THE ORAL MANIFESTATIONS
OF SYSTEMIC DISEASE
This critical review of the literature concerning the effects of systemic disease upon the soft tissues of the oral cavity is submitted in support of candidature for the degree of Master of Dental Surgery.

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The mouth is an easily accessible internal cavity, Schour & Massler (1945), which provides us with a unique opportunity to observe the earliest findings of systemic disease, Fabricant (1957), and to recognise incipient threats to well being. Becks (1948). One cannot separate the oral cavity from the body as a whole, and the mouth may well be regarded as the diagnostic mirror of the body. McCarthy et al (1955).

It is unfortunate, however, that many oral lesions are never found, and if found are frequently not recognised by the clinician untrained in the recognition of oral disease.

"In recent years, the Dental Profession has exhibited an increasing awareness in its public health responsibilities. The scope of Dental Education has been widened to include a basic medical appreciation, but it is fair to say that no corresponding development has taken place in Medical Education. As a result, the majority of Medical Graduates have little or no appreciation of the clinical pathology of the mouth." Current Comment (1957).

Textbooks give precise descriptions of ulcers with the implication that their aetiology is to be determined by their appearance. These diagnostic details are important and should be noted, but Fleming (1958) is of the opinion that oral ulcerations present such a variable pattern, that too much faith must not be pinned on their naked eye appearance in trying to determine their aetiology.

Oral lesions are often quite dramatic and marked colour changes result from the increased vascularity of the tissues. Early maceration of the lesion occurs in the warm and constantly moist "Oral Climate". Oral trauma rapidly disrupts any vesicular or bullous lesions which may form, and they appear as eroded areas surrounded by epithelial remnants. A markedly mixed Oral Flora may be responsible for the early secondary infection of the lesion. Burket (1957).
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DISORDERS OF THE BLOOD.

LEUKAEMIA

is a fatal disease, considered to be neoplastic by many, which has its origin primarily in the blood-forming organs, and is characterised by an extensive and abnormal proliferation of the white blood cells and their precursors, with cellular infiltrations of the various tissues of the body, especially the bone marrow, spleen, lymph nodes and liver. Cecil and Loeb (1956).

The Leukaemias are characterised by an abnormal proliferation of the leucopoietic tissues which usually results in the appearance of large numbers of immature leucocytes in the circulating blood. There are numerous theories regarding its aetiology. Whitby & Britton (1957). In mice the familial and hereditary factors are important, although in man they are less so and yet to be fully evaluated. Whitby & Britton (1957) & Custer (1949). Ionising radiation is of great significance, M.R.C.(1956), and intoxications by the aniline dyes and benzol have been reported on by Custer (1949). A cell-free tissue filtrate causes Leukaemia in fowls and mice, but the virus is thought to be of a contributory, rather than a causal, nature. Clinicians are impressed by the similarity between Leukaemia and infections. The infective theory is an attractive one and the large increase of circulating leucocytes seen in severe infection may nearly approach the counts seen in Leukaemia, although the reaction is not comparable to the Leukaemic process. Whitby & Britton (1957).

An ethnic difference in the incidence of Leukaemia has not been statistically substantiated, although the incidence is lower in American Negroes than in American Whites, and is possibly due to racial, social and geographic differences; more important, however, possibly being the diagnostic differences between the groups. MacMahon & Koller (1957).

There is a continually rising death rate from Leukaemia which is, in part, due to improved diagnostic techniques. It is important that an effort is made to determine the cause of this rising death rate. Sacks & Seeman (1947).
Since there is such a high incidence of occurrence of oral lesions in the Leukaemic state, it is important that ulcerative, gangrenous and hypertrophic lesions should be investigated thoroughly. From an examination of the literature, it would appear that there is some difference between the lesions of chronic and acute leukaemia, but no significant differences between the lymphatic, monocytic and myelogenous forms of the acute type. Whitby and Britton (1957) note that the differentiation of the acute leukaemias is often a matter of difficulty, but is accomplished by careful haematological examination.

Oral symptoms are seen in fifty-five per cent of all cases of acute leukaemia, and in fifteen per cent of cases of chronic leukaemia. Sinrod (1957). Duffy & Driscoll (1958), however, report that eighty per cent of cases show positive oral findings, and give the incidence of their occurrence.

The lack of clotting factors and protective elements in the blood and the infiltration of the oral mucosa by leukaemic cells are of importance in the aetiology of oral lesions. Local irritation is also significant, however, and may increase the severity of the condition. Systemic bacteraemia, anorexia, nausea, blood loss and pain may result from the oral lesions, and will complicate the general situation. Sinrod (1957).

It is important that the oral manifestations are recognised; they are often of an outstanding nature and appear early in the course of the disease. Dewey (1950).

Although Limarzi (1950) reports that a greyish tint is to be seen, it is not a common finding, and a mucosal pallor, the result of the anaemic state, is more usual. Sinrod (1957). The haemorrhagic tendency commonly seen and responsible for petechiae, ecchymotic areas and haemorrhage without injury, is an early expression of marrow dysfunction. Block & Bethard (1953).

Frank bleeding occurred in 42% of Duffy and Driscoll's (1958) cases, and petechiae and localised ecchymoses in 37%. Cook (1947) reports extensive purpura with blood oozing from the gums and mucous membranes. The buccal mucous membrane may be the site of
petechial and purpuric lesions. **McCarthy and Karcher (1946).** Haemorrhage from the interproximal areas results in the formation of small clots which provide anaerobic areas, ideal for the initiation of a Vincent's infection. **Brandt (1939).**

**Duffy & Driscoll (1958)** report three per cent of cases of Vincent's gingivitis in their series, and attribute the low incidence to the antibiotics used.

Gingival hypertrophy may be absent or marked to the degree that it buries the teeth completely. The interdental papillae are frequently blunted. An incidence of forty-five per cent of cases with hypertrophic gingivitis is reported by **Duffy & Driscoll (1958),** and from the literature it would appear a fairly common finding.

The swollen tissues are packed with immature cells, and localised lesions called lymphomas may form. **Thoma (1954).**

The shiny swelling is blue-red, **Cook (1948),** or pink, **Hume (1938),** and the papillae have blunted tips due to a lack of epithelial keratinisation, oedema and hyperaemia. **Sinrod (1957).** Connective tissue oedema causes a glossy and turgid consistency. That ectopic (extra-medullary) haemopoiesis takes place in the gingiva in leukaemia, is evidenced by the mitosis of the early precursors of polymorpho nuclear leucocytes. **Wentz et al (1949).**

Leukaemic infiltration of the dental pulp will cause pulpitis in non-curious teeth, and eventually areas of liquefaction necrosis may develop. Severe odontalgia with no apparent cause may prove a diagnostic problem in the early stages. Fistulas may be present in the periapical areas. **Burket (1957) and Cook (1947).**

**Wentz et al (1949)** report a dense infiltration of the lamina propria by immature white blood cells. Leukaemic infiltration of the dental periosteum causes looseness of the teeth, **Cook (1947),** which may migrate with the destruction of the lamina dura. **McCarthy and Karcher (1946).** Severe osteoclasia occurs in the densely infiltrated alveolar bone. **Duffy & Driscoll (1958).** The influence of systemic disease upon the alveolar bone is dealt with more completely by **Stahl et al (1952).** The resorption of the alveolar
bone is the result of pressure of the infiltrating leukaemic tissues. **Bender** (1944).

Tightening of the teeth occurs with remissions of the disease and is probably due to the disappearance of the leukaemic infiltration and reattachment. **Burket** (1944). A region of bone necrosis may occur in the bone marrow in acute illnesses; as was reported by **Brown** (1950) in his case of mandibular osteomyelitis in a patient suffering from lymphatic leukaemia.

Although a non-specific gingivitis was seen in fifty-three per cent of **Duffy & Driscoll's** (1958) cases, ulceration occurred in only thirty-nine per cent. Secondary infection of ulcerative lesions will result in necroses and perhaps even gangrenous stomatitis. **Moloney** (1940). According to **Banerjea** (1938) ulcerative stomatitis is not uncommon, and extremely painful, as are the other oral lesions. **McCarthy & Karcher** (1946). There is almost always a marked fetor oris, **Sinrod** (1957), which originates from decomposing blood, necrotic tissue and lack of oral hygiene. **Burket** (1944).

**Schaffer** (1951-52) reports that the tongue may be yellow, black or dark brown. The lips may be dry, pale and cracked, **Cook** (1939), enlarged and discoloured from haemorrhage into the submucous tissue. **Stumpf and Daggett** (1938). **Burket** (1944) considers that massive gingival necrosis is the result of thrombosis, the necrosis being a secondary change common to any infarcted area. Cervical lymphadenopathy is a quite early finding.

Although asialorrhoea is an early symptom, xerostomia may be a late one (and may increase the dysphagia.) **McCarthy and Karcher** (1946). Localised leukaemic infiltrations occur in the cheek, the tongue and the corner of the mouth. **Cook** (1947). Monilial infection may occur at any stage, and is a serious problem. **Duffy and Driscoll** (1958).

Histopathologically the acute myelogenous form is characterised by a dense accumulation of myeloid elements in an oedematous tissue. The basal cells show a tendency to proliferate, and there is a hydrophic degeneration of the prickle cell layer. The surface layers of the epithelium show dehydration and shedding.
The acute form of lymphatic leukaemia produces a specific histologic picture. In the chronic form, however, it is non-specific. Wentz et al (1949).

Oral lesions are relatively less common in chronic leukaemia, and the literature is particularly barren in this aspect. Haemorrhagic phenomena are usually early clinical findings, and take the form of gingival changes, submucous haemorrhage or unusual gingival bleeding. Spontaneous pulpal haemorrhages occur and will cause odontalgia. Burket (1957).

Treatment of the oral lesions is a great morale-builder, for it is very important that the patient's last days are made as comfortable as possible. Sinrod (1957). A warm sodium bicarbonate (10%) mouth wash is soothing, Burket (1957), although a normal saline mouth wash will soften deposits and relieve pain and dryness. McCarthy & Karcher (1946). Calculus should be very carefully removed, Sinrod (1957), since there must be no deep scaling. Cook (1947). The use of antibiotics greatly reduces the likelihood of Vincent's infection supervening. In the cases of Duffy & Driscoll (1958), there was an incidence of three per cent only. The Vincent's organisms can be controlled by filling the necrotic pockets with neoarsphenamine and glycerine. McCarthy & Karcher (1946). The necrotic slough should be carefully trimmed away. Sinrod (1957).

Vaseline may be placed on the lips and commissures, and is soothing, McCarthy et al (1946), as is a topical anaesthetic cream. Exposed bone should be covered by a zinc oxide pack. Sinrod (1957).

Teeth should only be extracted as a last resort; it is more prudent to relieve pain and establish drainage. If exodontia is unavoidable, a splint should be constructed and the patient treated as "a bleeder." Topical thrombin on a wisp of cotton wool is often effective in arresting gingival haemorrhage. Duffy & Driscoll (1958).

A spray is a useful adjunct in maintaining oral hygiene.
As yet there is no known cure for leukaemia, although temporary remissions are being obtained with antimetabolite and steroid drugs (Methotrexate, 6-mercaptopurine). These are not without complication, however, and a characteristic stomatitis may follow their use, with the appearance of aphthous type ulcers. Duffy & Driscoll (1958).

It is significant that leukaemic mice have recovered following massive irradiation and the intravenous injection of homologous bone marrow, with subsequent recolonisation of the haemopoietic and lymphopoietic tissues. Barnes and Loutit (1957). It is possible that human bone marrow transplants might be feasible in the near future. Dameshek (1957).

Sturgis (1952) considers other aspects of treatment in some detail.

Other cases are reported by Sprawson (1938); Neger (1939); Aseltine (1944); Boyd-Cooper (1944); and Mallet, Golan, England and Kutch (1947).
IRON DEFICIENCY ANAEMIAS

are typically microcytic and hypochromic. Classically the idiopathic form of hypochromic anaemia occurs in the middle-aged female with a history of repeated pregnancies and a poor diet. Growth, pregnancy and lactation place additional demands on the body for iron. Israels (1955).

It is important to remember that factors other than a dietary deficiency of iron exist. These include an impaired digestion and absorption of iron which occurs in sprue, and is seen to follow gastric resection. Chronic haemorrhage may be caused by haemorrhoids, peptic ulcer, carcinoma and hookworm infestation. Other important aetiologic factors include the inability of the body to synthesise haemoglobin in normal amounts, and chronic infection. Garby et al. (1957) describe a case of chronic refractory hypochromic anaemia associated with impairment of haemoglobin synthesis.


The anaemia is hypochromic and microcytic, and anisocytosis and poikilocytosis are normally present. There may be very slight neutropenia and thrombocytopenia, although these values are usually normal. Other aspects of haematology are dealt with by Whitby & Britton (1957).

Although there may be no oral symptoms associated with the condition, marked pallor of the oral mucous membrane is a common finding, and is seen best on the buccal mucosa and at the junction of the hard and soft palates. Burket (1957), Henry (1944), and Thomas (1954), who also states that there may be purpurral petechiae scattered over the gingiva, cheeks and palate.

The lips are dry, shiny and fissured, and an angular cheilosis may develop. Darby (1946).

Whitby & Britton (1957) describe a painful glossitis with vesicle and ulcer formation. If the glossitis progresses, it
may produce a smooth, red, bald tongue which is finally pale and atrophic (glazed tongue).

