"MUMPS"

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SYNONYMS.
Latin - Parotiditis, Phlegmone parotideae, Inflammatio parotidum, Cunanche parotideae; Italian - Parotide; Spanish -- Parotiditis; French - Parotide, Oreillous, Ourles, Fievre ourlienne, Partide epidemique; German -- Ohrspeicheldrusenentzundung, -- vulg.; Ziegenpeter, Mumps, Bauerwatzel, Tolpelkrankheit, Kehlsucht, Hirren; English -- Perotitis, Epidemic Parotitis, Parotiditis, Mumps.

DEFINITION.
An acute infectious, contagious, epidemic, febrile disease, generally occurring in young persons, characterised by an anatomical lesion situated in one or both parotid glands, which affects the entire economy after the manner of general diseases, runs a short course, and almost invariably terminates favourably without leaving any trace of its previous existence.

The disease usually appears but once in a lifetime. Although by no means limited to children, it is commonly met with between the second year and the age of puberty. Quite exceptionally the inflammation affects the submaxillary glands also.

Certain authors in view of the different methods of termination and certain etiological distinctions, varieties, or sub-classes. Thus a condition of tumefaction and inflammation may be set up in the parotid gland by a blow or some external injury, and following such trauma, parotitis may arise. Though this may occur, a class division of traumatic parotitis is hardly necessary or within the terms of the definition. The same may be said of those retention-cysts which arise from occlusion of the duct by a foreign body or as a result of local inflammations. It may be questioned also if those cases of so-called mumps that have been reported as caused by local diseases, stonatitis, extensive disease of the mouth...
or teeth, diphtheria, etc., are not in reality examples of duct-occlusion as a result of cicatrices or local injury. The epidemic and contagious nature of mumps must make us examine such cases carefully and prevent us from multiplying our varieties or parotitis proper. Two other forms have been recognised; (1) Idiopathic, or, more properly, epidemic parotitis, or true mumps; (2) Secondary, symptomatic, metastatic, deuteropathic, malignant, or suppurative, parotitis, or parotitis metastica, which may follow typhus, dysentery, measles, small-pox, scarlet fever, etc. The secondary form of the disease differs in no essential respect from the idiopath- this; except perhaps in tendency to proceed to suppuration of the glands.

**HISTORY**

Mumps is one of the most ancient of diseases, and was described in a masterly fashion by Hip pocrates (Epidemi, lib. i, sect. i, ed. Littre, ii, 600) who states that: "swellings appeared behind the ears, in many on one side, in most on both, without a fever or any confinement, but in some with a little fever. In all they disappeared without either inconvenience or suppuration, contrary to the custom of such tumours from other causes. At this particular time they were naturally soft, large, diffused, without inflammation, or pain, and went off universally without any visible signs. Children, young persons, adults, especially those who frequented the public places of exercise, were most subject to them. A few women were also affected. The greatest part had dry coughs, which were soon succeeded by hoarseness. Some again after a while had painful phlegmons upon the testicles, sometimes upon one, sometimes upon both. Some had fevers, others none; most of 'em trouble and fatigue enough: but with respect to the chirurgical part did very well." Both Hippocrates and all the other Greek and Roman medical writers of antiquity, were well acquainted with the difference between epidemic parotitis and the symptomatic inflammatory swelling of the gland. But for ages after the time of Hippocrates the disease in its clinical peculiarities remained unrecognized. Even Ambroise Pare could not distinguish cases of mumps from those of secondary parotitis, and even confounded them with affections of neighbouring glands. "Parotiditis," he says, "is an unnatural swelling involving the glands and neighbouring parts which
are below the ears." Sennert, Van Swieten, J. Capuron, and others were equally unfortunate in their descriptions of the mumps, which they regarded as essentially a periauricular swelling. J. Capuron appears to have been even more erroneous than others in his conception of the malady, for he says: "We give the name of oreillous to the swelling of the parotid glands. Tumours of this sort are almost always produced by the process of detition, or by a sudden drying up of ulcerated or suppurating ears; they depend also sometimes upon a scrofulous vice; they are accompanied or not by fever according as there is a simple swelling or an inflammation of the glands." But from all these periods we have extremely little information about the disease, and it was not until the beginning of the eighteenth century that parotitis came to receive more consideration in the history of epidemic sickness, side by side with the acute exanthemata and whooping-cough. Still, some physicians, even in the preceding century, had felt and expressed a part of the truth in the presence of epidemics of mumps. Thus, in connection with an epidemic in Scotland, in 1761, had quite a correct idea of the disease and noted the occurrence of orchitis and of testicular atrophy as sequelae of the attack. The contagious nature of the disease was asserted by Mangor in connection with the Wiborg epidemic of 1773, and this idea received subsequent and ample confirmation by the historians of the several epidemics which occurred in Italy. Writing of the epidemic of mumps in Genoa, in 1752, Pratolongo remarks: "The only disease which we can regard as epidemic in Genoa at present is that which we call mumps. In addition to the swelling of the parotids we have seen in some patients an enlargement of the testicles together with a violent fever. In others this swelling of the parotids was followed by an anasarca such as sometimes supervenes upon an attack of scarlatina accompanied by great difficulty in breathing and a sharp fever. Do you think that we could class this disease among the eruptive fevers?"

Mumps is now a widely diffused disorder, and occurs in endemic or epidemic form all over the world.
EUROPE.

Mumps is met with in all countries of Europe, and in ours as often as any other. Statistics as regards the comparative frequency of the disease are, however, to a great extent wanting. Parotitis is frequently seen in European Russia, from the Shores of the White Sea on the north to the shores of the Black Sea on the South. In the Balkan states and Constantinople it is no rarity. It commonly comes under observation in the Bavaria and Swabia. Epidemics have even occurred as far north as Iceland and Lapland. The Faroe Islands have not infrequently suffered from mumps.

ASIA.

Owing to the comparative harmless nature of the malady Asiatic statistics frequently make mention of parotitis. It appears to be common enough in the Russian possessions in Asia - Siberia, the Caucasus, and Russian Central Asia. From all the provinces of the Caucasus proper and of Transcaucasia, the disease was reported in the three years 1893 - 95; in the last named year the total number of cases recorded in both territories was 3,238 with 142 deaths. Throughout all parts of Siberia mumps occurs, including the Amur province, the territory of Chita on the Russo-Mongolian frontier, the far northerly province of Jakutsk, and the island of Sakhalin. The disease is said to visit Central Asiatic Russia just as commonly as it does Europe. One frequently hears of it in Transcaspia, the Turkestan provinces, Semipalatinsk, and the Semiretchinsk territories between the latter and Siberia proper.

We have little certain knowledge concerning the prevalence of mumps in Mesopotamia, Arabia, and Asia Minor. It occurs sometimes in Persia. In the winter 1901 - 1902 it was epidemic on the Turco-Persian frontier. It occurs from time to time in the islands off the coast of Asia Minor. Towards the close of 1901 it was widespread in Mitzlene.

Parotitis is a common disease in India, the natives being particularly susceptible to it. The malady is frequently found in emigrant ships there. Thus, Dangaix in two voyages from the East to the West Indies reported 88 and 147 cases respectively occurring on the vessel a week, after the departure. Huiller mentions the frequency of mumps at Pondicherry. Jobard describes two epidemics among the Indian emigrants on board the "Contest" 88 cases among 471 passengers) and the Medusa (67
cases among 512 passengers). The disease declared itself in the first of these vessels five days and on the other twenty-three days after sailing from Karikal. Buchanan (Jour. Throp. Med., Sept., 1899) mentions the great frequency of mumps among the natives of India. It appears that every year many of the native Indian troops are treated for it, in 1896, for instance, as many as 1081 and 742 in 1897. Parotitis is likewise a pest of the Indian goals -- e.g., in 1896, 845 prisoners were attacked, and 2,264 in 1897. In the latter year, moreover, the malady was commonest in the North-West Provinces and Oudh. But the Europeans resident in India by no means escape infection. The disease is seen just as much on the Indian heights as on the plains. Thus, there was an epidemic in 1892, at Hindu Khush, chiefly among the Sepoys of two regiments of the Kashmir Imperial Reserve, the infection being brought up from the low-lying districts around. Next year the men of another newly-arrived regiment suffered severely. In neither instance did the disease spread to the inhabitants of the villages in which the troops were located. Mumps is occasionally heard of in Ceylon.

The distribution of parotitis throughout China is not easy to follow. We have reason to believe that the Chinese are not immune to it. According to the Medical Reports of the Imperial Chinese Maritime Customs (No. 55) there was an outbreak among the Chinese of Chung-King in the winter of 1897 - 98. It also appeared in the Chung-poo valley in the province of Fukien.

The disease seems to be rarely encountered in the East Indian Islands. The native hill tribes of Java are said to be quite immune to it, but, according to Kohlbrugge (Janus, 1897 - 98, p. 211), not the foreigners.

AUSTRALASIA.

So far as the writer can learn, parotitis seldom visits Australia. During the decennium 1889 - 1898 the mortality statistics of Australia make mention of only one death from the disease. (in 1895). During the same period only one person died from it in South Australia in 1891, and another in 1895. Mumps is exceedingly rare in Queensland, and entirely unknown in West Guinea. It has, however, been seen in some of the Pacific Islands. In the Solomon group deaths have been recorded, during its occasionally epidemic prevalence. A case now and then is heard of in Fiji.
AFRICA.

Mumps is rather common in various parts of Africa. Laveran says it is as common in Algeria as in France. According to the medical statistics of the French Army, during the four years of 1862-65 the number of patients admitted for mumps was for the garrison in France 367, for those in Algeria 122, and for those in Italy 7. "The effective of the troops in France," he says, "for this period being five or six times that of the troops in Algeria, we see that mumps occurred with as great frequency in Algeria as in France." These figures also, Laveran adds, give but a faint idea of the frequency of mumps in the army since they refer only to those patients who were treated in the hospital, but most of the men suffering from mumps are treated in the infirmaries. During a period of eleven years from 1862 to 1874 (the years 1870 and 1871 being excepted) there was but one death due to the mumps in the army in Algeria. Thierry de Mangras reports 74 cases of mumps during an epidemic which attacked a column 1,200 strong returning to Mascara, and Widal saw 33 cases—one-half of them complicated with orchitis—among the men of the 87th regiment at Milihanah.

Mumps is of common occurrence along the west coast of Africa. It frequently attacks the inhabitants of Belgian Congo (Cong. Nat. d'Hyg. et de Climatol. Méd. de la Belgique et du Congo, 1897) and also those of Gambia. There was a small outbreak of mumps in the Cameroons in 1895. It is a very common disease of Uganda.

Epidemics of mumps—sometimes very severe and widespread—occur in South Africa. Such was an epidemic in 1898 in Namaqualand, as many as three-fourths of the inhabitants being attacked. Outbreaks are from time to time recorded in Cape Colony, Mauritius, and Madagascar.

NORTH AMERICA.

All parts of Canada seem to suffer from parotitis. Recent reports show that it is especially common in Ontario, Manitoba, New Brunswick, and even as far north as Alaska.

