth is rendered possible. These rhythmic contractions tend to shorten the oral aperture laterally, and to drag the free ends of the naso-labial folds inwards to the corners of the mouth. At the same time the cheeks have a rounded contour, induced partly by the persistent action of the antagonistic buccinators and partly by the subcutaneous deposition of fat. When a small child cries or gapes we can see these folds as they pass downwards on either side to the corners of the mouth, and from them can judge the position of the future alar wrinkles. Now, if we take the N.B. angle of a fold in the usual way, we shall find that in infants an angle of 70 degrees and upwards is not a rare measurement. Indeed, these exceptionally wide angles are common among healthy children of both sexes during their first decade. They become rarer as time goes on; rarer in men than in women, for the latter take more pains to preserve through years of maturity the witchery of their winsome youth.

Among adults, then, we can recognize two types of face with wider N.B. angles than the average—the square-jawed type and the infantile type. The explanation is simple. The acuity of the basal angles in an isosceles triangle depends on the ratio that the base-length bears to the length of a side. When the base is relatively short the angles are proportionally wide. If we now translate these geometric expressions into anatomical language suitable to our subject, we may say that the N.B. angles are wider than the average (1) whenever they nearly correspond in position to the corners of a small mouth, as

Fig. 1.

Fig. 2.

Fig. 3.

Figs. 1, 2, 3.—Infantile type of features, with wide naso-buccal angles ($65^{\circ}+$). Note that the alar wrinkles in Fig. 3, the portrait of a young woman, pass downwards to the corners of the mouth, following the lines of the naso-labial folds of infancy (Fig. 1) and childhood (Fig. 2).

Fig. 4.

Fig. 5.

Figs. 4, 5.—Square-jawed type of features (naso-buccal angles $60^{\circ}+$). The alar wrinkles do not meet the corners of the mouth. The depressors anguli oris in Fig. 5 assist by their hypertone in the widening of the naso-buccal angles.

Fig. 6.

Fig. 7.

Figs. 6, 7.—Acute naso-buccal angles ($40^{\circ}-$). The old lady (Fig. 6) is an example of the nutcracker-jaw type of countenance. The extreme acuity of the naso-buccal angles in these instances is largely due to the persistent hypertone of the buccinators, and to the transverse widening of the mouth in consequence.

is the case in the infantile type of face; or (2) whenever the apex of completed N.B. Δ is much above its average position at the bridge of the nose. The latter condition implies unduly long sides to the N.B. Δ , and is observed specially in the square-jawed type of face. How intimately these trigonometrical relations are connected with character-expression is shown in the lessened N.B. angle of the fixed smile of photographic portraiture, and how necessary it therefore is in an inquiry of this kind to obtain these facial angles whilst the features are at rest.

Before concluding I shall briefly refer to the mechanism whereby the creeping of a wrinkle as age progresses is presumably induced. Many of the observations already recorded cannot otherwise be satisfactorily explained unless we admit that this slow change of position takes place occasionally. I have examined the successive portraits of eight persons photographed at different periods of their lives. These pictures show that a divergence of 7 or 8 degrees in the obliquity of the N.B. angle may in some cases occur within a few years. The cause of the "creeping" must, I take it, be sought for in the prolonged hypertone of some of the muscular areas bordering the wrinkle and the hypotone of others antagonistic to them; and these excito-motory changes, again, may be due to continuous psychical exaltation or depression, so often associated with success or failure in the schemes of life.

The following figures may be provisionally accepted:

Average Value of Naso-buccal Angle in 149 Adults
(above 17 Years).

	Adults.	Men.	Women.
At all ages (100 M.)	55.3°	53.4°	60.9°
Forty-two above 70 (34 M.)	51.1°	50.7°	54.1°
One hundred and seven below 70 (65 M.)	57.6°	54.7°	62.4°

REFERENCES.

- ¹ A Clinical Study of Neuralgias and of the Origin of Reflex and Transferred Pains, *New York Med. Journ.*, July 23rd and 30th, 1887.
² Disturbances of Sensation, with especial reference to the Pain of Visceral Disease, *Brain*, vol. xvii, pp. 339-480. ³ Lavater (1772) noticed the divergence of the "lineaments or traits of the cheeks," *Essays on Physiognomy*, translated by Thos. Holcroft, n.d., p. 474. ⁴ In adults the angle of the jaw is about 120 degrees or less, in infancy 140 degrees or more; in the edentulous it again becomes widened to 130 or 140 degrees (see Humphry, *The Human Skeleton*, p. 293; *Quain's Anatomy*, ninth edition, vol. i, p. 56).

UNUSUAL CASE OF FACIAL PARALYSIS.*

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THE facial nerve, whilst in the aqueduct of Fallopius, bears a close relation to the middle ear. After leaving the chamber situated behind the hiatus Fallopii, wherein the genu is placed, it passes backwards and downwards at right angles to its previous direction in the upper and posterior part of the inner wall of the tympanum; here it is in relation to the fenestra ovalis below, the ampullary ends of the external and superior semicircular canals above, and the vestibule to its inner side.