Darby (1946) describes a glossitis which he links with the Plummer-Vinson Syndrome. The papillae are irregularly desquamated, and the tongue appears blotchy, swollen and with atrophic margins.

It is Limarzis' (1950) opinion that the patient with a normal colouration in the buccal and pharyngeal mucosa is rarely anaemic. Schaffer (1951-52) describes a tongue with a patchy dorsum and localised regions of atrophy.

Once the disease is established, diet alone will not restore the blood condition to normal, and iron is the only efficient treatment. Whitby & Britton (1957).

PLUMMER-VINSON SYNDROME - Kelly-Paterson syndrome.

The syndrome of glossitis, dysphagia and anaemia was originally noted by Plummer in 1914, by Kelly, and later by Paterson in 1919, who described a syndrome in which dysphagia and anaemia were common symptoms. Ahlbom. (1936).

The syndrome is most frequently associated with idiopathic hypochromic anaemia, the megaloblastic anaemias and some gastrointestinal disorders associated with anaemia. It is thought that the upper alimentary tract symptoms result from the impaired replacement of epithelium following iron deficiency. The dysphagia was thought to be of hysterical origin, but is in fact due to an achalasia following a change or degeneration in Auerbachs plexus. Webs and bands of tissue may be formed. Whitby & Britton (1957).

Thoma (1954) and Cahn (1952) describe a loss of skin elasticity with a resultant small, inelastic slit-like mouth and lips. Occasionally there is an angular cheilosis. The complexion may be pale yellow. The tongue is partly or completely smooth, although it may be wrinkled following atrophy of the underlying mucosa. The microglossia is due to muscular atrophy.

Glossodynia and xerostomia are fairly common symptoms. Stones (1954). This condition predisposes to carcinoma of the
oesophagus, pharynx and mouth, and should command immediate attention. Ahlbom (1936).

The anaemia should be treated with iron. Whitby & Britton (1957).

APLASTIC ANAEMIA

is a severe disease characterised by an extreme anaemia of the normochromic, normocytic type, leucopenia and thrombocytopenia, due to aplasia or hypoplasia of the bone marrow. The disease occurs rarely; in a primary (idiopathic) form, and as a condition secondary to certain bone marrow poisons.

Gingival haemorrhage is associated with the thrombocytopenia, and occurs in the early stages. Later there is oral and gastrointestinal ulceration. Whitby & Britton (1957).

The tongue is rarely atrophic, and there is no distinct glossitis. An ulcerating stomatitis follows the intervention of secondary infection, and it should not be confused with angranulocytic angina, because of the prolonged course of the anaemia.

Removal of the causative agent in the second type may result in recovery. It is important that patients are hospitalised prior to the undertaking of exodontia or oral surgery. Thoma (1954).
PERNICIOUS ANAEMIA - Addison's Anaemia; Biermer's Anaemia

was first described by James Combe of Edinburgh in 1824.

Callender and Denborough (1957) note an ethnic and geographical difference and a familial tendency in its occurrence. Callender, Denborough and Sneath (1957) state that the disease is significantly more common in persons of group A than Group O blood. A "pre-pernicious anaemia" state characterised by glossitis and other symptoms has been shown to exist.

The cause of pernicious anaemia has been well investigated, and it is clear that many factors and processes may be concerned. Whitby & Britton (1957). There are certain acceptable fundamentals, however, notably that the normal gastric juice contains an intrinsic factor which is not found in pernicious anaemia, and which ensures the absorption of Vitamin B₁₂. An extrinsic factor closely related to Vitamin B₁₂, and supplied by the diet, combines with the intrinsic factor (according to Castle's theory) to produce the haemopoietic factor, which is absorbed from the intestine and stored in the liver for use in the haemopoietic system. This is a simplification of a now rather complex theory in which Vitamin B₁₂ and its variants, folic acid, folinic acid and other members of the Vitamin B complex, have been found to play a part. Whitby & Britton (1957).

Clinical evidence shows a lack of constant relationship between the neurologic, haematologic and lingual manifestations. Blood changes vary with the stage the disease has reached, as well as with the amount of treatment given. There is a severe megaloblastic anaemia with anisocytosis and poikilocytosis. There are no rouleaux. The leucopenia is usually marked, but a focus of infection may produce a leucocytosis. In severe cases there is a thrombocytopenia. Whitby & Britton (1957).

The oral mucosa is pale, but according to Thoma (1954), has a yellowish tint. Burket (1957) describes it as a greenish-yellow, and notes that the colour is best seen at the junction
of the hard and soft palate. This is a contrast to the red appearance of the tongue in the early stages. Limarzi (1950) considers the yellow tint and pallor are due to increased amounts of bilirubin in the blood when the red blood cell count is low. The buccal mucosa may be red and sore. Jeremy (1946).

Although the tongue may appear quite normal, glossodynia and glossopyrosis, Burket (1957), is present in 50 per cent of cases, and may become apparent months, or even years, before the anaemia is obvious. Whitby & Britton (1957).

Gillespy (1955), however, considers that this is not so, and that it is an over-emphasised symptom.

The tongue undergoes very significant changes during the course of this disease, changes which were first noted by Moeller in 1877, and later by Hunter in 1909. Burket (1957). Schaffer (1951-52) considers that Hunter's glossitis is the glossitis of pernicious anaemia, sprue and idiopathic hypochromic anaemia. Moeller's glossitis is quite different and of idiopathic aetiology. Thoma (1954) thinks of Moeller's glossitis as an early symptom of pernicious anaemia, but Burket (1957) considers them the same thing. Cecil and Loeb (1956) state that Moeller's glossitis is of unknown aetiology and of no consequence. Rattner (1947) agrees that they are dissimilar.

The literature contains descriptions of the two lesions, and these descriptions are not similar. However, it may be well to consider them as merely variations of the lingual manifestations of pernicious anaemia.

The glossodynia and glossopyrosis wax and wane over an ill-defined period of time, but with each successive remission and exacerbation the tongue becomes increasingly smoother as atrophy of the fungiform and filiform papillae progresses. The tongue is very clean and never coated. Whitby & Britton (1957). A type of anaesthesia dolorosa may be associated with these symptoms, which are emphasised by temperature changes, pressure and seasoned or salty foodstuffs. It may be that desquamation of a thin layer of squamous epithelium uncovers the
The Atrophic Glossitis of Pernicious Anaemia
After Colby (1896)

Herpetic Vesicle of upper lip.
Author's patient.
nerve endings of the underlying corium and causes this hyper-

Burket (1957) describes the early glossitis as fiery red
with the usual distribution to the tip and margins of the tongue.
Loss of muscular tone follows later (accompanying atrophy), and
in some cases in the deeper parts, muscle is replaced by fat, and
the tongue feels stiff to the patient. Patients with dentures
may have some difficulty wearing them, since the mucosa is not
in a condition to withstand the additional trauma they induce.
Schieve and Rundles (1949) consider that pteroylglutamic acid
has an irregular effect on the neurologic, haematologic and
lingual manifestations. Vitamin B₁₂, however, causes a rapid
regeneration of the lingual mucosa.

According to Schaeffer (1951-52), Moeller's glossitis,
glossitis marginalis exfoliativa, is a disease or a neuralgia.
Rattner (1947) regards it as a disease entity, which may be a
manifestation of pernicious anaemia, (providing that you can
accept the concept that glossitis may be a fore-runner of a
blood change), but is associated sometimes with hormonal changes.
Exacerbations do occur with the onset of the menopause and during
menstruation, Thoma (1954), and pregnancy may induce remissions.
Rattner (1947).

It is a chronic superficial excoriating (abrasion) which
shows intensely red, irregular and sharply defined areas. The
anterior half of the tongue is smooth. Epithelial desquamation
or thinning accounts for the denudation, and consequent pain from
exposed nerve endings. The papillae are hyperaemic, swollen and
elevated above the mucous membrane (papillitis).

Function causes exquisite pain, and there may be some dulling
of the sense of taste (hypoguesia). It is significant that the
pain is confined to the denuded patches, and may be so severe as
to be referred to the ear, throat and oesophagus. Rattner (1947).
The mucosa between the patches is oedematous or a shiny grey, but
otherwise normal. Senton (1951) presents a case of Moeller's
glossitis.
The Plummer-Vinson Syndrome is found occasionally, but less commonly than in idiopathic hypochromic anaemia. **Whitby & Britton (1957)**.

The standard form of treatment of pernicious anaemia is by parenteral injection of a potent liver extract or of Vitamin B12. Folic acid alone produces satisfactory haematologic response, but it does not protect the patient against neurotrophic complications. **Whitby & Britton (1957)**. Transfusion is seldom indicated, although iron occasionally is. **Jeremy (1946)**.

**NUTRITIONAL MEGALOBLASTIC ANAEMIA** - Tropical Nutritional Anaemia.

Occurs in tropical countries and although the fundamental cause is the nutritional deficiency, there may be added factors such as pregnancy, malaria, hookworm infection, or syphilis. Wills' anaemia is accompanied by a severe glossitis, the tongue is quite red and raw, but folic acid produces a rapid and satisfactory response. **Whitby & Britton (1957)**.
CYCLIC NEUTROPENIA (periodic)

Cyclic Neutropenia is a rare disease characterised by the regular disappearance of neutrophils from the circulating blood at varying intervals. The neutropenic phase is generally associated with clinical manifestations of weakness, fatigue, stomatitis, arthralgia, infection of the skin and mucous membranes; abscesses may occur. Cecil and Loeb (1956).

Cyclic fluctuations of the circulating neutrophils are but a reflection of the cyclic changes in the bone marrow, and although its aetiology is obscure, its relation to the menstrual cycle suggests a hormonal imbalance. Recurrent necrotising lesions of the oral mucosa become apparent in a twenty-one day cycle in one case, and were treated with corticotropin and cortisone. Page and Good (1957).
HEREDITARY HAEMORRHAGIC TELANGIECTASIA

Osler-Rendu-Weber disease

is a hereditary dysplasia of the capillaries which affects both sexes equally, and is transmissible as a Mendelian dominant. It is characterised by haemorrhages resulting from multiple telangiectasis consisting of non-contractile capillaries. Whitby & Britton (1957). Usually the disease is first manifest in early childhood, Syrop (1957), by repeated epistaxis, and later by excessive menstruation, recurrent haematuria, haemoptysis or haematemesis. A severe hypochromic anaemia may result from these episodes. Whitby & Britton (1957).

Shepherd (1953) describes two types of cutaneous and mucous lesions, the first is the stellate angioma,(spider naevus, spider telangiectasis), which may have a flat or raised punctiform centre with visible radiating blood vessels. It may be blue or red in colour, and blanches on pressure. Burket (1957) describes them as small, red or purple spots which have a spider-like configuration.

Limarzi (1950) states that they are seen especially in elder patients, and are a brighter colour than purpuric lesions. Microscopically. Shepherd (1953) has shown that the vessel walls, deficient in muscle tissue, and considerably thinned, are subject to bulging and ballooning with the production of a tortuous mass. The mucosal surface of the tongue is affected, as are the cutaneous surfaces of the nose, cheeks, ears, eyelids and fingers. Shepherd (1953).

A second type, the nodular angioma, is a solid-looking tumour, red or cyanotic in appearance and lacking "spiders legs." It is usually not obliterated by pressure, and is seen on the lips, tongue, skin of face and fingers. Spontaneous haemorrhage may occur, and is evidenced by an arterial spurt, after which the lesion may undergo regression. Shepherd (1953).
The tongue, lips, palate, gingiva, buccal mucosa, Syrop (1957), and the floor of the mouth, Colby (1956), may be involved. The lesions increase in size and number with increasing age.

The prognosis is not unfavourable, but cauterisation of the bleeding points is sometimes necessary. Whitby & Britton (1957).

The telangiectatic lesion may be altered by thermocautery and electrocoagulation. Syrop (1957).

Koch, Escher and Lewis (1952) describe management with oestrogen or combined oestrogen-androgen therapy.
PURPURA

Under normal conditions the blood should remain fluid and within the vessels, and there are various factors tending to retain the blood within the vessels, and disturbances of these mechanisms include purpura.

The stresses tending to disrupt blood vessels are hydrostatic pressure, gravity, microtrauma and stretching. The factors preventing this disruption are integrity of the capillary endothelium and the intercellular cement; contractility of the damaged capillaries, venules and arterioles; platelets which adhere to endothelial defects; and tissue tension.

The elastic and muscular walls of the arterioles and the endothelial walls of the capillaries counter the hydrostatic pressure within the arterioles. This mechanical process is defective in the purpuric state, and may appear clinically as ecchymosis, petechiae, or bleeding from mucous surfaces. Purpura may be classified as being caused by:

(a) Defective Endothelium.
   (i) Toxic from renal disease or bacterial infection;
   (ii) Allergic to foods and drugs and the various purpuras of Henoch, Majocchi, Schamberg;
   (iii) Congenital as in Osler-Rendu Disease;
   (iv) Senile and Anoxic states.

(b) Defective Intercellular Cement.
   (i) Deficiencies of Vitamins C & P;
   (ii) Dysproteinoses, Amyloidosis, Macroglobulinaemia, Cryoglobulinaemia, Myelomatosis, Lupus Erythematosus.

(c) Deficiency of Platelets.
   (i) Defective production by marrow disease or toxicity;
   (ii) Platelet lysis by toxins or agglutinins;
   (iii) Hypersplenism.