The disease is quite as common in the United States as in Europe. Thus during the first year of the Civil War there were 11,216 cases with 9 deaths, in the second year, 13,429 cases with 30 deaths. In Mexico mumps prevails to some extent from time to time.

In the West Indies the disease is met with, and is indeed by no means a rare disorder. Recent
outbreaks have occurred in Jamaica.

**SOUTH AMERICA.**

Little is known of the prevalence of mumps in South America. With the exception of an epidemic of mumps in Peru writers upon the pathology of the South American continent are, for the most part, silent in regard to this disease.

**EPIDEMIC PECULIARITIES**

Mumps may show peculiarities as regards time and place. An epidemic usually lasts a few weeks or months, but it may be prolonged to the greater part of a year. Having left one place, it does not usually return to it until years afterwards; but it has been known to visit the same place annually or after short intervals of absence. Frequently the outbreak restricts itself to one town, or a small urban district, or to certain classes of the inhabitants, particularly to children, or to the military, and often to some one division of the latter, or to single buildings such as orphanages, hospitals, workhouses, cadets' quarters or soldiers' barracks; and in like manner it has been seen from time to time on board warships. Again, it may spread gradually until it has covered whole districts and even large tracts of country or entire provinces. Thus, in 1714 an epidemic of mumps extended throughout Istria; in 1753 it invaded Bologna, Ferrara, Mantua, the Marches, and Rome; in 1872 Northern Italy (Milan, Turin, Genoa), was attacked; in 1786 — 87 Treviso, Vicenza, Verona, Venice, and Padua; in 1826 Saxony; in 1829 the Canton of Zurich; in 1835 Treves and Düsseldorf; in 1841 Cologne and its environs; in 1851 and 1856 Sweden; in 1857 and 1889, Lower Bavaria and Central Franconia; and in 1857 and 1859 almost every part of the Duchy of Nassau. Instances of the prevalence of mumps within confined limits are supplied by the following epidemics; the prison of New York in 1821, the orphanage of Halle in 1837, and of Moscow in 1840, the girl's school at Bombay in 1837, and boys' school in 1851, the cadets' house at Berlin in 1836, and of Ploen, Holstein, in 1876. The disease frequently occurs among the military; for, once introduce mumps into a regiment, and whether this regiment be in garrison in London, Malta,
Calcutta, or Singapore, the propagation of the disease will be precisely the same, and the number of victims will be influenced in not the slightest degree by the temperature of the climate in question. There are numerous records of military epidemics, particularly in France; such as those of 1759, 1799, and 1868 in the garrison of Marseilles, 1779 and 1877 at Brest, 1827 at Mont-Louis, 1864 at Arras, Douay and Montpellier, 1866 at Rochefort, 1876 at St. Germain-en-Laye, 1877 in a number of French garrisons, and 1881 at Fontenay and Toulouse. There was also an army epidemic in 1827 at Heilbrown, and one in 1883 among the Austrian troops occupying the Herzegovina. Among the confederate troops in the American war of Secession mumps was prevalent to a violent degree; in the first year of the war there were 11,216 cases and in the second year 13,429 cases of parotitis recorded, including symptomatic forms of the disease. There are also accounts of epidemics on board warships, as, for example, that reported by Noble (Edin. Med. and Surg. Jour., 1808, July, p. 304.) on H.M.S. "Ardent" on a voyage to Monte Video; and others, on board French coolie-ships, in 1859, 1871, and 1873, described by Dangaix (Épidémie d'oreillons sur des emigrés Hindous transportés de l'Inde aux Antilles, Paris, 1860) and Jabard (Relation de deux épidémies d'oreillons observées sur des émigrants indiens en 1871 et 1873, Paris, 1874.
PATHOLOGICAL ANATOMY.

The exact anatomical changes in mumps are not thoroughly understood, since the trifling nature of the disease and the almost invariable termination in recovery afford no opportunity for post-mortem investigation. According to Poerster, who seems to have made examinations in cases where mumps occurred as one of the accidental complications of other and fatal diseases, the affected gland at first becomes hyperaemic; and is then the seat of serous exudation, by means of which the cut surface of the then not only reddened but also swollen gland presents a uniform, flesh-like, succulent, but no longer granular aspect. Sometimes the connective tissue surrounding it is also infiltrated with serum, and the tumour still more enlarged. In other cases the entire swelling has consisted of this infiltration of the surrounding connective tissue, and the gland itself has remained entirely free from lesion. The great point in favour of this view of the pathology is the repaid and complete subsidence of the parotial swelling by resolution - a termination to be expected only when the inflammatory process stops short of fibrinous exudation or suppuration.

Virchow believes that the essential foundation of all forms of parotitis is a more or less malignant catarrh of the ducts of the gland. He divides them into three groups: (1) Primary simple catarrh, usually appearing epidemically (angina parotidea, mumps), without disposition to suppuration and ulceration. (2) Secondary, purulent catarrh, readily productive of abscess (bienorrhoea parotideae), usually in connection with previous catarrh of the buccal cavity, and not infrequently with affections of the middle ear. (3) Specific catarrh, almost always leading to ichorous degeneration, usually associated with ichorrhoea or embolic metastasis in other places. Virchow's theory of malignant catarrh originally affecting the gland-ducts is undoubtedly true in some cases, but that it is far from being the rule is proved by the infrequency of parotitis as a secondary complication of catarrhal affections of the mucous membrane of the cavity of the mouth.

Trousseau and Cadet de Gassicourt assert that the lesions do not proceed beyond hyperaemia, and congestion, and they draw a sharp distinction between parotiditis secondary to infectious disease and epidemic mumps.
Jacob, at the autopsy of a soldier who died of oedema of the glottis during an attack of mumps found the following lesions; There was no increase in size of the actual substance of the parotid and submaxillary glands, but their cells were filled with a greenish, transparent, gelatinous fluid which gave to the tissues a waxy consistence. Ranvier, using the microscope, could detect neither inflammation of the glands nor lesion of the neighbouring lymphatic ganglia. The epithelium of the salivary ducts was intact, there was no cellular proliferation, and the interacinous connective tissue was not oedematous. The oedema was glottic and parotidean solely. In simple cases, therefore, there is no inflammation of the parotid gland, only when suppurative infection occurs by secondary infection.

The form of inflammation of the parotid gland secondary to infectious disease has been much more thoroughly investigated in those who have died from the latter. Some authors distinguish two different forms, in one of which the inflammation proceeds from the connective tissue of the gland, and in the other from the mucous membrane of the ducts and from the acini of the gland. Such distinctions are, however, difficult to make in the post-mortem room. The condition of things is naturally different, according to the duration of the parotitis previous to the fatal termination of the illness. If the patient dies when the swelling of the gland has existed but one or two days, the glandular tubes and acini are found swollen and reddened, while the connective tissue of the gland is yellowish - red and infiltrated with serum. A viscid, ropy, grayish-white secretion accumulates in the ducts, which soon takes on a purulent character. By pressure on the gland, and stroking the duct towards its orifice in the mouth, this fluid can be forced from the orifice, according to Bruns, and it is possible, according to him, to distinguish the purulent contents of the ducts, - the main one and its branches, - upon section through them from their thickened walls. If the parotitis has existed a few days longer, purulent softening of the acini of the gland sets in, and this always begins in the centre and spreads towards the periphery, so that the acini finally become changed into small collections of pus. Finally, the ulceration also seizes upon the interacinous connective tissue, and the originally multiple little ancesses unite into one or a few great cavities of pus. This pus now seeks an outlet. It either breaks directly towards the skin, which always requires a
considerable time, on account of the toughness of the overlying fascia, or it invades the neighbouring organs. Among these, the first place to mention is the external auditory meatus, and the rupture generally takes place between the cartilaginous and osseous portions of the meatus, or else further forward. The remaining ways in which the abscess may open into the mouth, the pharynx, or the oesophagus, or, still further by working its way down into the anterior mediastinum along the sheath of the sterno-mastoid muscle, or elsewhere can be explained in view of the anatomical arrangement of the cervical fascia - superficial and deep. It is, however, but seldom that such cases are reported.

In addition to this burrowing of the pus, other inflammations also occur, from the very outset, in the neighbourhood of a metastatic parotitis, namely, in the masseter, pterygoid and temporal muscles, from whence the pus forces its way inwards and upwards towards the base of the skull into the temporal or the zygomatic fossae. The purulent process may involve the periosteum of the adjacent bones, the temporal portion of the sphenoid bones, and the lower jaw, and even the bones themselves; and it may finally spread through the cranial bones to the cerebral meninges and brain itself. Not at all infrequently the labyrinth and middle ear participate, in which case the pus probably passes directly along the vessels and nerves that go from the parotid gland to the ear. Short of a fatal issue permanent deafness results from destruction of the ossicles of the ear.

The suppurative process likewise involves the lymphatic vessels, veins, and nerves that traverse the parotid gland. As a result of the irritation of the lymphatic vessels, the neighbouring lymphatic glands are always found swollen, reddened, or even in a suppurative condition. Thrombosis frequently takes place in the jugular vein and its branches, and the breaking-down of the clot leads to septic infection of the sinuses of the dura mater. The nerves traversing the parotid, the facial nerve, and some twigs from the second and third divisions of the fifth, are also destroyed in a complete breaking-down, especially in gangrenous destruction of the parotid glands; but in case of the simple formation of an abscess, they appear to remain intact a long time; otherwise paralysis of these nerves would be more frequently observed as a result of the disease. Apart from this,
the facial nerve seems especially calculated to conduct the inflammation, into the auditory apparatus, while the twigs of the trifacial favour its transportation into the brain, as would be inferred from the observations of Virchow, who states that he has several times seen accumulations of pus around the gasserian ganglion. In certain cases the parotid becomes gangrenous. From the purulent cavities gangrenous cavities form, filled with ichor, and gas, out of which, after they are opened, black shreds of connective tissue and of gangrenous acini may be drawn. The gangrene may destroy the gland in part or entirely, in which case, all the tissues, even the facial nerve, are destroyed; and a deep chasm remains behind the ear after recovery.

Lesions of the testicles, in view of their frequency and importance, have been carefully studied by numerous pathologists. Reclus found the testicle soft, flaccid, and atrophied in a case of mumps. The tunica albuginea, too large for the shrunken gland, was wrinkled, and the substance of the testicle itself was bloodless, opaline, and of milky whiteness. The surface on section was smooth, the seminiferous tubules were faintly marked, and although they could still be enrolled, they were soft and quickly broke. The histological changes have been studied by Malassez, who states that the intercanaliculcral connective tissue was not thickened and the vessels were healthy; the seminiferous tubules were diminished in volume (60 to 120 min., instead of 150 to 200 min.); the outer coat of the tubes was unchanged, but the inner tube was thickened, the epithelium was gone and the tubes were converted into simple cords, the entire lesion being that of a parenchymatous sclerosis.

Griffiths reports the finding of a ptomaine in the urine of patients suffering from mumps, and which, on injection into a cat caused suppression of the saliva and death of the animal in convulsions.