ETIOLOGY.

The main etiological factors of facial paralysis may be grouped under three headings:

1. *Central*:
 Tumours in and at the base of the brain.
 Meningitis.
 Nuclear degeneration, as in labio-glossal paralysis.
2. *Osseous* (in the Fallopiian canal):
 (a) Inflammation extending to the osseous walls, thence to the sheath and to the nerve itself.
 (b) Caries and necrosis of the aqueduct, the destruction extending to the nerve itself.
 (c) Injury to the nerve during operations on the accessory cavities of the middle ear.

3. *Terminal* (after exit from the stylo-mastoid foramen):

- (a) Injuries to the nerve.
- (b) Implication in cellulitis and growths in the neck.
- (c) Influenza, diphtheria, and syphilis, giving rise to neuritis.
- (d) And, finally, that type, yeclapt rheumatic, frequently met with, and usually ascribed to a cold or draught on the face, and for which sometimes no cause can be assigned.

But it is a matter of some doubt whether all these so-called rheumatic palsies should be ascribed to colds or draughts. Lake¹ states that they are frequently due to a transient acute inflammation of the middle ear, in which suppuration has not taken place, and quotes Sir William Dalby as having pointed out, in 1872, that many of these cases, said to have resulted from exposure to draughts, were frequently due to an acute otitis media, "the pain of which was so slight and evanescent as to have been quite overlooked both by patient and physician."

It is to the second or osseous division that the subject of these notes applies. An acute inflammation in the tympanum may easily extend to the osseous walls of the Fallopiian canal, and thence to the sheath, and so to the nerve itself; the accompanying infiltration and exudation, by exerting pressure on the nerve in its unyielding surroundings, will suspend its physiological activity. Then, usually, as the inflammation resolves and the pressure lessens, the nerve recovers more and more of its function.

Therefore this type is not serious.

On the other hand, in a case of chronic otorrhoea, no matter how small a quantity of pus is being discharged into the meatus, the onset of facial paralysis is a serious symptom, indicative of a grave condition both of the nerve and of the patient himself, for it shows that necrosis is taking place in the temporal bone. The disease may be situated in the middle ear, or perhaps in the antrum as well; but, wherever placed, the paralysis indicates that necrosis is extending to the Fallopiian aqueduct, and thence to the nerve itself. The close relation of the aqueduct with its contained nerve to the labyrinth has already been mentioned, therefore it will readily be understood that the facial paralysis may easily be a symptom of that very serious condition—suppurative labyrinthitis. As a matter of fact, investigation² has shown the facial nerve to be involved in no less than 83 per cent. of cases of labyrinthine necrosis.

Therefore this symptom is a clear indication for early surgical interference.

TERMINATIONS OF FACIAL PARALYSIS.

The terminations of this condition may be briefly summarized as follows:

1. Return to normal function.
2. Persistent paresis of the whole or of part of the nerve.
3. Complete permanent paralysis.

Maggie G., aged 9, came to the Ulster Hospital in June, 1907, stating that she had been unable to close her right eye for the past fortnight, and gave a history of previous double otorrhoea. She was unable to wrinkle any of the muscles on the right side of her face, the right palpebral fissure was widely open, the lower lid showed a tendency to fall away from the eye, and on telling her to close her eyes the eye itself was rotated upwards, but the eyelids did not move; she was unable to lift her lips to show her teeth on the right side. Owing to deafness, she had to be spoken to loudly and distinctly. A little thick pus was found in the right meatus, and the greater part of the right tympanic membrane had been destroyed; no history of headache, vomiting, or pain. She was admitted, and on June 6th a complete post-aural operation was performed on the affected side. The cavity was packed and the wound sutured up completely. Twelve days later she was discharged and ordered to attend daily to have the wound dressed, and for galvanism, the paralysis being only slightly less.

July 22nd. The paralysis not cleared up yet, though less; attendance for galvanism very irregular; very little scar on site of external wound.

August 15th. Paresis decreasing; can now shut right eye and open her lips so as to show her teeth on the right side; still very irregular in attending for galvanism.

October 21st. Hearing equal in each ear, though a little sub-normal, as low tones are not well heard. Still slight paresis on right side of face.

On May 25th, 1908, practically twelve months later, the patient presented herself at the hospital with an almost complete paralysis of the left side of the face, the onset having taken place two days previously.

She was unable to close the left eye or lift the lips so as to show the teeth on that side; the furrows in the cheeks were obliterated; no history of pain in the ear or of otorrhoea, no vomiting or vertigo. Patient had to be spoken to in a fairly loud voice, owing to deafness. The left tympanic membrane has been almost wholly destroyed; the handle of the malleus can be seen foreshortened and protruding *in situ*, but deprived of

* Read at the spring meeting of the Ulster Branch of the British Medical Association, Londonderry, May 8th, 1909.