(d) Defective platelets, which, in conjunction with altered capillary contractility, constitutes von Willibrand's disease. Sands (1958).
A more detailed classification is to be found elsewhere.

Whitby & Britton (1957).

The disease is recognised by purpuric spots and larger ecchymotic areas which form on the skin over the entire body. These areas do not fade on pressure, and change from bright red to yellow brown. Thoma (1954).

Capillary oozing from the entire marginal gingiva or severe gingival haemorrhage is frequently the first clinical evidence of the condition. Reddish-purple spots appear beneath the mucous membrane, especially near the junction of the hard and soft palate. They do not blanch on pressure, a factor which differentiates them from vascular anomalies. Burkett (1957). Small purpuric spots may be seen on the gingiva, and blood-filled blebs may form. Thoma (1954).

Thoma (1948) describes a fatal case of thrombocytopenic purpura in a young woman. The gingiva were pale and ecchymotic, and there was oozing from the oedematous papillae. Following splenectomy, there was no regression, the gums became more hypertrophic, spongy and granular, and oral haemorrhage was so severe the mouth filled with blood. The oral fetor became quite intense.

Local treatment to reduce gingival haemorrhage may include the use of non-caustic haemostatic agents, and 1 1/2 per cent strength hydrogen peroxide. Oral trauma is considerably reduced with a soft or semi-solid diet (containing large amounts of Vitamin C). Burkett (1957).
POLYCYthaEMIA VERA - Vaquez-Osler Disease
Splenomegalic Polycythaemia.

Polycythaemia refers to an increased number of circulating erythrocytes, usually above seven million per cubic millimetre. It may be primary in nature, and in this form is a disease characterised by a well-marked persistent and absolute polycythaemia due to excessive erythroblastic activity of the bone marrow. There is an increase in the total blood volume and in the blood viscosity. The patient has a cyanotic appearance and splenomegaly. Although its aetiology is unknown, it is apparently due to a primary hyperplasia of the haemopoietic tissue of the bone marrow. Early symptoms include headache, vertigo, lassitude, tinnitus and visual disturbances. Cyanosis and neurological symptoms are common. High blood pressure may complicate the picture at a later age (Polycythaemia hypertonica or Gaisbock's disease).

Almost all these symptoms are due to the great increase in blood volume and circulating red blood cells. The cutaneous symptoms are related to vascular distension and viscosity, but other lesions are due to organic changes in the blood vessels, and to heat and cold. The facies may simulate the appearance of cirrhosis of the liver with petechial haemorrhage, telangiectasia and generalised purpuric eruptions. Bluefarb (1951).

The oral mucosa exhibits a deep blue, Limarzi (1950), Robinson (1955), to red hue, Thoma (1954), although Bluefarb (1951) and Burket (1957) describe it as purplish red, (due to capillary distension).

Telangiectasis may result from dilatation of the superficial vessels and pigmentation of the mucosa following ecchymosis and/or persistent hyperaemia. The tongue may be enlarged, thickly coated, beefy red and fissured. Papillary hypertrophy produces a granular appearance. Bluefarb (1951).

Thoma (1954) states that the tongue has a deep blue to red hue, but Burket (1957) considers that it appears to have been
painted with crystal violet. The gingiva are often greatly swollen and have a haemorrhagic tendency with frequent and spontaneous episodes. There does not seem to be any tendency to ulceration.

The treatment of the oral lesions is aimed at the maintenance of strict oral hygiene. Exodontia may be accompanied by severe haemorrhagic episodes if carried out at a time when the red blood cell count is high.

Erythrocytosis or Secondary Polycythaemia should be regarded as an effort by the organism to compensate for some difficulty in the oxygenation of the blood and tissues of the body. Whitby & Britton (1957).

It is a condition seen in acclimatised residents at high altitudes, in patients with congenital heart disease, pulmonary emphysema, marked dehydration, acidosis and following the intake of certain drugs.

Oral manifestations are rarely observed. Burket (1957).
AGRANULOCYTIC ANGINA — Agranulocytosis, Granulocytopenia.

A severe disease characterised by marked leucopenia and associated with necrotic ulcerations, particularly of the mouth. The agranulocytosis may be caused fundamentally by an agent which inhibits leucocyte production, or by a noxious or restraining influence which prevents leucocyte maturation. A list of some of the drugs and chemicals responsible for the condition is given by Whitby & Britton (1957). Amidopyrine, Dinitrophenol, Thiouracil, Sulphonamides and the Mercurial diuretics are among a few.

The anginal manifestations are a direct result of the agranulocytosis, and it has been found that the blood changes preceded the faucial ulceration. Whitby & Britton (1957).

As a consequence of the leucopenia the angina worsens. The severity of the infection increases with injurious action on the bone marrow, further depressing it. A vicious cycle is thus established. Muir (1951).

The systemic symptoms are usually out of all proportion to the oral lesions, and include fever, malaise, headache and ever-increasing weakness. Burket (1957).

The results of the haematological examination are characterised by the marked leukopenia due to a neutropenia, so intense that polymorphoneuclears may be entirely absent. Anaemia and thrombocytopenia may be seen in the more chronic forms.

The oral lesions begin initially as sharply demarcated haemorrhagic cyanotic areas. Limarzi (1950).

A non-specific ulcerating stomatitis is described by Thoma (1954).

The ulcerative lesions are covered by a dirty, yellow-grey or green-black membrane, Limarzi (1950), and the absence of inflammatory reaction about these ulcerations should suggest malignant neutropenia. Burket (1957).

Ulcerative or gangrenous lesions of the gingiva, cheeks, palate, gums, Burket (1957), tonsil or pharynx, Batenger (1954),
on the floor of the mouth, Cook (1947), are characteristic of the disease.

Other gangrenous lesions sometimes form; they may be deep-seated and involve the periosteum or even the bone. Schaffer (1951-52), Thoma (1954).

A greyish slough, Schaffer (1951-52), may cover the ulcers, and contains desquamated cells, detritis and bacteria. Thoma (1954).

The oral condition is often unrestrained in its development, and progresses rapidly, a characteristic of Noma. Thoma (1954).

D'Agostino (1951) includes blood dyscrasias in his list of diseases which may precede Noma.

A swollen face, dysphagia, Thoma (1954), severe pain, fetor oris and regional lymphadenopathy, Henry (1944), may accompany the anginal lesions.

The first rule of treatment is the removal of the possible primary cause, and thereafter to prevent or limit secondary infection. Whitby & Britton (1957). A combination of penicillin folic acid and pyridoxine hydrochloride is most effective. Burket (1957). Blood transfusion may be effective, but its value is disputed. Whitby & Britton (1957). Oral lesions can be cleansed with 10 per cent sodium bicarbonate solution, 10 per cent solution of crystal violet or a polyantiobiotic troche may be used. Burket (1957).
BLEEDING DIATHESIS

Haemophilia

is a hereditary disease affecting males, but transmitted by females, and characterised by a prolonged coagulation time and a lifelong tendency to excessive haemorrhage, due to a quantitative deficiency of antihaemophilic globulin (A.H.G.). Whitby & Britton (1957).

It is usually recognised in infancy or childhood, either because of spontaneous haemorrhage, or continued bleeding from minor surgery or trauma. Haemorrhage into the gastro-intestinal and genito-urinary tracts occurs, giving rise to distressing symptoms that suggest conditions requiring immediate surgical intervention. Repeated painful haemarthroses eventually produce a form of arthritis and deformity. Cecil & Loeb (1956).

Within the oral cavity spontaneous haemorrhage may occur, and exodontia has been associated with bleeding, to the point of exsanguination. Thoma (1954). Haematoma may form on the tongue and other portions of the oral mucosa. Burket (1957).

A deficiency of the plasma thromboplastin component (P.T.C.) gives rise to a haemophiloid state, which closely resembles the classic type and has been called Christmas Disease. Whitby & Britton (1957), Spiegel (1958). A third factor has been hypothesised, the plasma thromboplastin antecedent (P.T.A.), but some consider that this factor is a manifestation of a combined deficiency of A.H.G. and P.T.C.. Stegelske et al (1957), Whitby & Britton (1957).

The management of the haemophiliac dental patient has been discussed by Byrd (1951), Henny (1944), White and Mallett (1949), Cooper & Youngs (1948).

Local haemostatic measures include the construction of an acrylic resin or shellac splint, which will protect the wound. The patient should be hospitalised prior to any exodontia or oral surgery, and prophylactically treated with A.H.G. if the material is available. Fresh blood should be available for transfusion purposes.
Other bleeding diatheses which may be of importance in oral procedures include the presence of a circulating Fibrinolysin. Firkin, Reed and Blackburn. (1957), and Fibrinogenopenia. Rose (1958).

The presence of circulating anticoagulants has been considered by Scopp & Fredrics. (1958).
ONYALAI.

Onyalai is an acute disease having all the haematological features of essential thrombocytopenia, and is characterised by the formation of haemorrhagic bulla as well as purpura. The disease is found only in Africa. Whitby & Britton (1957).

Haemorrhagic bullae involve any portion of the oral cavity although the buccal mucosa is most frequently affected. The bullae are from 2mm. to 2cm. in diameter; raised and reddish-blue to blue-black in colour. They burst and ooze with the resulting clot clinging to the surface. A marked foetor is present, also gingival pallor and dysphagia. Cerebral, gastrointestinal and vaginal haemorrhage may occur and complicate the clinical picture.

Oral hygiene can be maintained by use of a mouth wash, of sodium bicarbonate, and gentle syringing. General treatment is a little more difficult since the disease undergoes spontaneous remissions. Haemorrhage should be controlled and the blood lost must be replaced. Dodds (1950).
DISEASES OF ALLERGY.

Stomatitis Venenata
Stomatitis Medicamentosa
Angioneurotic oedema
"Allergy is an acquired specific alteration in the capacity of the system to react, brought about by an Antibody Mechanism."

Allergic stomatitis (dermatitis) is that stomatitis (dermatitis) brought about or related to an allergic reaction. Rostenberg (1957).

Landsteiner's concept of the mechanism of drug allergy postulates the formation of a drug (or product of drug) combination with tissue or blood protein. Antibody produced against the conjugate would subsequently react with the drug itself (or with the breakdown product) and also with the protein drug conjugate formed after the readministration of the drug. Since Antibody specificity is determined by the structure of the chemical haptene, it is possible that sensitisation would occur to closely related substances.

The mechanism of drug allergy, would, if this concept is correct, involve several variable factors which might affect the incidence of reactions and also the tissue sites involved. The capacity of the drug to unite with body protein would suffer individual variations. Also a soluble and rapidly absorbed conjugate would probably produce an immediate reaction of the anaphylactic type. Confinement of the conjugate to a particular tissue or cell (and not removed or absorbed) would result in reactions of the local, delayed type. If the haptenes were not the drug itself but a metabolic breakdown product, individual variation in the metabolism of the substance would play a role in the incidence of drug allergy. Cecil & Hoeb (1956).
CONTACT (DERMATITIS) STOMATITIS. Stomatitis Venenata.

The term includes all cases caused by outward contact with chemicals in gaseous, liquid, particulate or solid form. It does not include (dermatitis) stomatitis resulting from physical causes such as irradiation, heat, cold, humidity, dryness, pressure or friction, although a physical factor is often present and may aggravate the existing condition.

The mucosa (skin) becomes sensitised, apparently by the attachment of the contactant to the protein of the epidermal cells. This conjugate formed acts as an antigen, antibodies are produced, and the lesion represents a specific antigen-antibody reaction.

The lesion is essentially an epidermal oedema resulting in vesicle formation within the epidermis and manifest as small blisters accompanied by erythema and pruritis. In chronic cases hyperkeratosis and lichenification are seen. Cecil & Loeb (1956). Histologically there are many eosinophil leucocytes. Russell (1955).

A substance may damage the (skin) mucous membrane in its capacity as a primary irritant by direct denaturing action, caustic, degreasing, dehydrating, oxidising, reducing, protein precipitation or keratolytic action. These effects are confined to the area of contact and clinically may vary from redness, peeling and fissuring to necrosis and ulceration. Histologically there is an infiltration of polymorphonuclear leucocytes and lymphocytes, but there is no eosinophilia. The extent of the damage by these agents depends on their concentration, the duration of exposure and the resistance of the area exposed. Regardless of whether a substance is a primary irritant, it may cause sensitisation. Curtis & Fliegelman (1954). A substance may be a primary irritant when concentrated and a sensitising agent when dilute. Russell (1955).

After sensitisation a refractory period of 5-7 days follows and subsequent contacts of the drug at this site usually result in the appearance of a lesion. Curtis et al (1954). It is important to note that Stomatitis Venenata cannot be transferred by serum but can be transferred by living cells. Boyd (1956). Substances which
may give rise to Stomatitis Venenata include the Medicaments used in dental practice; Antibiotics; Camphophenique; Iodine containing preparations; Formalin, and the Cold sterilising solutions. Burket (1957).

Systemic manifestations other than those resulting from secondary infection are very rare.

The investigation of these conditions should include complete historical data, and it may be necessary to ask leading questions for the sake of brevity. The most intimate detail of the patient's occupation, hobbies and recreations must be obtained, any information of past treatments and even the patient's own idea as to the cause. Russell (1955).

The nature and distribution of the eruption may suggest the contactant. Cecil & Loeb (1956).

If the history and examination do not supply the required information, it may be necessary to patch test with suspected contactants. The patch test is attributed to Judassohn 1894.