According to Quinquand, the haemoglobin is but little altered, being normal in amount or perhaps reduced to 110 per 1.000; the albumin is diminished in amount possibly even as far as 65 gm. per 1.000 or lower; the fibrin to from 3 to 5 gm; while the products of disassimilation are increased to 8, 12, or 14 gm., and the proportion of urea was only slightly increased.
Bacteriology.

As mumps is an infectious disease its microbic nature has long been suspected. Pasteur thought it was due to a bacillus, which he found in the blood. In 1881, Capitan and Charrin (Comptes-rendus Soc. de Biol. de Paris, May 28, 1881), declared they had seen micro-organisms in six pupils of the Polytechnic School who were suffering from mumps. These were found in the blood, occasionally in the saliva, and were for the most part spherical, but sometimes occurred as elongated rods. According to them, there was never anything in the urine and seldom any distinct forms in the saliva, but the blood contained a very large number of microbes, most abundant during the height of the disease and diminishing gradually as convalescence supervened, but becoming very markedly less numerous in cases in which orchitis occurred, these microbes had variable forms, rods 2 min. in length by ½ min. in thickness, and micrococci, single, double, or in chains; cultures were made, but nothing happened from inoculations in dogs, rabbits, and guinea-pigs.

Bouchard, in a case reported by Karth, found bacteria in the saliva from Steno's duct, and also in the albuminous urine. Capitan and Charrin's researches were subsequently confirmed by Ollivier. In the case of a boy, eleven years old, an examination of the saliva showed bacilli and micrococci in the midst of epithelial cells and leucocytes. These micrococci, single or united in twos and fours or in zoögloea masses, were not more than ½ mm. in diameter. They were also found in the urine. Nothing similar was found in two other children, who were not suffering from mumps. In two other children affected with mumps the saliva, blood, and urine contained micrococci, diplococci, and short and mobile bacteria. These elements disappeared after recovery. Boinet found similar micrococci in fifteen patients with mumps. Bords, on the other hand, found no micrococci in the blood, but a bacillus (bacillus parotidis) which was sometimes enlarged at each extremity, and occasionally assumed the form of an S or a V before division. When the culture medium was poor there was a spore formation. The bacillus was quite resistant at ordinary temperatures, but succumbed at 140° F, the spores resisting up to 194° F. Corrosive
sublimate and boric acid destroyed the bacillus, but iodoform did not. Bordas believes that the disease develops only after the deposit of spores in Steno's duct, and that the saliva is the true vehicle of contagion.

Laveran and Catrin have more recently studied cases and found an organism thought to be specific. They examined, in a large number of patients with mumps, not only the blood but also the serous fluid from the parotid gland and the neighbouring parts, from the testicle, and from the oedema in certain parts, and also the auricular fluid in certain cases of rheumatism complicating the disease. These researches were confirmed by others in the case of adults. The puncture of the organs or cellular tissue was made by means of a fine needle fitted to a hypodermic syringe. Antiseptic precautions were employed, and no accident was caused by the operation; indeed, the puncture in certain cases seemed to have a beneficial therapeutic effect by way of relieving the pain in cases of testicular complications. Of the ninety-five cases studied positive results were obtained in sixty-seven. In thirty-nine out of fifty-six times pure cultures were obtained by puncture of the parotid gland, twice the cultures were impure, and fifteen times no result was obtained. These negative results may be explained by the occasional absence of any fluid in the organ, so that the plates were sown merely with the sterilised water contained in the needle. In most cases the amount of fluid extracted did not exceed a few drops. The testicular fluid, on the other hand, almost constantly gave positive results, that is to say, twelve out of sixteen experiments; the fluid removed from points of localised oedema gave a positive result in all the three cases examined, and the same is true in the two cases in which the fluid from a swollen joint was examined. In ten out of fifteen examinations of the blood white fever was present the same micro-organisms were found as in the fluid removed from the various organs. The microbe was found two or even three weeks after apparent recovery from mumps, a fact which serves to explain the rare instances of contagion after convalescence. After a month had elapsed negative results were invariably obtained. In the pus of an abscess of the neck in one case, was found a pure culture of the staphylococcus pyogenes aureus. In no respect did it resemble the organism seen in the parotid glands. The latter
occurred in the form of micrococci, usually arranged in pairs, sometimes in fours, and rarely in zoogloeæ masses. These cocci measured from one to two and a half micromillimetres in diameter; they were mobile, but not markedly so. They were coloured readily with the ordinary stains, but unlike streptococci and staphylococci they did not take up Gram's stain. The bouillon, kept in an oven at 35°C., showed changes at the end of from twenty to twenty-four hours, and these increased markedly later. Colonies on gelatin plates did not appear until the expiration of of forty-eight hours; they were punctiform, white in colour, grew slowly, and liquefied also very slowly and tardily. In stab cultures the colonies developed as very minute pearls along the track of the punctures; liquefaction began at the surface and proceeded very slowly. On potato the whitish culture was scarcely apparent, but it was more so in carrot; on serum it presented no peculiarities. Very convincing inoculation experiments were not expected, since no known animal except perhaps the horse, and that too, questionable, is susceptible to mumps. Subcutaneous, interperitoneal, and intravenous injections gave only negative results in guinea-pigs and rabbits. Injections into the subcutaneous tissue caused no reaction, but those into the testicle excited a very acute orchitis of short duration, ending in recovery by the end of a week. These last experiments were made in rabbits and dogs, but the animals could not be followed up long enough to see whether testicular atrophy occurred. In white mice four out of twenty-six inoculated were followed by death, and on examination the spleen was found enlarged. Four of these inoculations were made into the peritoneum, and in three of these death occurred, the peritoneum showing evidences of inflammation. The diplococcus above described was found in the blood removed from the heart cavity, with the usual precautions, in all the fatal cases.

Busquet and Ferré claim to have found similar diplococcus, in seventeen cases in the blood taken from the pulp of the finger and the lobe of the ear, and in the fluid from the parotid gland; and also a diplostreptococcus (either alone or in company with the diplococcus found elsewhere) in the saliva removed by a pipette from Steno's duct.

Mecray and Walsh report the finding of the same diplococcus in cultures made from the contents of Steno's duct during the height of the disease;
and moreover claim to have isolated and cultivated this diplococcus long before hearing of Laveran and Catrin's researches, by the following procedure; the mouth having been carefully cleansed with a saturated solution of boric acid, the orifice of Steno's duct, after this had been emptied by a light massage of the cheek, was covered for a period of five minutes with a piece of cotton wet in the same solution. A bit of sterile silk worm gut was then introduced into the duct and from it an agar slant was inoculated. Out of ten tubes six had a mixed growth, but in all of them there was noted a small-, white, slowly-growing colony. This was isolated in plate cultures and was found to contain two different organisms, one a streptococcus form, the other a micrococcus, nearly always seen as a diplococcus. Further culture showed that the streptococcus grew more rapidly and liquefied gelatin sooner— in three to five days—than the micrococcus. It did not occur in the original cultures as constantly as the latter, the diplococcus form, occurring for certain in eight of the ten tubes and being considered to be present in the others, though this could not be demonstrated with certainty, owing to the invasion of the colonies by the more rapidly growing cocci so common in the mouth, which the precautions taken had not succeeded in eliminating. The blood was examined in eight cases. Out of the eight tubes, three gave pure cultures of the characteristic diplococcus, and three gave a mixed result, the diplococci being found, but with them other cocci, notably a staphylococcus form, probably the staphylococcus epidermis albus. Control tests made from the blood of five healthy children have absolutely negative results. Cultures made from Steno's duct in these same children gave various oral micro-organisms in four cases, but not the diplococcus found in cases of mumps. These authors make no mention of the relation of the cocci to the pus-cells or to other organised constituents of the secretion from which they were obtained; no animal inoculations were made and nothing is said about the possible motility of the cocci or their reaction to Gram's staining solution.

Analogous results have also been obtained by Michaelis and Bein (Deut. med. Woch., May 13, 1897); they found a diplococcus in the pus-cells, which seemed to be identical with the one that Leyden has already observed in the sputum. In several cases of mumps, which they studied by culture and microscopic section, the organism was not
not only secured from Steno's duct, but in two
cases from the pus of a parotid abscess and in
one case from the blood. The diplococcus is
about one millimetre in diameter and resembles the
gonococcus, though smaller. The cocci usually
lie in the cells, sometimes eight or ten in one
pus cell, and are occasionally distributed through¬
out the pus in long chains or strings. They
take readily the usual stains, especially Loe¬
fller's methylene-blue but are decolorised by
Gram's method. They grow slowly upon the ordin¬
ary media, forming transparent, dew-like points
on agar-agar. These little drops do not coalesce.
In peptone-bouillon a white granular or floc¬
culent deposit forms, the bouillon itself remain¬
ing clear. The growth is said to be more rapid
in strongly than in feebly alkaline media. The
cocci are said to grow upon ascitic fluid and upon
milk, the latter coagulating in the course of
forty-eight hours. They are capable of slight
movement. Numerous inoculation experiments were
made, only one animal, a white mouse, dying.
The same organisms could not be demonstrated in
the healthy human parotid or its secretion by
control experiments. In spite of the small
number of cases studied, these authors are of the
opinion that this cococcus is a specific one.
The experiments of the observers quoted are
certainly interesting, but the lack of experimen¬
tal proof shows their incompleteness. In no case
has their specificity been shown by the reproduc¬
tion of the disease in animals by means of inocu¬
lation into animals; without which, of course,
their real importance cannot be established.
ETIOLOGY.

While it is more than probable that, like other diseases of the zymotic class, mumps is due to a contagium that finds its way into the body in the inspired air or with the food or drink, nothing has been definitely established regarding the nature of this infecting principle. The undoubted contagiousness of mumps, with the fact of its frequently occurring in extended epidemics, entitles it to a place among the zymotic diseases, from which it differs, however, in the marked disproportion between the local and constitutional symptoms, the former being well developed, the latter altogether absent or slight.

The disease occurs for the most part in the form of epidemics, and thus approaches the infectious diseases in many respects, from which, however, it is distinguished by its short duration, and the slight participation of the organism in general. Epidemics of mumps are of much less frequent occurrence than the acute exanthemata, often avoiding a locality for thirty years or more (Behr, Hinze, Waldenburg). In some localities, on the other hand, mumps is a very frequent disease, appearing annually. The disease is very common in the army, in regiments in garrison, and wherever there are large aggregations of young men. In the French army from 1888 to 1892 there were 33,745 cases of parotitis. Rochard (cited by Bruns) states that parotitis was, in 1757, endemic in Belle-Isle-en-mer; not that it existed continuously, for there were pauses sometime of eight or ten months' duration. It occurred at all periods of the year, but most frequently in autumn, and winter, and affected those soldiers only who stood guard; while non-commissioned officers, drummers, and the like, who shared the diet and quarters of the soldiers, were never affected. The disease rarely attacks nurslings, but is common in those attending schools.

As regards age, the mumps most commonly occurs between the second and fifteenth year. Rilliet and Lombard tabulate the ages of seventy-three patients attacked as follows:

- 18 -
No cases under 2 years.