On cutaneous surfaces the suspected contactants are gently smeared on the skin, covered with gauze, cellophane and adhesive plaster. A control patch is applied with no contactant. The patch is left in place for 48 hours and then read; if the reaction is delayed the patch is left a further 48 or 72 hours. It is extremely important to avoid primary irritation and to apply the substance in a concentration which is known to give no known reaction in the normal person, that is, one which has no primary irritant effect. Harvey (1958).

The reaction to the patch test depends on the patient's sensitivity, the concentration of substance used, the duration of application and the amount of substance in proportion to the skin area. These tests should never be carried out in the presence of acute extensive stomatitis (dermatitis).

If it is possible to use a normal person as a control, one must be careful not to leave the patch on for more than five days, as there is a possibility of the control becoming sensitised.
A positive test may be manifest by a reaction varying from a patchy impalpable erythema to a palpable raised erythema with vesiculation and marked subjective irritation. It is significant to remember that a positive test indicates only that the patient's mucous membrane (skin) has become sensitive at some prior date to the patch test material.

Negative patch tests are not conclusive since clinical sensitivity to the test material may exist in spite of a negative test which is but an imperfect imitation of the conditions under which the suspected substance has produced the present lesion.

Negative tests may be the result of the condition being due to an irritant; the test being applied during the latent period; a delayed result or sensitisation of too slight a nature to produce a response on a cutaneous surface, in which case the mucous membrane should be tested.

The mucosal contact test is dealt with by Nyquist (1952), who considers that in dental practice the application of the patch is of a more complex nature. Materials which are to be applied to the oral mucosa must be held in place by a simple prosthesis, by rubber cups or merely painted on. (A simple prosthesis is usually constructed of shellac with several metal claspers to retain and stabilise it.) The prosthesis is worn for a few days prior to testing. The suspect contactants are placed, and the prosthesis is inserted for 12 hours during which time no fluids are taken.

Nyquist (1952) considers that Denture Sore Mouth may result after a denture is inserted, and although allergy to the materials used is a popular cause it is in fact rarely so. This is not, however, in agreement with Spies et al (1955) who state that: "This specific type of sensitivity, although rarely described in scientific literature, is more prevalent than most dentists and physicians realise."

Spies' case suffered from stomatopyrosis, sialorrhoea and sore throat when wearing his dentures. The mucosa was hyperaemic, and the palate swollen and blistered. Patch test with uncured acrylic on the forearm not only produced a strongly positive reaction on
the third day, but caused an exacerbation of the oral symptoms despite the fact that the patient was not wearing the dentures at the time of the test. Vulcanite dentures have been constructed and caused no reaction. Hypersensitivity may develop to any denture materials, rubber base, synthetic resins, and the metal alloys. Nyquist (1952).

Bradford (1948) quotes a case of allergy (with positive skin test) to methyl methacrylate dentures, manifest by intense inflammation and pain of the mucoperiosteum. The inflammation regressed on removal of the dentures, but returned when they were reinserted. Vulcanite dentures subsequently proved satisfactory.

Autopolymerising acrylic restoration may produce a dermatitis in those dentists handling the material. Hollander & Kennedy (1951).

Stoy (1952) and Vickers (1952) state that sensitisation to denture materials may be a cause of angular stomatitis, and suggest that mercuric sulphide (vermilion), vulcanite and the newer plastics may be the possible aetiological agents.

Stoy (1952) considers that true sensitisation to denture materials is not very common, but primary irritation is the more likely cause.

Skinner (1947) lists the composition of acrylic resins in some detail. Essentially there is a liquid (monomer), a solid (polymer), an inhibitor, a plasticizer (e.g. dibutyl phthalate), (essential oils are known sensitisers which do not combine on curing but remain free between the polymerised molecules) and colouring matter, which may be the cause of the reaction.

Stoy (1952) remarks that sensitisation may be slow, but it is aided by infection and trauma, on the other hand oral hygiene may be excellent.

Fisher (1954) considers that methyl methacrylate liquid monomer is a sensitiser and can cause an allergic contact type of eczematous reaction on the skin and the oral mucous membrane. When completely polymerised it is no longer a sensitiser or elicitor of allergic reactions. The symptoms of this allergic stomatitis are soreness, xerostomia or sialorrhoea, stomatopyrosis, punctate or diffuse
erythema with or without erosions or with a deep imprint of the denture. Patch testing can be carried out by strapping the offending prosthesis on to the arm since the allergic reaction between skin and mucous membrane are analogous. This method of testing is not, however, without fault since false positive results may be obtained by pressure effects. It is more accurate to use scrapings and grindings from the denture.

Frykholm (1957) states that silver amalgam may produce some allergic manifestations, stomatitis, urticaria, oedema, dermatitis and vesiculation. This type of allergy is fortunately rather rare, and Burket (1957) remarks that the condition is more frequently seen with copper amalgam.

Dental and cosmetic preparations are quite often the cause of sensitisation. Known sensitisers include the following: dentifrices, mouthwashes, denture adhesive and cleansing creams, lipsticks, rouge and chewing gum.

Lanbach et al (1953) report a case of cheilitis caused by cinnamon (Cassia) oil in a new ammoniated toothpaste. The patient's mouth was covered by small pruritic blisters which broke and spread to involve the perioral area, were covered by golden crusts and surrounded by erythema and oedema.

Winter (1948) reports a case of an asthmatic patient who was in the habit of using a dentifrice containing orris root powder made up by her father (a druggist). The oral symptoms were glossodynia, glossitis and pronounced gingivitis. On discontinuing the dentifrice the condition resolved. Stomatitis, cheilitis (lips dry and scaly), circumporal dermatitis and glossitis were the symptoms recorded by Fisher & Tobin (1953) in a case of sensitisation resulting from the use of "Dichlorophene" G-4 in a tooth powder.

Stomatitis following the use of Fluoride Dental Powder or cream has been reported. (Anon.1958).

Lipsticks may cause sensitisation in patients who have only been using the brand a short time, or after many years use of the same brand. The lips become oedematous and pruritic, vesicles form with much oozing and crusting, the lips adhere. The condition may pro-
gress to cheilitis exfoliativa with an accompanying glossitis venenata when the tongue becomes sensitised. Thomae (1954). Lipsticks contain fatty acids, oils, perfumes and colouring materials. Usually these colouring materials are indelible dyes, namely: bromofluoresceins; tribromofluoresceins; tetrabromofluoresceins, and are responsible for the cheilitis. Zukon et al (1948) recommend that the patient should use a cosmetic with a non-indelible dye.

Thomae (1954) reports that cigars and cigarettes may produce cheilitis of an allergic nature.

Penicillin lozenges, pastilles and sprays have been responsible in many cases for the production of penicillin stomatitis, which is manifest by stomatodynia, glossodynia, sore throat, asialorrhoea, and a glossitis marked by its oedema and bright red colouration of the fungiform papillae; the tip especially is affected. This violent reaction is thought to be due to either the drug, its impurities or the lozenge base. Cross (1949).

Cook (1948) describes a case of stomatitis following use of penicillin troches which was manifest by the appearance of grey blisters on the tongue.

Farrington et al (1947) describe another case with cheilitis, perlèche, glossitis, stomatopyrosis and stomatitis. Treatment of these cases of contact stomatitis consists of elimination of the causative agent and its constant avoidance. Supportive care includes the use of antihistamines and a mild microbial agent; hydrocortisone ointment may be of some use.
STOMATITIS MEDICAMENTOSA.

Is the result of drug absorption, and may be caused by any medicament. Mucosal reactions are the same as cutaneous reactions but are less frequently seen because the mouth has no horny layer and is equipped with mucous glands for lubrication. The onset is abrupt and may follow a very short or extremely long period of sensitisation. The lesions are multiple, usually with an amorphous, eroded or fungoid appearance and vary from a marked erythema to vesicle formation, erosion, ulceration or even gangrene. The lesion may be the same for many drugs but one drug may produce a variety of eruptions. General symptoms are rarely marked, but in severe cases fever, malaise, haemorrhage, purpuric spots and even death may occur.

Any drug may be involved, but some of the more common are the barbiturates, penicillin, phenolphthalein, arsphenamine, sulphonamides, arsenic, mercury, iodides and quinine.

Rabinovitch & Sintkoff (1948) describe a fatal case of acute exfoliative dermatitis with small oral ulcers covered by an adherent grey exudate following penicillin therapy. The case terminated fatally.

An excellent paper on the Oral Reaction to Penicillin has been prepared by Gross (1949).

Streptomycin may produce many untoward reactions. Beham & Perr (1948) describe three cases of painful stomatitis. In the first case the oral mucosa, anterior pillars and inner surface of the lips were involved by yellow vesicles, which became eroded and covered by a shaggy grey necrotic membrane. This diffuse erosive stomatitis was accompanied by an eosinophilia (10%). Following withdrawal of the drug, the condition almost cleared up entirely in 5 days, but returned when therapy was recommenced. In the second case there was swelling of the oral mucosa, aphthous type eruption, pruritis and tightness of the mucosa. In the third, a diffuse erythematous rash accompanied a crop of small yellow vesicles on the inner aspect of the cheek and vermilion border
of the lower lip.

Pallister (1949) reports a fatal case following Streptomycin therapy. The cheeks, lower gingiva and tonsils were covered by a dirty white ulcerated area. Patchy palatal lesions in another case were associated with a confluent purulent membrane on the mucosa. Wilson's (1958) cases occurred in nurses handling Streptomycin and the oral lesions took the form of a cheilitis, stomatitis and ulceration of the tongue. The use of a closed system (viules and carpules) gloves and masks avoids contact with the drug and lessens the chances of sensitisation.

Black hairy tongue is sometimes described as an allergic reaction following antibiotic therapy. There is no substantive evidence to support this view.

Burket (1957) reports reactions to the other antibiotics, with resulting mucosal and cutaneous reactions. Cheilitis, glossitis and a diffuse stomatitis may follow topical or parenteral administration of Aureomycin. Terramycin and Achromycin are also responsible for side reactions which include xerostomia, stomatopyrosis, oral and lingual pruritis and angular cheilosis, which was unrelied by vitamin B administration. Chloramphenicol may also be associated with a diffuse stomatitis, pharyngitis and glossitis. The antibiotics Neomycin, Polymyxin, Bacitracin and Tyrothricin are used almost exclusively for topical medication, and there have been no reports of undesirable oral mucosal reaction to them.

Penolphthalein is the active ingredient in various laxatives, Stones (1954), and it may produce a stomatitis and glossitis which, according to Burket (1957) is manifest by a series of blebs, vesicles, erosion or deep ulcerations. The reaction is frequently of the "fixed type."

Other drugs which may produce oral lesions include the barbiturate derivatives, salicylates; sulphonamides and pyridium.

Procaine may produce a severe reaction in either the dentist (in the form of a dermatitis) or the patient. Many severe reactions to Procaine probably result from its intravenous injection and subsequent effect on central nervous system, heart, vascular bed and
respiratory tract, and not from an allergic mechanism. Sadove et al (1952). Burket (1957) states that following injection there may be a localised oedema which in many cases is due to procaine. In some of these patients it has been hypothesised that the procaine sensitivity developed as a result of prior sulphonamide administra-tration. Kemp (1958) states that "dentists who suffer from a procaine idiosyncrasy are forced to use anaesthetics which do not belong to the para-aminobenzoic-acid series." Kile (1950) reports a case of procaine allergy, and Sullivan (1958) reports a case of hypersensitivity to procaine in a female patient undergoing oral surgery.

Treatment of Stomatitis Medicamentosa consists of elimination of the drug responsible for the lesion. Supportive measures include the use of the antihistamines and hydro-cortisone. Ulcerative lesions should be treated with a bland agent.
ANGIONEUROTIC OEDEMA. Giant Urticaria - Quincke's Disease.

Is a transient oedematous swelling of the upper lip related to food allergy, Archer (1952) heredity, psychologic difficulties, infectious diseases, endocrine disorders or infection of the gall bladder. Burket (1957). Attacks may coincide with exposure to the cold, emotional strain or menstruation. Once initiated the swelling appears within 5 to 30 minutes and may persist for 24 to 36 hours. Archer (1952).

Areas involved include the skin about the eyes, the chin and the lips. Gross oedema causes considerable disfigurement.

Involvement of the tongue, soft palate and uvula may interfere with function, and spread to the pharynx is possible. Thoma (1954). The hereditary type seem predisposed to glossal involvement and there is 20% mortality rate. Burket (1957).

Since it is frequently difficult to isolate the contactant and thus its avoidance, treatment may not be possible.

Intramuscular epinephrine may be used in acute attacks. Tracheotomy may be necessary and the clinician should always be prepared. Antihistamines are frequently helpful.

The mechanism of the reaction is thought to be based on the release of histamine or histamine-like substance affecting the deeper blood vessels and causing vasodilatation and transudation. Archer (1952).
DEFICIENCY DISEASES

Including the Avitaminoses,
Sprue and Kwashiorkor.
NUTRITION.

The oral tissues are particularly sensitive to nutritional deficiency and dietary aberrations, and they are frequently the first to show the effects of such deficiencies.

At any one time in the oral cavity there is a highly varied range of tissue response and reaction, for the tissues of the mouth vary from the simplest (mucous membrane) to the most highly specialised (papillae of the tongue and dentine). Thus we have the unique opportunity of being able to observe hard and soft tissues of both epithelial and connective tissue origin, side by side.

The mouth is an internal cavity; its lining is continuous with that of the gastro-intestinal tract; it receives specialised glandular secretions and it is easily accessible.

The enamel and dentine are kymographic; they are fixed records of the past history of the patient, but the alveolar bone, the gingiva and the tongue reflect the present internal status of the patient. Schour and Massler (1945).

On considering the oral manifestations of these deficiency states, it is well to remember that the so-called classic case, is in fact the rare case, and the so-called atypical case is the usual case. Whatever the intensity of the manifestation, whether spectacular or not, depends on tissue response to the prolonged deprivation of essential chemical substances. To establish a diagnosis in these deficiency states depends on a reliable history and careful examination. Spies et al (1955).

There appears to be a predilection for some sites, and we see that local conditioning factors influence the appearance and severity of the lesions, for example, the development of cheilosis is facilitated by radiant energy and of glossitis by the friction of the tongue, teeth and cheeks. Afonsky (1955).

The oral mucous membrane is very sensitive to disbalance of the intricate enzyme systems concerned with cellular respiration,
oxidation and reduction, and this results in the early appearance of lesions. Afonsky (1950). It is extremely important to realise at this stage, however, that these oral manifestations are not pathognomonic of any one deficiency state. Afonsky (1955).

There are any number of grades of deficiency states, varying from the very mild (sub-clinical) to the severe, Afonsky (1950), and despite the type and duration, the deficiency state begins on the cellular level, and it remains on this level often long before it is clinically recognised. Medina (1956).

The lingual mucosa is a highly specialised one, and readily affected by biochemical upsets on the cellular level. The fungiform papillae are the most highly specialised and the first affected. The filiform papillae are less specialised and affected later.
VITAMIN A. Axerophtol.

Vitamin A is a carotene formed in the body by the action of the liver enzyme carotenase on one of the carotenoid provitamins. The chief function of this vitamin is the maintenance of the epithelial tissues of the body and a deficiency causes cellular atrophy and basic cell proliferation, with the production of a keratinised epithelium susceptible to bacterial invasion.

Hyperkeratinisation of the oral mucous membrane Schour & Massler (1945) and hyperplasia of the gingival tissues may occur. Burkut (1957), Medina (1956) and Brauer et al (1952).

Enamel hypoplasia is not a common occurrence Thoma (1954), and even in children with severe xerophthalmia and blindness these dental changes have not been noticed. Schour & Massler (1945).

Thoma (1954) reports Xerostomia accompanying the deficiency, but it would appear that this is the result of a keratinising metaplasia of the epithelial cells with subsequent blockage of the glandular ducts with epithelial debris. He also describes a form of leukoplakia associated with the deficiency, which Burkut (1957) suggests a combination of Vitamin A and Vitamin C will frequently clear up.

Arnott (1958) has had considerable success in the treatment of some types of leukoplakia by this method, with emphasis laid upon the use of Vitamins from natural sources.

General retardation of dental development, eruption and growth of alveolar bone is reported by Brauer et al (1952). The lamina dura is ill defined, the periodontal membrane is irregular in width and the cementum is thickened and Cementicles may form in animals fed on a Vitamin A deficient diet.
THIAMIN. Vitamin Bl. Aneurin.

Thiamin has not been convicted as the specific aetiologic factor in the production of beri beri, but it does have greatly beneficial results therapeutically.

It is important to remember that Aniacinosis and ariboflavinosis may co-exist with beri beri and contribute to the oral lesions present. Cecil & Loeb (1956):

The oral lesions associated with beri beri are rarely severe, and not distinctive, Thoma (1954) although there is a marked sensitivity of the tissues. Schour & Massler (1945) Afonsky (1950).

There may be pain in the jaws and face in addition to glossodynia and the odontalgia arising from hypersensitive dentine. (This constitutes the peripheral neuritis of the oral region.) Afonsky (1950). Herpetic type lesions may be found on the buccal mucosa, under the tongue and on the palate. Stones (1951) Schour & Massler (1945).

A macroglossia of oedematous origin may be seen, there is loss of muscle tone, the fungiform papillae are enlarged and hyperaemic, Medina (1956) and the edge of the tongue is commonly indented. Burket (1957).

The oral mucosa, the tongue and the gingiva may have an old rose colour.
RIBOFLAVIN. Vitamin B2. Lactoflavin.

Is the "yellow enzyme" described by Warburg and Christian in 1932. Its importance in human nutrition has been established but the exact mechanism of its action is not understood, although it may act as a hydrogen transporter, forming an elaborate enzyme complex when combined with specific protein. Spies et al (1955).

Aside from the effects it exerts on the oral tissues, ocular involvement is significant and includes conjunctivitis, laceration, burning in the eyes, failing vision and invasion of the corneal vessels. Cecil & Loeb (1956).

The first oral signs of a riboflavin deficiency appear as a change of colour of the mucosa of the labial commisures, pallor, maceration, ulceration and pain may follow. Medina (1956).

Later the angles of the mouth become grey white and moist, the epithelium cracks and secondary infection occurs. It is interesting to note that very little inflammation accompanies this maceration, and non-adherent honey coloured crusts form which can be scraped away without causing bleeding. Finnerud (1944).

Schour & Massler (1945) describe an accompanying asialorrhoa.

The lips may be red, desquamated and ulcerated at the muco-cutaneous junction. They are frequently dry, wrinkled, patchy or mottled as a result of this desquamation. Medina (1956).

The lips are sometimes described as having an abnormal shiny redness. Cecil & Loeb (1956).

The so-called Magenta glossitis does not usually accompany the angular cheilosis and is not frequently observed. Afonsky (1950).

The tongue is initially engorged and painful. The summits of the fungiform papillae are denuded and the underlying capillary loops show through as red elevations. Stones (1951). These papillary "stumps" give the tongue a "pebbly" or "cobblestone" appearance. Medina (1956). The dorsum is usually uniformly coloured, dry and uncoated.
The buccal mucosa may be oedematous and show dental imprints at the occlusal line.

An interesting point is made by Burket (1957) who notes that the angular cheilosis of ariboflavinosis is almost always horizontal, while the angular cheilosis associated with a decreased vertical dimension slopes downward.

Afonsky (1955) reports that ariboflavinosis in dogs does not produce very severe lesions; there is a simple papillary and connective tissue atrophy and the tongue becomes smooth and pink with a bluish tint.

There may be a fine, scaly and slightly greasy desquamation on a mildly erythematous base in the naso labial fold, alae nasi, vestibule of the nose and on the ears.
PELLAGRA. (Italian pelle agra = rough skin)
Lombardy Leprosy.

Is a non-contagious, non-hereditary clinical syndrome affecting the alimentary tract, the skin and the nervous system. (Diarrhoea, Dermatitis, Dementia and Death.)

According to Goldsmith (1956) the disease is due to a deficiency of Niacin and its precursor Tryptophan. Niacin is a specific curative for the lesions of the mucosa, and has a favourable influence on the nutrition of the tongue, and for some of the gastro-intestinal and mental symptoms. It does not, however, relieve the peripheral neuritis (which Thiamine hydrochloride will). Nutrition Reviews (1948).

On a cellular level it is known that Nicotinic Acid is an essential part of Coenzyme I and Coenzyme II.

Black tongue is a term applied to a naturally occurring disease in dogs, cats and man. However, whereas feline and canine black tongue responds to Niacin therapy, black tongue in man does not. Spies et al (1955).

Schour & Massler (1945) consider glossodynia to be a prodromal symptom of a Niacin deficiency.

There is an early vascular hyperaemia, Medina (1956), which begins at the tip of the tongue and spreads to the lateral borders and later to the dorsum. Early oedema is only slight but produces some indentations from the teeth. Mann (1941) notes that early papillary hypertrophy, stomatodynia and glossodynia occur.

Oedematous and heavily indented in some cases, the tongue may be knife blade thin at the edges and the indentations appear punched out and bright red. Afonsky (1950). As the deficiency progresses, the symptoms intensify and the organ becomes fiery red and vascular. Mann et al (1941), Schour & Massler (1945).

The Glossodynia and Glossopyrosis may become quite severe.

The intensity of the acute process is indicated by the superficial irregularities and sharply demarcated grey or red coloured

A painful gingivitis Thoma (1954) and Schour & Massler (1945) and angular cheilosis (of riboflavin deficiency) may accompany the lingual manifestations. Stones (1951).

The tongue and buccal mucosa may be covered by a thick grey white gelatinous plaque Johnson (1955) or by white patches Spies et al. (1955) on the undersurface. There may be some hypertrophy of the fungiform papillae. Mann (1941) Medina (1956).

Glossopyrosis and stomatopyrosis may be so acute that the patient feels his mouth has been scalded. Johnson (1955) Thoma (1954).

The lips at this stage appear quite red and cracked, bleeding occurs from the slightest trauma, and it is quite common to see a superimposed Vincent's infection. Spies et al (1955) Thoma (1954).

"Crevice" formation is a sign of acuteness and takes the form of deep clean cut linear depressions with sharp edges and bright "raw meat" surfaces. These crevices are seen mostly in the anterior half of the tongue and run parallel to its long axis. Afonsky (1950).

In the early advanced stages there is infiltration, hyperaemia, proliferation and atrophy of the papillae, which have opaque tips. Later as the condition becomes more advanced the vascular hyperaemia remains, but the papillae undergo further atrophy, Medina (1956) and the superficial epithelial layers are desquamated Stones (1951) leaving the red, smooth, glazed surface of the Cardinal tongue or Bald tongue of Sandwith. Thoma (1954) Schaffer (1951).

Afonsky (1950) has described a Strawberry tongue associated with chronic pellagra which exhibited bright red and greatly enlarged papillae. In the chronic case the tongue is smooth, glazed, red and pale. The smoothness results from papillary atrophy, of which Afonsky (1950) describes two varieties. More commonly the appearance is blotchy resembling the "geographic tongue" and small rounded areas two to four millimetres in diameter are
denuded, usually from the anterior half. Atypically the dorsum becomes granular, slightly rough and covered by small pinhead sized smooth elevations. There is no coating and later the tongue becomes glazed.

The smooth tongue with atrophic papillae contrasts with the small thin atrophic tongue, which is the result of muscular atrophy and actual loss of substance. This true "atrophic tongue" is glazed, pink, pale or slightly bluish, but may become scarlet red and painful with exacerbations (thus becoming the Cardinal tongue of Acute pellagra).

The clinical changes in its appearance vary immensely with the stage of deficiency, acute or chronic state, transformation of acute into chronic, exacerbation of the chronic stage, remission, self cure or therapy.

"Fissuring" is another change seen in chronic pellagra and results from invagination or wrinkling of the dorsal surface. The fissures are shallower than crevices with shallow or deep sloping walls. Medina (1956) Afonsky (1950).

In advanced pellagra the interdental papillae may be attacked, there is massive periodontal breakdown and possibly an accompanying Vincent's infection. Mann (1941).

Although a single deficiency state is seldom seen clinically, Afonsky (1955) was able to produce such lesions in adult dogs. The tongues of these dogs on a Niacin deficient diet rapidly underwent diffuse papillary atrophy which began at the margins and spread medially and posteriorly. The more severe the deficiency the more rapid the spread and the brighter the colour of the tongue became. The filiform papillae became shortened as they lost their tips and keratin projections, and although the fungiform papillae initially enlarged they too became shortened. The circumvallate papillae were not involved.

Microscopically the reduced papillae were covered by a thin epithelial layer, there was a decreased rate of keratinisation and the loss of the tips and keratin had rounded the papillae. With the loss of its stratum granulosum the epithelium showed a
uniform cell type and a shrunken connective tissue core.

Following Niacin therapy the colour rapidly returned, the surface became roughened, beginning in the centre and progressing to the margins, as elevations appeared, to form the roots of the future papillae. This constituted a complete reversal of the degenerative process.
is necessary for the conversion of tryptophan into kynurenic acid and it has been shown in the rat that tryptophan may be converted into nicotinic acid.

Pyridoxine has been successfully used for certain symptoms exhibited by pellagrins who did not respond to nicotinic acid or riboflavin. Thorpe (1952).

A deficiency of either riboflavin or pyridoxine may precipitate lip lesions and it is possible that they both may be essential for the nutrition of the lips at the muco cutaneous junction. Bicknell & Prescott (1942).

Thoma (1954) reports a glossitis and stomatitis similar to that seen in a Niacin deficiency, and Schour & Massler (1945) state that a specific oedematous magenta glossitis may develop.

Medina (1956) considers that it is related to the development of an angular cheilosis, although Thoma (1954) reports some erosions resembling the cheilosis of ariboflavinosis. Some cases of glossitis, stomatitis and cheilosis will respond only to Vitamin B6.

It is Stones’ (1951) opinion that the lesions resemble those of a combined riboflavin and nicotinic acid deficiency.

A "moth eaten" tongue produced in dogs on a pyridoxine deficient diet is described by Afonsky (1955). This appearance is the result of a patchy atrophy of the papillae of the anterior two thirds of the organ. There is an increased intensity of the colour which varies with the severity of the disturbance.

It would be well to keep in mind that a single deficiency state is not commonly seen clinically, but more frequently other members of the complex are involved with the production of multiple lesions.

Schulte (1952) describes such a case, following aureomycin therapy, which responded to Vitamin B Complex.
PANTOTHENIC ACID

is a member of the Vitamin B Complex, and is related to the utilisation of the other Vitamins.

Burket: (1957) and Medina (1956) state that there is no evidence of oral lesions in man, but Stones (1951) reports an angular cheilosis and a purplish red glossitis characterised by papillary atrophy and absence of coating.