7 " from 3 to 5 "
7 " 5 to 10 "
7 " 10 to 15 "
19 " 15 to 20 "
8 " 20 to 30 "
8 " 30 to 40 "
2 " 40 to 50 "
1 case 50 to 60 "
1 " 60 to 70 "

More than half the cases were therefore in patients between the ages of five and fifteen, only two cases after fifty, and none before the end of the second year. Individuals advanced in life seem to be almost entirely exempt, and so, too, infants at the breast. Gantier, however, tells of a case of mumps in the new-born child of a woman suffering from the disease. In this case the swelling, which was confined to the submaxillary glands, appeared twelve days after the commencement of the parotid lesion. The woman was forty-five years old, and was attacked with mumps during the eight month of pregnancy, and was prematurely delivered of a child with inflammation of its left parotid gland. In extended epidemics it is not at all a rare thing to meet with cases in adults, but it will generally be found on examination that these patients have escaped the disease during childhood. Military medical statistics show that -- and Cornac, Colin, and Gallaud in particular have emphasised the fact-- that young soldiers are more liable to take mumps than their elders. In Bussard's 28 cases, 5 had been between one and two years in the army, and 16 less than one year.

Sex is by many believed to exert some predisposing influence, a much larger proportion of males being attacked than females. This is affirmed by those who have studied epidemics in boys' schools, colleges, and other collective buildings. Apart from this, however, sex has little or no influence upon the etiology of the malady. Thus, in the 73 cases referred to, analysed by Rilliet at Geneva, 38 were in male and 35 in female subjects; furthermore, in an epidemic studied by Lepeçq la Clôture, women (and children) were attacked to the almost entire exclusion of men.

That mumps is contagious the history of epidemics clearly proves. The duration and intensity of an epidemic are, however, very variable.
While at one time it becomes extinguished in a few weeks, and spreads so little that it can hardly be termed an epidemic, at another time it will attack nearly every child and many adults, and is not exhausted until after the lapse of several months. The same holds good for the extension of individual epidemics. In many cases it is limited to one institution, or to one garrison, in others it spreads over whole cities and extensive areas. The contagious character of the malady is seen in hospitals as well as outside. In Val-de-Grâce, Catrin observed five cases originating within the hospital. In 1887 at Taraxon, all the orderlies in the army hospital were attacked. Cadet de Gassicourt saw a patient in the hospital attacked twenty days after a child suffering from mumps had been placed in the next bed to him. Roth tells of the contagion travelling from bed to bed and also of its being carried by the physician. To show that the causative agent possesses considerable vitality, he says that in one case a woman who slept in a bed which had been occupied twenty-two days before by a patient with mumps fell ill of the same disease. That mumps is decidedly contagious is also clearly evident from the way in which it spreads in many house epidemics, of which the following description of Leitzen furnishes a striking example; In the latter half of April, 1837, while mumps was neither prevalent in the institution, namely Franke's establishment in Halle, nor in the town, the scholars returned from their holidays. One of them had been staying at Pritswalk, in the Mecklenberg district, where mumps prevailed, and where he had associated with patients thus affected. After his return, this lad fell ill with a moderately severe parotitis, from which he recovered in five days. During the latter days of April six orphans who had had considerable intercourse with him, became ill and the malady spread further in this section. Of the scholars who dwelt apart from these orphans, but who were instructed in common with them, the first sickened on May 16th and then mumps spread among them. The first cases in the city occurred at the end of May, and then the mumps spread so rapidly that some three hundred cases came under treatment in the polyclinic. During the Whitsuntide vacation an orphan visited Trotha, an hour distant from Halle, took the mumps in the
early days of his sojourn there, and infected two children in the same house, without the disease spreading any further, in Trotha. These last two cases were isolated indoors.

Mumps is believed to be a less contagious disease than measles. Direct contact is usually required for its propagation, for cases have been recorded in which the interposition of a wall, a glass partition, etc., prevented its spread. The causative agent would seem, therefore, not to be of a volatile nature and incapable of being spread abroad by means of the atmosphere. During the winter of 1874 - 75 the disease was epidemic at Oléron. The garrison (250 men quartered in the right wing of the castle of Oléron) was attacked in the month of January. The first case was in a soldier who had passed several hours two weeks before in a room where there were two children sick with mumps. Following this four of the man's room-mates were attacked, and later other men up to a total of 28 of whom 16 had had less than one year of service. In the left wing of the castle 220 sailors were undergoing confinement for various offences, and were therefore strictly isolated, having no intercourse with either soldiers or civilians; none of these took mumps. Again, in an infant school in Paris there were 25 children suffering from mumps. This school was located on the ground floor of a large building the upper stories of which, were occupied by a girls' school, having more than 200 pupils - A wall about eight feet high, pierced by a glass door, separated the playgrounds of these two schools. The glass door was opened only two or three times a day, as required by the necessity of the domestic service, and was at all other times kept tightly closed. This slender and incomplete partition sufficed to confine the epidemic to its place of origin, and to prevent it from gaining entrance into the girls' school. In the classroom of this infant school, which had an attendance of from 100 to 130 children, according to the time of the year, all the pupils were seated on a sloping platform; the benches were eight in number and only about five yards in length, so that each child had a space only about one foot in length in which to sit, and contact of one child with another was inevitable. The danger of such close and constant contact is seen from the progress of the epidemic in this school. For, on February 11th
12th and 13th, there was one case each day; and on the 14th two cases; on the fifteenth 4; on the 23rd two; on the 27th one; and on the 28th three — giving a total of fifteen cases, after which the school was closed. During the eighteen days that this epidemic lasted the pupils in the girls' school, immediately contiguous, remained free.

Rendu has shown that mumps is especially contagious at the beginning, and even before the parotid tumour has begun to be visible. It is likewise extremely contagious during the height of the illness, and retains that property in the convalescence. Thus Seta describes the case of three children in one family who were successively attacked by mumps. The parents were warned that the malady was contagious and isolation of the patients was recommended. At the end of six weeks the parents took their convalescent children to stay with their uncle's family in the country, with the result that two children of the latter fell sick of the disease.

The older writers denied that mumps was at all contagious, especially Boehler and his contemporaries of the eighteenth century (who affirmed that the disease was entirely due to cold); also Hamilton of Edinburgh (1759), and Mangor (1771). Following these authors, Ozanam, Cullen, A. Cooper, Bretonneau (who himself contracted the disease from sleeping in a room with a young man suffering from mumps), Trousseau, Rilliet, Lombard, and numerous military surgeons, and pediatric physicians, have vigorously proclaimed the contagious nature of the malady, and established the truth of fact in question advocated.

In spite of assertions from various quarters to the contrary, it would seem that the disease cannot be propagated to animals by contagion. Inoculation experiments with cultures of the supposed specific microbe and with fluid matters taken from the bodies of the sick have always given negative results. Busquet declares that he has seen a dog take parotitis from his master suffering at the time from the malady, and that he found diploctreptococci, similar to those described by Catrin and Laveran, in the saliva of the dog's mouth and that expressed from Steno's duct.

It is not definitely known how the supposed pathogenic microbe of mumps gains entrance to the system. Probably it is not by means of the respiratory passage, as the latter are seldom affected during the course of the malady. The fact of the early localisation of the disease in the
salivary glands suggests an entrance of the infective principle through the mouth; perhaps through the nose by way of the pharynx. Henoch and others state that it is not at all unlikely that the germ becomes mixed with the saliva and passes up Stenon's duct to the parotid gland. This theory, however, does not explain those cases in which the first manifestation of the disease is an orchitis, the parotid symptoms being delayed.

An attack of mumps usually confers upon the individual a lifelong immunity to the disease: even relapses are of rare occurrence. Rilliet in particular believes in this immunity, having convinced himself of the fact over and over again. He says that he has seen a father and his child contract the disease, while the mother escaped in consequence of having had it years previously. He noted the same thing in the case of a child eight years of age who had mumps two years before, and who in the epidemic in question was the only one of the family who escaped. Finally, he satisfied himself by enquiries that those who now suffered had never had it before. But there are exceptions to this rule, many such appearing in the literature of the disease. Servier has seen a soldier who suffered from mumps, although he had the malady five years before, and had an almost complete atrophy of one testicle in consequence. Jacob saw two cases of relapse in the same epidemic. Minier describes the case of a man who had four attacks of mumps in three years, and mentions two other instances of recurrence after an interval of one year. Antony has seen three similar cases, Nicholson one recurrence after three years, and Fabre several cases. Out of twenty-four cases of mumps Fournié saw no less than five instances of recurrence; Krugelstein, Quasco, and Logerais each report one case. Catrin, in the epidemic of 1892-93, noted nine recurrences and two relapses (one after eighteen days, the other after three months) out of one hundred and fifty-seven cases of mumps. Busquet reports three cases of recurrence; one patient had five attacks, three on the left side and two bilateral; another had two attacks, and the third had three attacks. In each of these cases diplococci were found in the blood. In the French military medical statistics appear two cases of a second attack in 1885, two in 1887, two in 1889, three in 1890, five in 1891, and three in 1892, with two recurrences in one person. In Catrin's cases there was one recurrence at the end of the year,
two after two years, three after four years, one after five years, one after seven years, and one after ten years. On the whole the period separating two attacks of mumps is a very variable one.

Mumps bears a peculiar relation to measles, scarlet fever, and diphtheria, epidemics being apt to occur directly before, during, or immediately after the prevalence of either of these affections, especially the first. The popular idea of mutual protection is entirely without foundation.

The disease is in origin quite independent of the kind of soil, of hygiene, and of race, but is said to be markedly influenced by season and weather. Thus, in 150 epidemics of mumps, for which the date of outbreak is precisely stated, the distribution according to season was as follows; In the winter, 48; in winter and spring 17; in spring 41; in spring and summer, 2; in summer, 16; in summer and autumn, 4; in autumn, 16; in autumn and winter, 7. There were then 129 epidemics in the cold months and 21 in the warm, confirming the general opinion that the disease is most often epidemic during times of cold and wet weather. Out of 26 epidemics, the outbreak was preceded in 21 by cold and rainy weather; and in the case of several of these, the persons principally affected were those who had by force of circumstances been exposed most to the weather. The epidemics among the garrison at Bell-Isle-en-mer, the Troops at Lyons in 1761, and at Mont-louis in 1828 may be cited as similar instances.

Mumps has no dependence whatever upon the condition of the soil or hygienic circumstances. As the geographical distribution shows, there are no differences discoverable in the amount of the disease among the several races.
SYMPTOMATOLOGY.

INCUBATION.
The incubation period of mumps is usually regarded as being of longer duration than in most other infectious diseases. It is said to average twenty-one days. Trousseau reckons that at from ten to fourteen days; though there are various older writers and more recent authorities according to which the germinating stage lasts from six to eight days. Rilliet and Lombard analysing 29 cases found that: In 1 case the incubation was eight days; in 11 it was nineteen to twenty days; in 13, from twenty to twenty-two days; in 1, between twenty-three and twenty-six days. d'Heilly believes the incubation period of mumps to last from eighteen to twenty-one days. From a study of 42 cases Dukes concludes that the period of incubation varies from eighteen to twenty-two days; he has, however, seen it prolonged to twenty-three, twenty-four, and twenty-five days. In an epidemic in India Jobard noted the outbreak of the disease on shipboard twenty-three days after leaving port. Antony has reported cases in which the period was twenty-six, twenty-eight, and thirty-three days. Merken has seen two cases of twenty-five and twenty-six days' duration respectively. Roth tells of three cases in which the period following contagion was eighteen days, and Pearse also fixes the same period as the duration of the incubative stage. Henoch says that this period ranges from fourteen to twenty-two days. In a small hospital epidemic following the entrance of a child with mumps into the wards, Cadet de Gassicourt records the first cases as having occurred on the twentieth day. The stage of incubation is marked by no symptoms, though sometimes a history of impaired appetite and digestion, irregular bowels, and languor during the last two or three days may be ascertained.