Afonsky (1955) describes the tongues of his dogs as becoming light grey with atrophy of the filiform papillae. They resemble the early stages of aniacinosis.
VITAMIN C. Ascorbic Acid.

Vitamin C occupies the almost unique place among the Vitamins by occurring naturally in only one form. Artificial analogues prepared are closely related to Vitamin C but have only some degree of its biological activity. The vitamin is thought to have a threefold activity, it is concerned with the metabolism of tyrosine, folic acid and the oxidation-reduction reactions. Harris (1956).

A deficiency of this vitamin gives rise to scurvy. Ascorbic acid is essential for the proper formation of collagen by fibroblasts. It is concerned also with the production of inter-cellular material in other tissues and a deficiency of it causes mesenchymal tissue changes as well as a lack of formation and maintenance of the intercellular material. The decreased cohesion of endothelial cells contributes to capillary weakness and haemorrhage.

A deficiency of this vitamin gives rise to scurvy, an excellent description of which can be found in Cecil & Loeb (1956). Infantile Scurvy Barlows disease

May be the result of using a feeding formulae deficient in Vitamin C. Stones (1951). Spies et al (1955) describe such a case in a child who lost both appetite and weight, appeared pale, was fretful and suffered a severe scorbutic gingivitis.

Brauer et al (1952) adequately describes juvenile scorbutic gingivitis. In mild acute cases the subepithelial capillary loops become engorged and dilated, giving the gingiva a violent red colour. In moderate cases there is some swelling and the colour deepens to a dark red, which, beginning on the interdental papillae soon involves the marginal gingivae, forming a swollen purplish collar about the teeth. The gingival crevice becomes enlarged and filled with debris, a factor which further aggravates the condition.

In fully developed acute scurvy the gingivae become boggy and denuded of epithelium, the blood vessels shine through
and the violaceous red swelling resembles to all intents a haematoma. The alveolar gingiva may become involved and newly erupted teeth completely buried. Haemorrhage tends to be spontaneous in acute cases, and pain constant and intense. Secondary infection by Vincent's organisms may occur.

In mild chronic cases the subsurface capillaries are only slightly dilated and engorged. The interdental papillae and marginal gingiva become oedematous but not hyperaemic, and gingival recession does occur. Fetur oris results from the accumulation of debris in the gingival pockets.

The oedematous gingival collar becomes covered by small ulcers and granulation tissue in severe chronic cases. Haemorrhage and swelling of the periodontal membrane may occur with subsequent rarefaction and loss of alveolar bone, the teeth are loosened and may be exfoliated.

The course of the scurbutic gingivitis is undoubtedly influenced by coincident local factors.

**Adult Scurvy.**

The scurbutic gingivitis of adult scurvy is not radically different from that seen in the infantile form of the deficiency. Cecil and Loeb (1956) describe a painful gingivitis with friable adherent clots and marked fetor oris. There is a tendency to haemorrhage; the lips appear cyanotic and the tips of the interdental papillae may be blunt and grey. Orban et al (1947). These purpuric type lesions result from capillary fragility. Thoma (1954) The gingival colour and its varieties has been described by Medina (1956) as varying from pink, old rose or purple to blue.

The histopathologic picture of scurbutic gingivitis is described by Orban et al (1947). The keratin layer is missing and replaced by a thin layer of cells, the prickle cell layer undergoes hydropic degeneration and there is oedema and acute inflammatory reaction in the connective tissue. The epithelial pegs are lost and scattered phagocytes are seen to contain haemosiderin.
A case of Scorbatic Stomatitis is described by Roughton & Waldron (1953) in which in addition to the gingival involvement the palate, the cheeks and the floor of the mouth were ecchymotic. Necrosis, infection and fetor oris were present.

Bone resorption and loosening of the teeth is frequently seen to accompany avitaminosis C, and it has been suggested that this follows the failure of the osteoblast cells to lay down the bone matrix and the fibroblasts to produce collagen, consequently the alveolar bone and the periodontal membrane are unable to stand the stresses of function, the teeth become loosened and the weakened atrophic alveolar bone becomes resorbed. Schour & Massler (1945).

The work of Boyle et al (1937) support this theory. There is inability on the part of the tissues to compensate for the wear and tear on the cementum, the collagen and the alveolar bone.

Burrill (1942) relates the ascorbic acid plasma level to the incidence of gingival and periodontal disease. He considers that the patient who neglects his mouth will also tend to neglect his diet, so that the gingival and periodontal lesions arise from the same neglect that allows the Vitamin C level to be low.
SPRUE (Psillosis)

is a chronic afebrile disease (Aldersberg & Schier 1947) consider it to be a syndrome) with marked tendency to remissions and relapses. It is characterised by recurrent glossitis, aphthous stomatitis, flatulent indigestion, diarrhoea (often with fatty, frothy, foul smelling stools), general weakness and a severe macrocytic anaemia with a megaloblastic bone marrow. Cecil & Loeb (1956)

Aldersberg & Schein (1947) and Aldersberg (1948) postulate a primary, secondary and atypical sprue. The secondary form is associated with demonstrable pathology of the gastro intestinal tract but the primary form is not, and post-mortem examination reveals no pathology of aetiological significance. Differentiation between the types depends upon the duration of the symptoms, the presence of oral and lingual lesions, haematologic changes and response to therapy.

Aldersberg (1948) considers that both tropical and non- tropical sprue are the result of a disturbance in the second phase of fat digestion, a phase during which the emulsified and split fat passes through the membrane of the intestinal wall. A cellular factor related to folic acid is thought to be responsible.

Oral and lingual lesions are the outstanding clinical signs in primary sprue, but may be of minor importance in secondary sprue. It is obvious how these severe oral lesions will interfere with alimentation and contribute to the development of a vicious cycle. Aldersberg (1948).

Frequently the lesions show evidence of an Avitaminosis B complex but signs of other deficiencies, namely, A, D, K & C, may be present in various combinations.

In the early stages the tongue is inflamed and the glossitis is characterised by superficial erosions. Minute vesicles and patches of congestion appear on the sides, edges and tip of the tongue. The sides appear fissured. Glossopyrosis and glossodynia may be quite severe. Balendra (1957).
This chronic superficial erythematous glossitis is considered by Afonsky (1951) to be Hunter's glossitis.

Schaffer (1951) describes a tongue which is raw and ulcerated but glazed in patches.

In the more advanced stage there is complete and total atrophy of both the filiform and the fungiform papillae. Cecil & Loeb (1956). This may be the "red and slick" tongue that Spies et al (1955) describe. Papillary atrophy and epithelial desquamation are, according to Stones (1951) responsible for the red, smooth and patchy appearance and the sensitivity.

The presence of superficial erosions with an aphthous looking pellicle and the congested rawness of the cheeks, gullet and uvula were noted by Balendra (1957).

Burket (1957) reports the almost constant presence of gingivitis, which is to be expected in such a deficiency state.

Angular cheilosis is a common finding according to Balendra (1957), Stones (1951) and Medina (1956).

In some cases stomatodynia Medina (1956), stomatopyrosis Aldersberg (1948) and profuse sialorrhoea Schaffer (1951) were reported.

It is interesting to note that severe glossitis and stomatitis were rare or absent in cases of secondary sprue. Aldersberg (1948).
KWASHIORKOR. Malignant Nutrition.

Although its precise cause is obscure, many investigators believe that Kwashiorkor develops as a result of varying mixtures of protein deficiency, under-nutrition and hunger oedema. Cecil & Loeb (1956).

Dean (1952) considers that it is largely a protein deficiency disease, which is seen in the tropics and sub-tropics and attacks children at a time when their protein requirements are highest. Trowell & Davies (1952).

The seriously ill child is much underweight and underheight. There is oedema and retention of subcutaneous fat. Bone development is retarded and pressure areas may be involved by the "Crazy pavement dermatosis." Trowell, Davies & Dean (1952). The abdomen is distended, there is diarrhoea and the motions are loose and contain undigested food. Depigmentation may occur in the very dark skinned races, Saint (1958), and any one of the avitaminosis may complicate the picture.

Facial pallor is accompanied by a loss of pigment along the buccal borders of the lips. Trowell, Davies & Dean (1952), Mazumder (1953).

The tongue is bright red and smooth on the forward edge, and the lower lip may be fissured in the mid line and at the muco cutaneous junctions at each angle. Ballendra (1957) reports the occurrence of gangrenous stomatitis with angular involvement. Saint (1958) states that postmortem findings include widespread atrophy of the cells of the salivary glands. Treatment is aimed at providing a diet rich in protein.
THE INFECTIOUS DISEASES

Viral Diseases
Rickettsial Diseases
Bacterial Diseases
The Mycoses
Specific Infectious Granulomata.
VIRAL DISEASES

Foot and Mouth disease; Granuloma inguinale; Herpes simplex; Herpes zoster; Infectious mononucleosis; Lymphogranuloma inguinale; Psittacosis; Rubella; Rubeola; Varicella; Variola; Yellow Fever.
FOOT AND MOUTH DISEASE - Epizootic stomatitis

is a highly contagious infection of cloven-footed animals, rarely transmitted to man. Rivers (1948). Human infection follows direct contact and the handling of infected tissues and fluids. Cecil & Loeb (1956).

Mucous and cutaneous lesions follow a short incubation period of two to eighteen days. Vesicles form on the oral mucosa, pharynx, lips and tongue. There is excessive salivation and regional lymphadenopathy. Burket (1957).

Walters et al (1952) Abstract (14) describe a case in which multiple vesicles formed with small haemorrhagic ulcers on the mucosa of the lips, gingiva, cheek and palate. There was fetor oris and polydipsia.

On rupture the vesicles discharge a watery fluid. Thoma (1954).

A mild alkaline mouth wash is indicated for the oral lesions. Tetracyclines are the drugs of choice in the treatment of the human infection. Cecil & Loeb (1956).
GRANULOMA INGUINALE — Granuloma venereum

is defined by Stones (1954) as a chronic venereal disease occurring in the negro. It affects the inguinal and genitoanal regions, although, according to Burket (1957), it is not of proven venereal origin.

It is caused by the virus Klebsiella granulomatis, and the characteristic feature of this disease, the Donovan bodies, can usually be demonstrated in the mononuclear cells of the biopsy specimen and sometimes in the exudate.

The oral lesions have been well described by Ferro and Ritchie (1946). A punched-out ulcer forms from a small papule on the lips. The base is smooth and red and may extend into the mouth to include the entire inner surface of the lips. The buccal mucosa, pharynx and vocal cords may be involved. The lesions may be ulcerative, exuberant or cicatricial. The oral lesions are secondary to active genital lesions, and are the result of autoinoculation. If fibrous scarification follows, it may restrict jaw movement.

Gingival lesions have been described by Burket (1957) and are a bluish-red colour; the tissues are increased in size and there is a haemorrhagic tendency.
HERPES SIMPLEX

The virus of herpes simplex may involve cutaneous or mucosal surfaces with the production of clusters of small vesicles. These eruptions usually appear after some stimulus, mild infection, mechanical irritation, vaccine, improper food, fever, excessive isolation or menstruation. Burnet & Williams (1939), Others, Editorial, Dental Digest (1955), have expressed this as an unstable equilibrium between host and virus, and any alteration of tissue response may enable the virus to express itself. Doer (1939), quoted by Burnet & Williams (1939), suggests that the agent is an endogenous one, produced by the reaction of a stimulus on a cell with the production of a virus-like agent. Burnet & Williams (1939), however, favour the theory of the exogenous viral agent. Burket (1957) states that infection with the virus is almost universal and antibodies can be demonstrated even in young children. The titre of herpes serum can be accurately measured by the use of the chorioallantois of the developing egg. Editorial Dental Digest (1955).

Burnet & Williams (1939) consider that the recurrent manifestations seen in the herpetic patient are the result of the virus supplying a constant or intermittent stimulus, which maintains the circulating antibody at a high level. This appears to be a paradox, but it is an anomaly encountered in viral disease.

The non-herpetic patient does not develop the herpes antibody. Since the lesion recurs time and time again in the same location, it has been suggested that the virus is vegetating in the skin, in part of the nervous system, in the oral cavity or the salivary glands. Burnet & Williams (1939).

Corneal scarification and inoculation with the vesicle fluid is useful. The preparation of epithelial smears stained with H & E show bizarre multinucleated cells resulting from the ballooning degeneration. Cooke (1958). These giant cells are pathognomonic of herpes simplex, zoster and varicella.

Cohn (1950) describes the mechanism of vesicle formation. Barker & Hallinger (1947) have demonstrated the presence of
the herpes simplex virus in the common fever blister, aphthous stomatitis, acute herpetic gingivostomatitis, paronychia, encephalitis and Kaposis varicelliform eruption.

**HERPES LABIALIS, FACIALIS AND MENTALIS.**

Commonly the lips are affected by recurrent lesions in the same location at either regular or irregular intervals. A prodromal pruritus and pyrosis ushers in the lesion. A hyperaemia follows and then vesicles appear, either singly or in clusters, grouped together and ranging in size from that of a pinhead to a pea. The vesicles contain a clear, Thoma (1954), or yellow fluid, Burket (1957), which is expelled when the vesicle ruptures and forms a thin, adherent, yellowish crust on the skin and mucosa. A fever may accompany the eruption which lasts between eight and ten days.

The vesicles per se are rarely seen in the mouth as a result of trauma and the oral climate. Tissue tags may, however, be seen adhering to an ulcerated area, and indicate recent rupture of the vesicle.