INVASION.
The invasion of mumps is usually gradual, a slight swelling of the parotid gland being the first sign of the on-coming disease. Exceptionally, however, the malady invades suddenly with chills, hyperpyrexia, and delirium. If patients are carefully observed during the period of incubation they may sometimes be seen to suffer from prodromal
symptoms. These are usually so slight as to escape the notice of the child's mother or nurse. Berthez and Sanné observed prodromes in 230 out of 540 cases in a school epidemic of mumps. Catrin noted them in 102 out of 157 cases; in 44 cases they consisted of chills and malaise, in 58 cases in malaise only; among individual symptoms he noted night sweats forty-one times, epistaxis fourteen times, tinnitus aurium eighteen times, earache eight times, joint pains fifteen times, herpes labialis four times, and syncope twice. The usual initial symptoms. In 24 cases Fournié noted pharyngitis and angina fifteen times; the same symptoms were observed by Bourgeois in 19 out of 61 cases, by Jourdan in 16 out of 60, by Madamet in 11 out of 56. At Bayoune in 1891 three out of four of the soldiers attacked had sore throats at the beginning; 62 of Catrin's 100 patients suffered similarly. Some amount of pyrexia is also nearly always present at this period. Severe earache may likewise introduce the disease. The patient is usually pale and languid, has slight rigors, pains in the breast and head, and loss of appetite; later, local pain in the parotid region on moving the jaws or on taking acid liquids into the mouth. The surface temperature increases from hour to hour, and just before the glandular swelling appears it reaches perhaps 100° or 101°F. In some cases, as stated, the invasion is characterised by the same train of symptoms that ushers in the acute exanthemata, such as repeated vomiting, diarrhoea, restlessness, and anxiety, a disposition to syncope, and, in very irritable children convulsions. Contrasted with this violent invasion other cases are met with, in which there are no prodromes whatever except a gradual rise in temperature, imperceptible without the use of the thermometer.

ACTUAL ATTACK.

The first symptoms of the actual attack is a peculiar stitch-like pain in one parotid region, usually the left. This radiates towards the ear of the affected side, and is increased by movements of the jaw, as in mastication and by external pressure. Rilliet has marked out three painful points; one at the level of the temeropomaxillary articulation, another below the mastoid apophysis, the third over the location of the submacillary gland. The pain grows rapidly more intense, and soon becomes associated with swelling. The tumour first appears in the
depression between the mastoid process and the ramus of the lower jaw, which it fills up, and at the same time thrusts outward the lobe of the ear. As the gland alone is swollen at first, the tumour has the outline of a triangle, with the apex directed downward, and forward; soon, however, the connective tissue becomes oedematous and the swelling is greatly extended, involving the cheeks and neck, in the latter region, in severe cases, running forward as far as the middle line, downward nearly to the shoulder, and backwards towards the spine. The swelling has even been noticed upon the eyes and forehead. Gailhard saw a swelling of the eyelids and of the subconjunctival connective tissue, accompanied by chemosis. Karth and Pognon have remarked upon a slight degree of exophthalmos. The moist prominent point of the swelling is directly in front of the ear. The oedema also extends internally, involving the pharynx, tonsils, and sometimes even the larynx. Henoch has observed once or twice a dilatation of the temporal and periorbital veins which he thinks was due to compression of the facial vein by the parotid tumour. The skin covering the swelling is not essentially altered, either in respect to colour, or to temperature. With a tumour of moderate size it is somewhat reddened; but when tightly stretched, on the contrary, the filling of the capillaries is impeded, from the effect of which a pale, waxy, glistening appearance results. The skin cannot be raised into a fold anywhere over the tumour, on account of the oedema of the subcutaneous connective tissue. The central portion is firm and elastic to the touch, the periphery doughy, and pressure here often produces pitting. There is but moderate tenderness, and the three points of pain indicated by Rilliet, namely, at the articulation of the lower jaw, under the mastoid process, and over the submaxillary gland, are not always distinctly pronounced, though readily to be explained by compression of the periosteum, and the submaxillary gland. The oedematous parts at a greater distance from the parotid are almost always altogether painless. It is easy to determine that the swelling actually involves the salivary glands and not alone the cellular tissue surrounding them; it is located in front of the tragus, behind the ascending ramus of the maxilla, over which it rises. When the glandular projection is very marked we
may palpate directly the parotid gland on which we may distinguish the lobulation and uneven surface. The disease as a rule follows a favourable course. After the local and general symptoms have culminated in from three to six days, they gradually subside in from about the same length of time, so that recovery is complete in from one to two weeks. The absorption of the exudation takes place with remarkable rapidity, so that in a few days everything has disappeared leaving no trace. Cases have been observed, however, in which the duration was much longer, and even in which there remained a permanent chronic enlargement. In scrofulous children the process of resolution may be tardy, and protracted during several weeks. Albert has seen the swelling become permanent in certain cases of relapse: Two regimental trumpeters suffered from relapse, due apparently to the efforts made by the men to play their instruments. Following these relapses there remained a notable enlargement of the parotid, in one case for eight months, in the other for ten months. The oedema first disappears, and then the swelling of the gland, during which the epidermis is cast off in fine scales.

While mumps almost always begins on one side, as a rule, both glands are affected during the attack. The second tumour begins to develop twenty-four to twenty-eight hours after the first, though its appearance may be delayed much longer, even until resolution has begun on the side primarily affected. As the course of the inflammation is similar in both parolids, the whole duration of the attack will depend upon the time of involvement of the second gland. Several cases of affection of one gland only are on record. Rizet of Arras, noted a similar single parotitis fourteen times and a double one eight times in 22 cases. Rilliet, of Geneva, found a proportion of one unilateral to six bilateral cases, and simultaneous involvement of both parolids to every three cases of successive attack. He distinguishes three kinds of swelling, thus: (1) A very moderate swelling, with slight soft engorgement of the gland, and but little deformity of the face; (2) very noticeable prominence in the parotid region, which is swollen out, tense, and painful on pressure, and sometimes the skin is red; (3) the tumefaction in the parotid region is marked, extending in every direction and disfiguring the patient greatly, often so as to render him almost beyond recognition. He tells of some cases of enormous swelling in the epidemic at Arras.
Three adult patients presented a frightful deformity of the face; in two the parotid and submaxillary glands were so swollen that the patients had no resemblance to human beings, and the third had such a tremendous tumour that he was unrecognisable even to his most intimate friends. In the case of a lad of sixteen years, the right parotid alone was involved, but this was so enlarged in less than five days the swelling had reached the sternoclavicular articulation on that side; the skin was shining and there was a feeling as if fluctuation were present. In two weeks all the swelling had disappeared and there remained only an engorgement of the cervical glands in the form of a chain in the neck, but this also disappeared in the course of two months.

Even in the mildest cases there is usually a certain amount of fever, even from the beginning of the attack. This point is insisted upon by Catrin. Fabre of Commentry, in 27 cases out of 58, noted the occurrence of violent fever, even with chills, although there was no orchitis; Fournie noted fever in 7 out of 24 cases; Prozorowski, in an army epidemic, saw but three apyretic cases; Lichtenstern says that there is always fever at the commencement and Gerhard has invariably noted more or less elevation of temperature. The fever is moderate, sometimes even inappreciable without the use of a thermometer, and the patients are confined neither to bed nor room, appearing much as usual. This author assigns to the fever a duration of four or five days, and says that the defervescence is rapid and that the disease is never absolutely apyretic; in the army, where the men are immediately isolated upon the first symptoms of mumps, this observation can be better made than elsewhere. In an epidemic studied by Catrin, in 1892--93, out of 143 cases in which the temperature was taken, apyrexia was noted in but 38; in 46 cases the fever lasted one day, in 39 two days, in fifteen 3 days, and in 5 four days. The temperature varied between 100° 4 and 104° F. Of the apyretic cases 2 men only were in the second day of the disease when seen first, 13 were in the third day, four in the fifth day, 7 in the 6th, 3 in the seventh, and 1 in the tenth day. When the parotids were affected successively at an appreciable interval, the fever was often observed to light up again coincidently with the swelling of the second gland. These cases would, therefore, suggest
that cases of mumps in which there is no elevation of temperature must be very exceptional. The fever is usually moderate, especially in children whom often it does not prevent getting out of bed, going about and playing as usual. Sometimes, however, it is intense from the beginning, and is accompanied by restlessness, the typhoid condition, and delirium. At the end of four or five days defervescence occurs, gradually by lysis; sometimes, however, the fall is rapid, and the pulse becomes slow and irregular. Hyperpyrexia and its dangerous concomitants are chiefly to be seen in cases complicated by orchitis. The febrile movement may be ended by polyuria or profuse sweats.

Prominent among the other symptoms calling for special mention is the alteration of expression. At first the head is inclined towards the affected side; later, when both glands are involved, it is held perfectly erect, and, as the slightest movement increases the pain, it is maintained stiffly in this position. The swelling of the cheeks prevents all play of the features, and this, combined with the widely-open, staring eyes and increased thickness of the neck, gives the patient a stupid, almost idiotic expression. The swelling of the neck is sometimes so great that its diameter exceeds that of the head: the shoulders, neck, and head have the outline of a truncated pyramid when viewed together. Any movement of the lower jaw greatly augments the suffering, the mouth is kept closed, often so tightly that it is impossible to see more than the tip of the tongue. All efforts at mastication are suspended, and deglutition is so painful, especially when the tonsils become enlarged, that the patient bears the pangs of hunger and thirst rather than endure the agony entailed in satisfying his wants. The act of speaking even augments the pain; the voice, when heard, has a nasal tone. The acuteness of hearing is impaired, there are singing noises and shooting pains in the ears, headache, and sometimes symptoms of cerebral congestion due to pressure upon the cervical veins occur in several cases. The tongue, is heavily coated, the mouth is either dry or there is an increased flow of saliva, and the fluid dribbling from the mouth adds another element to the idiotic expression already referred to. There is loss of appetite, increased thirst, occasionally vomiting, and commonly constipation. The temperature is elevated and the pulse increased in frequency,
both to a moderate degree. The respiration is unaffected, except when the oedema has invaded the submucous connective tissue of the larynx; when breathing becomes difficult and more frequent, than normal. Throughout the attack the pain, usually intensified by some extraneous influence; as pressure or the act of speaking or of swallowing, is only moderately severe. In ordinary cases the patient rests quietly and sleep is undisturbed, unless the tonsils are enlarged, when it is liable to interruption from loud snoring. There is restlessness, sleeplessness, and slight delirium in the case of nervous excitable children suffering from a severe attack.

The swelling may invade the submaxillary glands in addition to the parotid. Catrin saw this occur seventy-one times in 137 cases; Antony, fifteen times in 42 cases; and Fournié saw swelling of these glands in almost all his cases. Vacher has reported three and Wertheim four cases in which the submaxillary glands were alone involved; Fabre noted two cases of exclusive submaxillary affection during an epidemic in which 700 persons were attacked; Amodru saw 4 cases of submaxillary mumps complicated with orchitis. Even the sublingual glands may participate in the morbid process. Henoch reports a case which was undeniably one of sublingual mumps. Under the name of subglossitis he describes an affection which seems to affect the sublingual glands and which may be an abnormal form of mumps: It lasts seven or eight days and during its existence the subhyoid region is swollen and oedematous, the tongue is pressed upwards, and the jaws are separated.

The mucous membrane of a patient with mumps very often is altered, but it may at times be dry and a little red, the gums are swollen and covered with an opaline pultaceous deposit, and the tongue is coated. The occurrence of agina has been mentioned above. Guéneau de Musy says there is occasionally a true buccal exanthem. He admits himself in agreement with Trousseau who holds that mumps has the strongest resemblance to the eruptive fevers, and believes that this resemblance is made still stronger by the coexistence of a congestion with tumefaction of the buccal mucous membrane, most marked in the vicinity of the posterior molars, towards the inner surface of the cheeks, around the orifice of Steno's duct, and on the anterior part of the palatine vault. This he regards as a true exanthem, the
tegmentary manifestation of the disease; and adds that he has found this eruption in three cases of mumps, in one of which the swelling of the parotids was replaced by that of the submaxillary and sublingual glands. Mourson says he has never failed to discover a tumefaction of the orifice of Steno's duct, appearing in the form of a nipple about the size of a small haricot bean, markedly congested and with some ecchymotic points around the meatus. The canal itself can be felt, he says, by the finger as a thick and hard cord. Granier has noted a hyperaëmia not only of Steno's duct but also that of Wharton and Rivini, as shown by a projecting dark red ring at the orifice of each of these ducts. Laveran, however, does not regard these lesions as being of any importance and says that it is only very exceptionally that they ever occur.

The general symptoms keep pace with the local in their increase, but they commence to subside before, beginning to disappear while the swelling remains stationary. As soon as resolution sets in the general and local improvement are both rapid, and by the end of the week nothing is left but a trifling weakness and pallor, which disappear in a few days more, leaving the patient perfectly well. The affection may, however, be prolonged by the occurrence of relapses. In a patient of Karch's there were as many as five distinct attacks, each one marked by fever and general symptoms. The first attack, which was the gravest of all, affected the salivary glands, the kidneys, and the spleen; the second involved the lacrymal glands; the third, limited to the parotids, enabled a diagnosis of mumps to be made; the fourth was marked by a swelling of the submaxillary glands; in the fifth attack the lacrymal glands were alone attacked. Again, the disease may become chronic and persist for months.
COMPLICATIONS AND SEQUELAE

ORMITIS.

Orchitis is a very characteristic complication of mumps, and was known to Hippocrates. It is so common that many regard it as a special localisation rather than a complication proper. This metastasis is usually met with in pubescent and adults, being very rare either in childhood or old age. Henoch says that he has never seen testicular involvement in a child; Rilliet his youngest patient who developed it was fourteen years old; but Barthez and Senné, out of 230 cases, noted that there were three children twelve years old, and seven youths between fifteen and seventeen years of age. Debize tells of a boy, thirteen years old, who following acute parotitis, had orchitis on the right side, and fell into a typhoid state. Fabre saw this complication in a boy of nine years, and Cenerville in a child of four. Orchitis is seldom heard of in school epidemics. It is, however, very common in the army. In an epidemic studied, in 1785-86, all the troops who were attacked by mumps had orchitis. Noble saw 12 cases of orchitis out of 12 cases of mumps among the marines on board the "Ardent." At Chateauroux, in 1832, most of those affected with mumps had orchitis. In the epidemic of Mascara, Thierry de Mangras saw 22 cases of orchitis in 76 of mumps; Rizet, of Arras, 10 in 22; Widal, 50 in 100; Julou, 14 in 35; Chatain, 9 in 37; Laurens, 32 in 116; Bussard, 13 in 28; Soreh, 15 in 35; Gérard, 13 in 44; Madamet, 7 in 56; Pervier, 26 in 106; and Jourdan, 11 in 61. In 699 cases of mumps in fourteen army epidemics, there were 211 cases of orchitis, or about 30 per cent. In Catrin's collection of 10,601 cases of mumps there were 1,965 cases of orchitis, or one in about every six.

Catrin refuses to subscribe to the common opinion that the orchitis of mumps differs from that of gonorrhoea in an exclusive localisation in the parenchyma of the glands and never in the epididymis; and says that in 43 of his cases he invariably found the epididymis engorged, and that when it was possible to observe the case from the start it was always seen that the epididymis was affected before the parenchyma of the testicle. In one case, the epididymis alone was affected to the entire exclusion of the parenchyma of the organ. Catrin believes that an abortive form of orchitis sometimes occurring in mumps,
manifested by certain vague pains in the testicle, either spontaneously or excited by pressure, and occasionally there may even be a slight swelling of the testicle or of the epididymis. These attacks, he says, are never followed by atrophy of the testicle. The temperature may be slightly elevated, but there are never any appreciable general symptoms, and the local manifestations are ephemeral and so slight that the patient, may not mention them at all unless special enquiry is made.

The course of the orchitis is very similar to that of mumps, the inflammation increasing gradually from three to six days, then undergoing repaid resolution, the gland returning to its normal condition by the end of two weeks. The local symptoms are swelling, the testicle being enlarged to two or three its natural size, dull pain, and moderate tenderness, while in very severe cases there is burning on micturition and a purulent discharge from the urethra. The spermatic cord does not sympathise in the inflammation, and neither the swelling, pain, nor tenderness is so great as in specific orchitis. The general symptoms are confined to a moderate elevation of temperature and increase in the frequency of the pulse, thirst, and loss of appetite. An interval of two or three days usually separates this fever from that of the parotitis. Only very seldom does the orchitis come on with grave general symptoms, such as fever, restlessness, delirium, or convulsions. A mild parotitis may be accompanied by orchitis just as readily as one of great severity. The orchitis is usually unilateral, the right testicle being affected, just the opposite to the parotids, of which the left is the first involved. The proportion of cases of double to those of single orchitis varies in different epidemics. Thus, in Geneva, Rilliet found 4 cases of double orchitis out of 23; in the unilateral cases there were 13 on the right side and six on the left. Juloux in 14 cases of orchitis found in which both testicles were affected. Laurens, in 32 cases of orchitis, found 6 double, 17 on the left side and 9 on the right. Jourdan found one double case in 11 of orchitis, and Servier 2 in 26. On the other hand, Rizet saw 7 cases of double orchitis to 3 of single at Arras, and 5 double to 3 single at Montpellier. The course of bilateral orchitis (which according to the above statistics would seem to be eight times less frequent then the unilateral) is longer by forty-eight hours than that of the double form, and the attending fever is more intense.
The testicle usually resumes its normal condition after the subsidence of the inflammatory process, but in some epidemics it has been seen to undergo complete atrophy of which remarkable examples are cited by Hamilton (1761), Murat (1803), Bruns, Frank, and others. Dogny (Brun's Handb., p. 1091) reports the same concerning an epidemic which raged in the garrison of Mont Louis, in January 1828. Of 800 men, 87 were affected — all of them between twenty-two and twenty-eight years of age, except one who was thirty-two years old. The course of the disease was favourable; its duration was from eight to twelve days; metastasis to the testicle was very frequent. Of 69 bilateral and 18 unilateral cases of parotitis, metastasis to both testicles occurred in 4 cases, and to one testicle only in 23 cases, all of which resulted in atrophy of the affected testicle — of which the historian convinced himself several months afterwards. Rilliet noticed a diminution in the size of the testicle in 2 cases following recovery from mumps, in one of which the organ was reduced to one-half its normal size. Grisolle reports 4 cases observed in his own practice, and remarks that this accident would be regarded as more common if the patients were kept under observation, for a long time, for the atrophy is a late accident and progresses slowly and without active symptoms. Chatain followed up 9 cases of orchitis and found 3 of them terminating in atrophy of the testicle. Chauvin saw 6 cases of atrophy out of 16 of orchitis. Juloux examined the testicles of 14 soldiers two months after they had recovered from orchitis and noted a diminution in size of the testicle in all. In 32 cases of orchitis Laurens found 16 of atrophy; the gland was smaller by one-fourth in 7 cases, by one-half in 7, and by three-quarters in 2. Sorel, examining his patients seven or eight months after recovery from orchitis, found 7 in whom atrophy had occurred. Gérard, in 11 cases examined fifteen months after recovery, found a diminution in consistency in nearly all, a diminution in volume in 4, and a pronounced atrophy in 2; in one of these cases both testicles were reduced to the size of a bean, and there was also a diminution in virility. Madamet found a slight atrophy in 4 of 7 soldiers examined three months after an attack of orchitis. Servier examined 23 men six months after recovery and found atrophy of the testicle in 12; the atrophied testicles were about the size of a large haricot bean, were rather hard, and were
wholly insensible to pressure, which did not evince any testicular sensation; in one case he found hypertrophy of the testicle. Jourdan examined 11 soldiers in the fourth and fifth months following an attack of orchitis and found in 5 the testicles reduced to the size of a bean, in 3 the organs were reduced about one-half in size and were quite soft, in 2 the diminution was slight, and in 1 there was a hydrocele. Catrin examined 37 men from seven to eleven months after recovery, and found 16 cases of marked atrophy, 5 of softening, and 4 in which the testicles first became atrophied and later returned to their normal volume. Of 13 who had double orchitis, 6 had normal glands and 5 had double atrophy. In the statistics of the army he found among 175 cases of orchitis complicating mumps, 51 in which atrophy had occurred, i.e., 1 in 3.5, or 29.14 per cent. In his own statistics he found 1 case of atrophy to every 2.3 of orchitis, or 43.24 per cent., but says that if he had counted among his cases those of abortive orchitis, he would have obtained nearly the same figures as those derived from the general statistics, i.e., 1 atrophy in 3 cases of orchitis or 32 per cent. Laveran found 103 cases of atrophy of the testicle in 163 of orchitis. The accident frequently leads to impotence and sterility.

Hornus has seen the orchitis proceed to suppuration. The patient was a soldier, twenty-two years of age, who suffered from double orchitis during an attack of mumps, the glands suppurated, the pus passed up along the spermatic cord to the peritoneum, and the man died from the resulting peritonitis. In other cases the orchitis may become chronic just as the parotitis sometimes does. Martens has reported a case in which the orchitis of mumps passed into a tuberculous orchitis and this was followed by pulmonary tuberculosis. Such terminations of the orchitis of mumps are, however, of much more rare occurrence than atrophy.