The intraoral vesicle is usually small, but may be as large as 25 millimetres in diameter. It is extremely painful and is surrounded by a bright red raised border during the first few days of its existence. A linear lesion may be the result of tooth brush trauma. Within four to five days, a cheesy yellow material, composed of fibrin, debris and epithelial cells, develops.

Usually a greater area is involved in a case of herpetic stomatitis. The condition is seen in children frequently following exposure to an individual with a herpetic lesion.

Acute herpetic gingivostomatitis was first reported by Black in 1938, and thought to have a viral or fusospirochaetal aetiology. In 1942 Black stated that the condition followed auto-inoculation from the fluid of a herpetic vesicle. Ziskin & Holden (1943).
The Vincent's organisms are considered to play a subordinate role in the pathogenesis. 

_Brauer et al_ (1952).

_Ziskin & Holden_ (1943) describe fifteen cases among which was one manifest by the appearance of a fiery red line at the gingival margin, vesicle formation, ulceration and the formation of a yellow exudate surrounded by a red halo. Sore throat, stomatodynia, dysphagia, pyrexia and malaise may accompany the condition. The patient is frequently irritable and there is regional lymphadenopathy. Spongy hypertrophy of the gingiva occurs.

_Collings and Dukes_ (1952) report a case of herpetic stomatitis related to the menstrual cycle. The lesions completely disappeared during pregnancy, only to re-appear again after term. Further examination revealed a psychosomatic factor related to her fear of conceiving. There is a very delicate balance between susceptibility and resistance, which in this case was upset by the emotional and endocrine factors.

_Nathanson & Morin_ (1953) consider that herpetic stomatitis may be an aid in the diagnosis of infectious mononucleosis. Although there is no other reference to it elsewhere in the literature, _Wyburn_ (1957) reports six cases with malignant change following herpes simplex.

The smallpox vaccine may prove effective in the treatment of some cases. Aureomycin, Terramycin and Vitamin therapy have also been suggested. Palliative applications are of value. _Thoma_ (1954).

Application of Eau de Cologne on the labial lesions causes early desiccation and relief from the symptoms.
Herpes Zoster – Zona, Zoster, Shingles

is an acute infectious disease characterised by inflammation of one or more dorsal root ganglia or extra medullary cranial nerve ganglia, and associated with painful vesicular eruptions of the skin or mucous membranes. The surface lesions are distributed along the course of peripheral sensory nerves arising in the affected ganglia. Ormsby and Montgomery (1944).

A prodromal period of a few days is characterised by malaise, fever and some pain in the area later affected. Cecil & Loeb (1956).

The vesicular eruption may involve the oral cavity, distributed along the course of a sensory nerve. Vesicles appear slowly and are surrounded by an erythematous base. Burket (1957).

Thoma (1954) describes the vesicles as thick and tough, containing an initially clear, but later sero-purulent, fluid. The lesion is always unilateral. The trigeminal nerve is affected quite frequently, in particular the first division. When the second and third divisions are affected, mucosal and dermal lesions are seen.

Crops of painful vesicles may appear on the palate and tend to coalesce. They never cross the mid-line. Balderston (1953).

Burket (1957) states that the anterior part of the tongue, the soft palate and the cheeks are the most frequent intra-oral sites.

Involvement of the geniculate ganglion of the facial nerve may be associated with involvement of the trigeminal nerve. The Ramsay Hunt Syndrome may be characterised by ageusia, xerostomia, glossodynia and herpetic eruption of the tongue. Other aspects of the syndrome are considered by Findlay (1949).

Muscular weakness is associated with herpes zoster of the cranial nerves. Kendall (1957).

Post herpetic neuralgia is a frequent and particularly distressing feature of the disease, Burket (1957) and may require posterior root section or ganglionectomy. Cecil & Loeb (1956).
There is no specific treatment for herpes zoster, although Aureomycin and Thiamin hydrochloride may be effective. Thoma (1954). Topical agents may be effective in the reduction of pain.
INFECTIOUS MONONUCLEOSIS – Glandular Fever

is a disease of unknown aetiology and protean symptomatology. It is acute and self-limiting, and is characterised by lymphadenopathy, lymphocytosis and the presence of heterophile antibodies in the circulating blood (demonstrated by the Paul-Bunnell heterophile agglutination test). Cecil & Loeb (1956), Thoma (1954), Rivers (1948).

Thoma (1954) states that oral lesions may be present but complicated by Vincent's organisms or even the herpes virus. Burkert (1957) describes the appearance of petechiae and papules on the palate and ulcero necrotic lesions of the marginal gingivae and tonsils.

Nathanson & Morin (1953) describe the appearance of herpetic stomatitis prior to the development of glandular fever and as an aid in its early diagnosis. Their case showed a patchy grey-white membrane, a sore throat and transient cutaneous eruption.

No specific treatment is available. A bland mouth-wash may help to alleviate the oral symptoms. Thoma (1954), Cecil & Loeb (1956).
LYMPHOGRANULOMA INGUINALE - Lymphopathia venereum

is an infectious disease, systemic in nature and varied in manifestations, Cecil & Loeb (1956), caused by a filterable virus. Burket (1957). A triad of iritis, aphthoid lesions of the mouth and penis and a positive Frei test, is described by Coutts. Cecil & Loeb (1956).

Oral lesions result from auto inoculation, kissing and the oro-sexual perversions.

The lingual lesions, usually on the tip of the tongue, and noticed in prostitutes, consist of a slightly painful, but superficial, ulceration with non-indurated borders. In chronic cases the area becomes dark and cicatrical, the epithelium is lost, and lichenoid papules, opaque and of a grey colour, form.

There may be cervical adenopathy with a violaceous and indurated skin covering. One or more sinuses may be present, and pressure causes a yellow purulent material to be discharged. Difficulty in differentiating actinomycosis, tuberculous adenitis and blastomycosis from the condition, will occur. Burket (1957).

The sulphonamides and tetracyclines are more effective than penicillin. Fluctuant bubos should be drained. Cecil & Loeb (1956).
PSITTACOSIS - Ornithosis

is an infectious disease, endemic among various members of the bird kingdom. It is caused by a virus, is transmissible to man, in whom it usually induces an atypical form of pneumonia. Cecil & Loeb (1956).

Oral manifestations have been described by Day (1939) in a patient who made a habit of kissing pet love birds. A painful, elevated ulcer formed on the palate, and was characterised by sharply defined creamy-white stalactite formations which recurred when removed.

The disease responds to chemotherapy; the tetracyclines are the drugs of choice. Cecil & Loeb (1956).
RUBELLA - German Measles

Rubella is an apparently benign but potentially malignant infection of children and young adults. The mild form is manifest by a mild rash and possibly a cervical lymphadenitis. It is, however, an important factor in the genesis of certain foetal abnormalities. Cecil & Loeb (1956). Gregg et al (1945) consider the occurrence of congenital defects following maternal rubella during pregnancy.

Involvement of the oral mucosa may occur, with a fine, red, exanthema affecting the soft palate. Tonsillar enlargement occurs. Thoma (1954) describes the appearance of red macules with no desquamation and regional lymphadenopathy.
RUBEOLA — Measles

is an extremely contagious, febrile disease of high morbidity characterised by a rash and catarrhal inflammation of the eyes and respiratory tract. Although principally a disease of children, it may affect with equal frequency persons of any age not previously attacked by its virus. Cecil & Loeb (1956).

Following an incubation period of twelve to nineteen days, the disease is ushered in by photophobia, coryza, cough, conjunctivitis and Koplik spots. The fever and cough worsen and a maculo or maculo-papular rash appears and spreads. It may become confluent and blotchy and is quite well developed in one to two days. The fever falls coincident with the disappearance of the rash, a brownish stain remains and is followed by a brawny desquamation. Rivers (1948).

The small pathognomonic spots which form inside the cheeks were first described by Koplik in 1896, and bear his name to this day. They consist of irregularly-shaped macules of bright red colour, containing minute bluish specks. Thoma (1954). Rivers (1948), however, describes them as pinhead white or bluish-white spots surrounded by erythema. They are best seen in daylight and gradually fade as the oral mucosa becomes engorged and the exanthem appears. Histopathologically, the spots consist of focal exudations of serum and endothelial cells which form vesicles. Focal necrosis follows. Osteomyelitis or noma may complicate epidemic measles. Burket (1957).
VARICELLA - Chickenpox

is a mild, communicable disease of childhood characterised by fever and a vesicular eruption, with surrounding erythema involving the entire body and mucous membranes of mouth and throat. Cecil & Loeb (1956).

Painless vesicles with an erythematous base appear on the oral and pharyngeal mucosa twelve to twenty-four hours prior to the cutaneous eruption. More frequently you see a shallow eroded base surrounded by mucosal tags. Burket (1957).

Thoma (1954) states that fresh crops of vesicles appear every three days.
VARIOLA - Smallpox

is an acute communicable disease, characterised by constitutional symptoms and a single crop of skin lesions all proceeding at the same rate through a macular, papular, vesicular and pustular stage over a period of approximately three to ten days. Cecil & Loeb (1956).

The pustules dry and crust over in the second week, and the scabs drop off in the third. A fever returns with the pustular stage, and on its third day a hyperaemic rash appears Rivers (1948).

The mucous membranes of the mouth are subject to eruptions; the visible parts most liable are the hard palate, the tip and edges of the tongue, and the pillars of the fauces. Lesions may be absent in one case and in another case of equal severity, a confluent rash may cover the mouth and throat. Ricketts (1908).

Pustules form on the buccal and pharyngeal mucosa after the initial rash. Rivers (1948).

The mucosal pustules are small, slightly elevated, bright red macules which leave an eroded area which may ulcerate when they are cast off. Glossitis variolosa is the term applied to the inflamed and swollen tongue of smallpox. Thomas (1954).

Oozing from the gums is not significant, but a dark, bloody extravasation into the mucous membranes of the fauces, pharynx, epiglottis, tonsils, palate and the root of the tongue is a common and characteristic symptom in toxic cases. These areas may be stained black by the effusion. Ricketts (1908).

Some interesting aspects of Smallpox are considered in a recent paper by Marsden (1958).
YELLOW FEVER

is an acute viral disease characterised by sudden onset, prostration, moderately high fever, a pulse rate slow in relation to temperature (Faget's sign), and when severe by vomiting of altered blood, albuminuria and jaundice. It is transmitted from man to man by the domestic mosquito Aedes Egypti. *Cecil & Loeb* (1956). After an incubation period of three to six days, the period of infection is ushered in suddenly by fever, head and backache, and severe gastrointestinal symptoms. At this stage the tongue is bright red at the tips and edges.

The period of intoxication begins on the fourth day, the patient is depressed and jaundice becomes evident. The gingivae are swollen and bleed easily and apparently spontaneously. The lips may be swollen when death intervenes from the sixth to ninth day. *Rivers* (1948).

There is no specific treatment but prophylaxis by vaccination with the living virus is available.
RICKETTSIAL POX

is a mild, self-limited, acute, febrile illness caused by Rickettsia Akari, and characterised by an initial skin lesion developing at the site of infection, fever of about one week's duration and a papulovesicular rash. Cecil & Loeb (1956).

Colman (1950) describes lesions involving the tongue and the palate which resembled those on the body, but were characterised by more transient vesicles and a zone of erythema.
BACTERIAL DISEASES

Gonococcal Infection. Bacillary Diseases.
Glanders. Anthrax. Leprosy.
is the commonest of the venereal diseases, and is the principal infection caused by the gonococcus (Neisseria gonorrhoeae). Formerly common and important, extragenital infections with the gonococcus have become rare since the advent of penicillin. Cecil & Loeb (1956).

Transmission is chiefly through some sexual act or perversion, although innocent infection does occur through contaminated fingers, clothing and instruments.

Gonococcal arthritis of the temporo mandibular joint and gonococcal stomatitis are the chief oral aspects. Gonococcal stomatitis is essentially a surface infection of the oral mucosa, and occurs in infants who have become infected during their passage through an infected birth canal; in children who have gonococcal vaginitis; in adults through auto inoculation of the oral mucosa by contaminated fingers and in sexual perverts through orogenital contact. The stomatitis is characterised by the formation of yellowish plaques on the tongue and hard palate; in advanced cases a whitish exudate may cover the mucosa. Burket (1957). In localised areas a thick greenish-yellow patch and yellow exudate cover a fiery red oral mucosa. Copping (1954). The patient complains of glossodynia, xerostomia and oral pruritis in the early stages, but later the saliva becomes thick, ropy and abundant. There is frequently extreme pain associated with any oral function.

Diefenbach (1953) reports a case of parotitis and stomatitis of Neisserian origin, in a passive homosexual practising fellatio, the contact having acute gonorrheal urethritis.

In the diagnosis, a history of concurrent urethral or vaginal discharge is significant. Smears from the lesion should show gram negative intracellular diplococci. Penicillin is the drug of choice in the treatment of gonococcal infections. Cecil & Loeb (1956).
DIPHTHERIA

is an acute infectious disease caused by a bacillus, Corynebacterium diphtheriae. The primary lesion is usually located in the pharyngeal area and is characterised by the formation of a greyish pseudo membrane. Cecil & Loeb (1956).

Butlin (1885) states: "I have no intention of implying that the tongue is liable to diphtheria when the fauces are not affected." He considers that lingual involvement is most unusual even when the tonsils and the fauces are extensively covered with membrane, and when it is involved it is the posterior portion of the dorsum which is affected, by a membrane continuous with that covering the fauces.