Kovacs reports two cases of orchitic mumps without parotitis; and Laveran insists that unilateral or double orchitis may constitute the only manifestation of mumps, there being absolutely no enlargement of the salivary glands. In an epidemic at Châteauroux in 1832, there were several cases of orchitis without any swelling of the parotid glands either before or after the testicular affection. The same thing was observed in an epidemic at Geneva. Rilliet, Gulliard, Mayer). Desbarreaux-Bernard reports 7
7 cases of this abnormal form of mumps; in one family a patient had an attack of orchitis at the same time that his brother suffered from parotitis. At Danzig, among 29 soldiers suffering from orchitis only 10 had parotid enlargement, and in the remaining 19 no parotid swelling could be detected at any period in the course of the disease. Many other similar cases have been recorded. Not only may there be a metastasis from the parotid glands to the testicles but metastasis may take place from the former to the latter. Military surgeons have often observed orchitis appearing as the first symptom of mumps. Finally, Grivet tells of the occurrence of retarded orchitis, the testicular inflammation appearing weeks or months after the subsidence of the parotid trouble. According to Blondeau, mumps patients suffering from gonorrhoea are not at all disposed to orchitis and the mumps generally pursues its course free from all complications. In very rare cases there has been seen a repeated alternation of the orchitis and the parotitis.

**URETHRITIS AND PROSTATITIS**

The urethra, the prostate, and the seminal vesicles may occasionally be involved in the inflammatory process. Barthéz and Sanné saw purulent urethritis in 5 out of 10 cases of orchitic mumps. Gosselin reports the case of a man, twenty-one years old, suffering from orchitis due to mumps, who had a well-marked prostatitis. Other cases appear in the literature, and in all the presence of the gonococcus was negativated.

**OVARITIS**

The female genital organs may participate in the disease though much less severely than those of the male. Rizet describes the occurrence of intense ovarian pain in two young women suffering from mumps. Niemeyer records a similar case. Meymert observed a week after an attack of mumps in a girl, sixteen years of age, a round painful swelling in the right ovarian region, which, however, disappeared at the end of three weeks. Bouteillier reports the occurrence of ovarian pains, limited to the right side, in a woman, twenty-four years old, who was ill with mumps. He was able to feel a tumour in the right iliac fossa, which was painful on pressure, but which only existed for two weeks.
In certain cases mumps shows a peculiar tendency to metastasis or secondary involvement of the labia and vulval glands. Laghi saw it in the labia majora, nearly two centuries ago. Rilliet reports the case of a woman, thirty-six years of age, in whom a swelling of the labia majora appeared on the fifth day of mumps, and lasted for three or four days, the lesion being probably a Bartholinitis. Gailhard has seen suppuration follow in these cases. Peter (ga z. des Hôp., 1868, No. 37) describes the case of a woman, aged twenty-three, in whom the previously regular menstruation ceased in the year 1845, since when she had been subject to a series of inflammations of the parotid gland - always on the left side, and always readily subdued by leeches and cataplasms; they occurred, he says, at the periods of the failing menses - at times a sanguineous tumour of the left smaller labium of the left side was found at the same period, instead of the swelling of the parotid.

**Mastitis.**

This appears to be of somewhat common occurrence. Trenal saw it three times. The first case was a girl, eighteen years of age, whose parotitis subsided on the fifth day, when suddenly there was pyrexia, and the breast began to inflame forthwith; this disappeared on the seventh day with profuse sweatings, and the patient recovered in due course. The second case was that of a girl of fifteen years in whom a painful swelling of the breasts appeared on the fifth day of mumps, while the parotids were yet enlarged; recovery took place on the seventh day. The third patient was a pregnant woman, thirty years of age; on the sixth day, while the parotid swelling was diminishing, the breasts became enlarged and tender; on the eight day sweating occurred and the patient recovered. Jobard noted inflammation of the breasts in an East Indian woman who was suffering from mumps, and in whom the parotid swelling reappeared. When the mastitis subsided. Rizet tells of the occurrence of mammary congestion in a little girl of five years during an attack of mumps; and says he has seen the same occur in two soldiers as the result of this disease. Marchand records a similar case in a soldier. Sir A. Cooper, Cullen Rochard, J. Franck, Cavallini, and Roche have all seen swelling of the breasts in women suffering from mumps.
THYROIDITIS.

Swelling of the thyroid gland has been noted by Matignon and Guelliot in connection with mumps. Guelliot's case was that of a girl of twelve years, who, on May 11th, 1869, developed a swelling of the right parotid gland. Three days afterwards the neck began to increase in size, and in other two days was observed a horse-shoe shaped swelling over the anterior triangle of the neck, most prominent on the right side; the right lobe of the thyroid gland being the size of a pigeon's egg, the left smaller. The patient had no pain, fever, submaxillary adenitis, or peripheral oedema; on May 17th the swelling began to subside and by the next day the gland had returned to its normal size.

ADENITIS.

Rilliet, in one case only, saw a scrofulous adenitis as a sequel of mumps. Submaxillary, preauricular, or cervical adenitis are not uncommon complications of epidemic parotitis. Catrin reports 50 cases of adenitis in various situations, several being in front of the masseter muscle. Lafforgue described adenitis marked the commencement of mumps in 5 men from twenty-one to twenty-three years of age, the primary submaxillary adenitis preceding by forty-eight hours at least the parotitis and disappearing with the latter. The glandular inflammation sometimes proceeds to suppuration. Madamet came across a persistent retro - and sub-maxillary adenitis in 5 soldiers. Houard reports swelling of the cervical lymphatic glands in 3 out of 61 cases of mumps. Rizet observed the same persisting for two months in a soldier.

SUPPURATIVE PAROTITIS.

Suppuration of the parotid gland is a somewhat relatively rare complication of mumps. Several instances of this accident are on record. Barjon saw it three times in one epidemic. Stoicescu describes a case of the lesion in a man of thirty years and another in a woman of thirty years. Dionis noted in the course of an epidemic at St. Cyr that suppuration occurred in almost every case of mumps ( ? ) In an epidemic at La Pelisse, Masleixrat saw only 1 case of suppuration in 100 of mumps; and Laveran's observations in Paris were similar. Bucquoy saw this complication only twice among several thousand cases. Perrand has isolated streptocci from the pus, proving the former to be the cause of the latter.
The tumour, which occupies the same position and thrusts out the ear-lobe as in ordinary parotitis is hard, dense, well defined, and the seat of considerable pain until suppuration takes place, when the latter subsides greatly. The skin over it is red, hot, and tense, and there is much tenderness and little or no pitting on pressure. After the abscess has formed there is a well-defined fluctuation on palpation, and at the position of pointing the skin becomes very thin and assumes a bluish-red colour. Gangrene of the gland is manifested by the peculiar offensive odour, blackening of the skin, the formation of a cavity, and the discharge of ichor and shreds of tissue. The alteration of the expression, the pain in the ear, the difficulty in moving the jaw and in swallowing are as constantly present here as in ordinary mumps. The course is usually rapid, the abscess pointing on the fourth or fifth day after the appearance of the parotid swelling; occasionally, however, the inflammation process is much slower, extending over a period of several weeks. The course is also much protracted when secondary abscesses form in other parts of the gland or in the surrounding tissues, when the abscess is transformed into a ichorous cavity, or when gangrene sets in. Ordinarily where the pus is evacuated by spontaneous rupture or by incision the abscess heals by granulation.

DIGESTIVE TRACT.

This is seldom implicated to any important degree. The main points in connection with it — constipation, the buccal exanthem, etc — have already been noted. Holdman describes a case of jaundice, and Thierry de Mangras one of biliary catarrh.

RESPIRATORY SYSTEM.

Mumps is sometimes complicated by oedema of the glottis, and this may prove fatal. Tourtelle lost two patients in this way; and Jacob one from oedema of the larynx, but Pilatte was able to save his by prompt tracheotomy. Pulmonary congestion with or without haemoptysis may occur. Merklen had a case of pulmonary apoplexy with diaphragmatic neuralgia, and Holdman once encountered pulmonary embolism of parotid origin. Boinet has recorded a case of bronchopneumonia. Ferrand says he once saw an elderly female patient die from pleurisy complicating mumps.
CIRCULATORY SYSTEM.

In addition to the usual circulatory manifestations of the disease, both endocarditis and pericarditis have been observed. Gachon says the latter is usually dry, unaccompanied by other complications, and though sometimes coexistent with the former, is not usually fatal. Jaccoud saw endocarditis in two cases: one recovered and the other suffered for life. The occurrence of endocarditis - which is nearly always at the mitral orifice - is also instanced by Catrin and Bourgeois.

RHEUMATISM.

Trousseau has seen patients with mumps develop articular pains similar to those of scarlatinal rheumatism. Jourdan found them in the shoulders, elbows, and wrists in 4 out of 61 cases of mumps. These arthropathies usually disappeared in a few days and were unaccompanied by either swelling or effusion into the joints. Some of the reported cases would suggest true rheumatism as the underlying condition. Rilliet, for instance, observed rheumatism follow an attack of mumps in two brothers, but one of these had suffered from true rheumatism some years previously, and the parotitis served only as an exciting cause to light up the old trouble. In other cases, however, it would appear as though the attack of mumps had really determined a sort of infectious pseudo rheumatism.

In this only a few joints are involved at a time, the arthrolgia leads to fixation, the lesion travels along the synorial sheaths and invades the bursae (the prepatellar bursa in Bergeron's case) there is moderate fever, and effusion into the joint occurs. These cases seldom proceed to suppuration; in the effusion of one of them Catrin found the diplococcus. The rheumatic symptoms have sometimes been known to precede those of the parotitis.

NEPHRITIS.

Catrin reports the finding of albumin in the urine of 30 per cent. of his cases (12 out of 39). Pratolongo has seen anasarca follow an attack of mumps in one case, and Renard the same complication in three young soldiers, who recovered as well as in the three who died from the nephritis of mumps out of many other cases of albuminuria studied. Jourdan's case had haematuria and thyroiditis in addition to the parotid lesion. Colin has twice seen anasarca in young soldiers. Karth, Jaccoud, and Gagé have all noted intense albuminuria following a period of anuria. Croner observed it even in a child of six years.
Morard states that he has seen various cutaneous symptoms in mumps. He observed in the case of two soldiers an eruption resembling measles upon the trunk and limbs, but unaccompanied by fever. Pailhas found a scarlatiniform eruption in a girl of thirteen years, as well as a varioliform rash in a boy of seven, appearing three days before the parotid swelling. Guelliot has observed multiple areas of painful edema, unaccompanied by albuminuria, in a boy nine years of age.

NERVOUS SYSTEM.

Various complications affecting the nervous system may arise in mumps and they are sometimes very grave. Ataxia—dyssynergia, restlessness, delirium, carphologia, and convulsions are seen in all the infectious diseases. Sir Astley Cooper lost a child in the delirium which followed sudden resolution of the parotitis. Usually the nervous complications precede or accompany the orchitis. Hysteriform, epileptiform, or maniacal attacks have all been reported but chiefly in those of a neurotic temperament. Lanois and Lemoine attach great importance to the meningitic and cerebral complications of mumps, and mention four cases, one of a man, aged twenty-two, who died in a furious maniacal paroxysm during an attack of parotitis; one of a man who died after having had delirium and two attacks of syncope, in which recovery followed coma with stertorous breathing accompanied by fever; and another in which the patient had delirium with sensory illusions and tinnitus aurium. According to them, aphasia and paralysis frequently occur and are persistent. Healy describes the case of a child aged fifteen, of a very nervous constitution, who contracted mumps, when delirium and fever supervened and orchitis developed. On the evening of the fifth day the temperature was 107° F., the pupils were insensible to light, and there was obstinate constipation. The following days the delirium was so furious that it was necessary to restrain the patient. On the eighth day coma appeared, the pulse was thready, the temperature fell a little (103° F.), but there were crises of furious delirium in which the child tried to bite his attendants. No headache was complained of and there was no vomiting. Walking was difficult for some six months after recovery, there being incoordination and uncertainty. The speech was impaired, the child was very emotional, and he had agraphia. Another was that of a youth of seventeen years who had mumps with orchitis in the right side; he was suddenly seized with furious delirium and had aphasia and right brachial monoplegia with anesthesia; but eventually recovered.
Sorel once attended a corporal in the army, aged twenty-four, for orchitis complicating mumps, the temperature was 107° F., and there was delirium followed by great depression, and then aphasia of fifteen months' duration. Lennois and Lemoine have noted aphasia and right hemiplegia as sequelae of mumps, which they attribute to hyperaemia of the meninges - or to a meningoencephalitis.

PARALYSIS.

Joffroy, and others describe interesting cases of spinal or peripheral paralysis, following mumps, all of which recovered. Chavanis describes the case of a man, aged fifty-five, who had parotitis and orchitis with hyperpyrexia and delirium. Fifty days after the onset of the disease he suffered from lumbar pains, cephalagia, and weakness of the legs, especially of the left; there was a sensation as if the left boot were too short and he dragged the leg on this side. In walking he felt as if the soles of the feet, especially the left, were of rubber. There was sweating on the left leg, but not on the right. A year later there was melancholia with some hebetude, but the patient was able to work better than before. He had frequent headaches, and general weakness persisted, there were involuntary seminal emissions and impotence was almost complete. The spine was painful on pressure and the lower extremities, especially the left, were paretic. There were cramps in the calves and formation in the left foot. The paralysis was never sufficiently pronounced to prevent walking, but there was merely a difficulty with a feeling of weight, and the left leg often gave way under him. Two days later recovery had taken place, the sadness disappeared and work had again become easy; nevertheless, the lower extremities were not so strong as formerly and the left leg especially remained weak. This case is remarkable on account of the initial symptoms and the extremely long duration of the paralysis. Revilliod records the case of a boy of seven years who had symptoms of paralysis after an attack of mumps. There was flaccid paralysis of the four extremities, most marked in the lower limbs, together with complete left facial paralysis and paralysis of the right hypoglossal nerve and of the velum palati. Deglutition was difficult, and respiration was slow and sighing, but the sphincters were intact. The reflexes were never restored, but the paralysis disappeared in two months under salt baths, counter-irritations, and electricity.
THE SPECIAL SENSES.

Diminished acuteness of vision, photophobia, lachrymation, and injection of the papilla have been reported by Hatry of Lyons, who also lays special emphasis on the palpebral oedema seen by others. Boas remarks on a case of amblyopia following mumps in a girl of seven years. Dor has seen this disease produce dacryoadenitis, lachrymation, and photophobia in a child aged three. Adler, Hirschberg, Marc Dufour, and Leriche describe similar accidents and go the length of recognising a mumps of the lachrymal gland. According to these authors, the symptoms consist in orbital pains radiating to the forehead, and temples, the eyelids are swollen and oedematous, covering the eyeball, and there is also a chemosis. The condition is distinguished from simple conjunctivitis - which at first sight it resembles - by an oblong, smooth, hard swelling, painful on pressure, at the site of the lachrymal gland. The pains and oedema disappear in thirty-six hours. Among the most disastrous ocular effects of mumps are optic neuritis and neuro-retinitis followed by optic atrophy, ending in total blindness. These accidents are fortunately of very rare occurrence.

One of the sequel of mumps, but seldom seen, is incurable deafness. According to Catrin, it develops rapidly, often unexpectedly, and almost suddenly; it is usually an early symptom, but in one case it occurred after two weeks. Even when it is unilateral it has no correspondence with the seat of the parotitis, the influence of sex, age, and the gravity of the original disease seems to be nil. The affection may or may not be accompanied by general symptoms, such as noises in the ears, disturbance of equilibrium, vomiting, insomnia, and finally vertigo, which latter may persist for months or years, or may become attenuated, leaving a simple vertiginous condition, which is increased by any causes which in themselves tend to produce vertigo, such as looking from a height, and the like. The absence of lesions and the inefficiency of therapeutic measures suffice to distinguish this vertiginous deafness of mumps. Fournier refers it to disease of the auditory centres or of the auditory nerve. Roosa has seen 10 cases of disease of the labyrinth after mumps, and Meniere 4, and Kipp 2, all of which developed rapidly, and were incurable. Connor reports 33 cases, in which he believed the lesions to be located in the semicircular canals. Tsakyroglous mentions 2 cases, one recovering, and another of suppurative otitis media. The painful deafness which not infrequently arises at the onset or during the course of mumps usually subsides of its own accord.
The prognosis in mumps, as appears evident from the consideration of its symptomatology, is exceedingly favourable, there being no record of a fatal case of the uncomplicated disease. Suppuration may occur, but it is an extremely rare event. In scrofulous children the course may be prolonged for several weeks, and in them resolution is often imperfect, a degree of enlargement and induration of one or both parotids remaining for some time. Were it not for the risk of complications to which the patients are exposed, and especially orchitis, the disease would be invariably benign. In the child mumps is very harmless, as it is usually uncomplicated by orchitis or other accident. Not so, however, in adults, in whom the liability to testicular complication is great; and the brunt of the attack may fall upon the kidneys, or genital organs, or death occur from oedema of the glottis. Again a fatal result may ensue from compression of the larynx and trachea by the enormously swollen parotids, as in the case—a man of fifty years—reported by Bougard. Females are less liable to sequel complications than males. In the latter orchitis is a serious accident—occurring, according to Laveran, twice in every five cases—as it invariably ends in impotence, when the resulting atrophy is bilateral.
DIAGNOSIS

The diagnosis of mumps is easy after the disease is sufficiently developed to produce the characteristic alterations in the facial expression: the superficial position, and the peculiar form of the inflamed parotid prevent all doubt as to the seat of the disease. In the earlier stages the position of the swelling, immediately beneath and in front of the ear, its triangular shape, and the elevation and outward displacement of the lobe of the ear of the affected side, distinguish it from the enlargement of the cervical glands so liable to occur in strumous subjects. The acute onset and course of mumps are the point of distinction between it and morbid growths, or the very rare condition of hypertrophy of the parotid gland. A retention-cyst from occlusion of the duct-orifices, by a local disease or a foreign body, may cause all the symptoms of mumps. In such cases the lack of a history of exposure or of an existing epidemic will lead to an examination of the mouth, and more particularly of the duct. Occlusion by such almost imperceptible substances as a bit of tooth-brush bristle, etc., may require the most careful examination to detect. If there be a local disease of the mouth, it is necessary to bear in mind the possibility of a mechanical occlusion by the results of inflammation, by cicatrices, etc. External injury may also set up a swelling of the gland like the real parotitis in many respects, but here the history serves to distinguish.

TREATMENT.

The treatment of mumps is simple in most cases. The patient should be kept in a uniform temperature, confined to the room, or, better still, to bed, until the resolution is well established. While the difficulty in swallowing and fever continue the food should consist of milk and beef-tea; later, other nutritious articles of diet may be allowed as freely as the appetite demands. Water or lemonade may be given as the patient requires them, to allay the thirst. A daily evacuation of the bowels must be secured by the use of laxatives. During the early stage, if the fever be high, cool baths may be tried (64°F to 68°F), or any of the internal antipyretics of the indications presented.
and the condition and age of the patient allow. Some who have had great experience of the disease speak well for the use of tincture of aconite, cautiously administered and followed by liquor potassii citratis. Tonics are required during the decline of the disease, of this class the most useful are the iron preparations, with or without infusion of quassia and calumba.

Headache and delirium should be relieved by the local application of cold, preferably as the ice-bag; difficult deglutition from enlargement of the tonsils, by the frequent swallowing of pieces of ice, or if possible by astringents, such as tannic acid and glycerine (one drahm to the ounce); sleeplessness, by the administration of bro mide of potassium, with or without small doses of hydrate of chloral in children and of some preparation of opium in adults. In cases attended with symptoms stimulants are required, and for those in which meningitis is threatened cutting off the hair and the application of cold to the forehead, wet packs, the bromides, and ether are necessary. Some cases are also markedly benefited by the use of strychnine or caffeine hypodermically, cinchona and quinine.

As to the requirements for topical treatment, the best results and the greatest relief to the suffering will be obtained inunctions of opium and belladonna ointment or other soothing applications three, four, or more times in the day, the part being meanwhile enveloped with a moderately thick layer of cotton wadding covered by oiled silk. Water dressings or light poultices may be used with advantage. Hufeland advises the exhibition of an emetic, and also the application of mercurial plaster to the swollen gland. It is neither necessary nor advisable to blister or massage the inflamed parotids, as was recommended by Hamilton, for this does not prevent metastasis. But when resolution has commenced a stimulating lotion will hasten the disappearance of the swelling. If, particularly in strumous subjects, resolution be incomplete and glandular enlargement and induration remain after the cessation of the acute symptoms, cod-liver oil and the syrup of the iodide of iron are demanded for internal administration and the liniment of iodine for external application. It is well to dilute the latter to prevent its causing irritation of the skin, and not to use it more than twice in the day. If a tendency to suppuration is noticed, shown by tenderness and redness of the skin, a leech or two may be applied behind the ear. Should an abscess become inevitable, its formation should be hastened by poultices, and when formed it should be opened and its contents thoroughly evacuated to
prevent its doing serious injury to the neighbouring parts.

For inflammation of the testicle, a somewhat elevated position of the scrotum, perfect rest, emollient, and warm applications will usually suffice for its relief; at most the attempt may be made to allay the congestion by mild laxatives; more than this may be dangerous. On no account may leeches, blisters, scarifications, or Finschutz's method of massage be tried. Czerny and Emery Desbrousses advise jaborandi, which in two cases they found to bring about a resolution of the orchitis. For the same purpose Martin injects pilocarpine under the skin, and has had favorable results. Sorel, however, saw the drug produce testicular atrophy in three cases. Vedrennes is equally opposed to the exhibition. The use of salicylate of sodium and of Pulsatilla appears to be confined to Henderson and Duscatel who alone respectively advocate them. When the testicle shows signs of softening and atrophy, massage, electricity, and counter-irritants may be tried.

Salt baths, electricity, massage and strychnine are indicated in cases of paralysis. For the deafness following mumps Dundas Grant recommends iodide of potassium, quinine pilocarpine, and catheterism of the Eustachian tube.
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