The occurrence of a diphtheritic stomatitis with membrane formation on the tongue, lips and cheeks but no involvement of the fauces or tonsil has been described by Riddell (1950).

Labial diphtheria may result as an extension of the membrane in cases of late severe faucial diphtheria, or very occasionally as an accompaniment of nasal or faucial diphtheria. Labial involvement in the absence of diphtheritic lesions of the throat or nose is an exceptional phenomenon.

In Riddell's (1950) forty-six cases, seen in British Prisoners of War in the Far East an ariboflavinosis had given rise to an angular cheilosis to which was then added a diphtheritic complication. No true membrane formed, but the severe cases showed a heaped-up, sodden, macerated, whitish epithelium at the corners of the mouth, while milder cases had a pearly white or faintly yellowish glistening adherent membrane covering the outer two-thirds of the lips, bilateral frequently, and sometimes extending to meet in the mid-line. A shallow superficial ulceration followed the loss of the membrane in seven to ten days. A slight cervical and sub-mental adenitis accompanied some cases, toxaemia was insignificant or absent and there were no fatalities, although neuritic complications occurred in a few cases.
Involvement of the oral mucosa is rare, Burket (1957), although it has been reported at the site of erupting deciduous teeth and in the fissures of the oral commissures.

Histopathologically the entire epithelial covering and the superficial layer of the corium are destroyed; a fibrinous exudate containing inflammatory cells covers and is firmly attached to the connective tissue. As new exudate is produced the membrane increases in thickness. Thoma (1954).

Immediately diphtheria is suspected, a swab should be taken. The patient is hospitalised and treated with anti-toxins and penicillin without awaiting bacteriological confirmation. Tolhurst et al (1955).

Methylene blue is suitable for topical application. Thoma (1954).
BRUCELLOSIS. Malta Fever, Undulant Fever.

Is an infectious disease transmitted to man from the lower animals by a small non-motile, spore forming gram negative rod belonging to the genus Brucella. (Br. Melitensis; Br. Suis; Br. Abortus.)

The first clinical signs of fever, weakness, chills, nocturnal sweats and pain follow an incubation period of 5 to 21 days. (6 to 9 month periods have been observed.) Cecil & Loeb (1956).

The gingival margins are red and swollen, the stippling may become smoothed and elevated, and grey patches appear on the ventral surface of the tongue and upon the lips. Miller (1957).

A lesion resembling thrush, but greyer and more difficult to remove than thrush, is described by Burkett (1957) in a physician who drank infected milk. His mouth was studded by small, elevated grey patches surrounded by hyperaemic areas. Regional lymphadenopathy accompanied the lesion, as is usually the case. The anterior pillars of the fauces may be ulcerated, the so-called Duguels Ulcers. Mazunder (1953).

Chlortetracycline and oxytetracycline are the drugs of choice in Acute and Chronic Brucellosis.
TULAREMIA – Rabbit Fever

is a specific infectious disease caused by Pasteurella Tularensis. It acts as a heterogeneous infection chain, and is a potent factor in the destruction of the wild animal population.

Man may enter the chain either accidentally or occupationally; in the handling of infected rabbits, contaminated water or following animal bites. Man to man transmission is as yet not reported.

The onset is sudden, following an incubation period of one to ten days, and the general symptoms are usually quite severe. Cecil & Loeb (1956).

A nodule forms at the entry point of the organism, and the regional lymph nodes become inflamed, swollen and abscessed. The floor of the mouth may be involved by indolent buboes, at the point of entry. Thoma (1954).


Streptomycin and dihydrostreptomycin are the drugs of choice.
GLANDERS - Farcy

is an infectious disease of equines (which is occasionally transmitted to man) caused by the organism Malleomyces Mallei, and characterised by nodular and ulcerated lesions. The ulcers have an irregular edge and a sloughing yellowish-grey base. 

Cecil & Loeb (1956)

Involvement of the tonsil with the loss of portion of the soft palate and uvula, and spread to the hard palate, the buccal mucosa and the gingiva, are described by Walters et al (1952) Abstracts (15),(16), in a case that terminated fatally, (after perforation of the cheek.)
ANTHRAX

is an acute infectious disease caused by the Bacillus anthracis. It attacks many animal species and is transmissible from them to man. Two epidemiologic groups are conveniently formed; Agricultural Anthrax acquired during the handling of livestock by veterinarians, butchers and farmers, and an Industrial Anthrax acquired from the handling of wool, skins and hides. The cutaneous lesion is the so-called "malignant pustule". Cecil & Loeb (1956).

In the mouth, which is readily infected by contaminated hands, multiple yellow pustules with bright red bases become apparent. Briggs (1947).

The throat may be sore, the tonsillar pillars, the soft palate and the posterior pharyngeal wall injected and oedematous. Walters et al (1952), Abstract (9). Later the lips become cyanotic and the tongue dry and heavily coated. The pustules which were initially yellow became golden-yellow at autopsy. Walters et al (1952), Abstract (10).

Treatment should include chemotherapy with Aureomycin or Terramycin, Cecil & Loeb (1956), and the administration of the anti-anthrax serum at the earliest possible moment. (Commonwealth Serum Laboratories Handbook of Instructions, 1956.)
LEPROSY — Hansen's disease

is a chronic contagious and infectious disease produced by Mycobacterium leprae, (discovered by Hansen in 1874.)

It is characterised by mucocutaneous lesions in the form of nodules and ulcerations, and by nerve lesions in the form of paresthesias and palsies. Histopathologically it has been classified as either Lepromatous, Indeterminate or Tuberculoid. Cecil & Loeb (1956).

Burket (1954) (quoting Del Rio) states that 20% of the patients have lesions involving the tongue.

Abdalla (1956) reported several cases in his series which presented with nodules or tubercles involving its surface.

Butlin (1885) was unable to find any case in which the lingual lesions preceded the eruptions elsewhere. He did, however, describe the presence of distinct pale tubercles studding the dorsum, of rose-coloured eruptions and impairment of taste. (In advanced cases the lingual lesions vary from a mild glossitis to a deep fissured tongue approaching a mosaic pattern and grossly resembling a geographic tongue.) The anterior third may be involved by nodules. Mazumder (1953).

Prinz & Greenbaum (1939) have classified three types of changes in the appearance of the leprous tongue. Firstly the Tessellated tongue, in which deep furrows divide the organ into slightly raised squares. The silver tongue is dry, silver-like and shiny, and has a pattern of stripes and discs. It is identical to the "leper's tongue" described by Mathis (1956).

The fully developed Leprous tongue shows pronounced nodules and heavy ridges.

The lips are the site of a variety of leprous lesions, namely, macules, papules, nodules and local and general infiltration. Prinz & Greenbaum (1939).

Sala (1957) describes a case of the infiltrative type of lesion involving the free margin of the upper lip.

Involvement of the soft palate is not uncommon, and it may
be completely destroyed. Abdalla (1956). The uvula (especially the base) may be the site of congestion, infiltration, nodule formation, Prinz & Greenbaum (1939), or ulceration, which either proceeds to scar formation or the entire destruction of the uvula.

Paralysis of the palatal muscles sometimes occurs. Prinz & Greenbaum (1939), and also deviation of the uvula. Abdalla (1956)

The mucosa covering the palatal nodules may be light pink, yellow or purple. Mathis (1956).

Hard palate involvement may take the form of discoloration, tubercle formation, ulceration, Abdalla (1956), or perforation. Mazumder (1953).

The lesion may be the colour of the surrounding tissues; it may be pigmented, pearly or haemorrhagic. Nodules attached to the palate and gums are either hard or soft, firmly embedded or pedunculated, and vary from the size of a pin head to that of a lima bean. Prinz & Greenbaum (1939).

Prinz & Greenbaum (1939) state that nodules are not found in the buccal region. Abdalla (1956), on the other hand, says that they occasionally are found.

The alveolar process in advanced cases may show resorption, Prinz & Greenbaum (1939), and 25% of the patients of Abdalla's (1956) series were suffering from periodontal disease.

Gingival hypertrophy may be sufficient to partially bury the teeth. The Trigeminal and Facial Nerves are commonly involved in the anaesthetic form of the disease. Burkett (1957).
THE MYCOSES.

Actinomycosis.
Blastomycosis.
Histoplasmosis.
Moniliasis.
Maduromycosis.
ACTINOMYCOSIS.

Is a specific granulomatous disease of mycotic origin characterised by the development of swellings; in the regions of the face, neck and floor of the mouth, which gradually soften and are accompanied by the formation of multiple sinuses and fibrosis of the surrounding tissues. Arnott & Ritchie (1949).

Although Bollinger in 1877 demonstrated the presence of the "ray fungus" in the disease "lumpy jaw" affecting cattle, it was Harz who named the organism Actinomyces bovis. Israel in 1878 gave the first accurate description of the disease in man and drew attention to the identity of the two infections.

The cervico facial region is the more commonly involved, since more than 50% of the infections occur here. The other two sites most commonly involved are the abdomen (22.3%) and the thorax (14.9%). Thoracic actinomycosis may result by extension of the infection from the cervico-facial region. Jepson et al (1958). Goldsworthy (1937) describes a case of pulmonary actinomycosis.

Clinically two principal types of actinomycotic infections are recognised. The very chronic slowly progressive, indurated type, with so little pus formed, that bacteriological conformation of the diagnosis is often difficult. Fibrosis predominates. In the more acute and rapidly progressive type suppuration predominates over fibrosis to such an extent that the lesion is at first indistinguishable from any other acute abscess. A sub-chronic type exists between these two well defined extremes, and the majority of cervico-facial actinomycotic infections could be thus described. Goldsworthy (1947). The disease may have a course of from eight to twelve months duration, or longer if the treatment is ineffective, but the prognosis for the cervico facial type is good and a complete recovery occurs in about 97%.

The causal agent is a gram positive filamentous organism irregularly staining, which is slow growing in culture and forms heaped up coherent colonies, adherent to a solid medium. Actinomyces bovis (Wolf and Israel) a microaerophilic organism, and a strict parasite, is usually responsible for the disease in man. Although the group
of actinomycoses are widely distributed in nature. In pus and cultures Actinomycetes bovis commonly appears as diphtheroid rods, which may in a small proportion of cases show rudimentary branching. Goldsworthy (1947).

Two theories of etiology exist; the exogenous theory of Bostroem (1891), in which the Actinomycete is found in soils, grains and grasses and infection follows contact with these things (for example, sucking straw). Robinson and Ennever (1948).

The endogenous theory holds that the organism is present in the oral cavity as a potential pathogen, and only requires suitable conditions to become an active pathogen. Goldsworthy (1947). The endogenous theory is not new, and the concept of post exodontia infection Sullivan & Goldsworthy (1940) is more acceptable than Bostroem's Theory. The relationship between dental treatment and cervico-facial actinomycosis is considered by Holmes. (1958).

Actinomycosis may be associated with Exodontia, fractured jaw, injury during a procedure of operative dentistry or eruption of a molar tooth. Arnott & Ritchie (1949) consider that the teeth and their supporting structures, the mucosal surfaces and the tonsils contribute portals of entry for the organism. Disease and trauma involving these structures predisposes to the disease. Trauma plays an important role in the etiology of actinomycosis, since tissue damage creates conditions of lowered oxygen tension in which the organisms can live and function. Further contributions to this anoxic state are made by the bacteria so frequently accompanying actinomycotic infections. Goldsworthy (1947).

The lips may become involved; generally the lesion is nodular, resembling a "wart" or retention cyst. Gardiner. (1936).

In 3.7% of the cases Burket (1957) the tongue is involved either as an isolated infection, or by the extension of an adjacent infection. There is frequently a history of trauma and the lesion may take the form of an abscess, ulcer, cyst, sinus or a small or large tumour. Gardiner (1936). Schaffer (1951-52) considers that involvement of the tongue is rare in man, although common in herbivora and pigs.
Gee & Sullivan (1940) were able to demonstrate the organism within an apical granuloma and Gold & Doyne (1952) describe a case in which the organisms gained entrance through a carious exposure. An osteomyelitis of the alveolar process resulted.

A case of actinomycosis of the hard palate is described by Ludwig (1955).

Actinomycosis may be associated with fractures of the mandible and such a case has been described by Gruber (1952).

Extension of cervico-facial Actinomycosis to one of the major salivary glands or the thyroid gland may occur. Gardiner (1936).

Preventative measures are of extreme importance, good oral hygiene, and dental procedures carried out with care and respect for the oral tissues will go far in the elimination of the disease. Goldsworthy (1947).

Some people refuse (unjustifiably in Goldsworthy's opinion (1947)) to establish a diagnosis of actinomycosis without the presence of "sulphur" granules in the pus. However, "Bacteriological evidence must always be sought, because without it the diagnosis cannot be regarded as established." Goldsworthy (1947).

The establishment and maintenance of drainage is essential although complete excision of the lesion is sometimes possible. A large range of drugs has been recommended for the treatment of Actinomycosis but with the advent of antibiotic therapy these have been greatly superseded.

Penicillin is recommended by Arnott & Ritchie (1949) and Burket (1957), although Scott-Young (1958) considers that it is very difficult to get it to the site of infection in sufficient dosage. Other antibiotics used in its treatment are Streptomycin Lambert (1952), Achromycin and Neomycin Hinds & Dernan (1955), Terramycin Zegarelli et al (1952) and Aureomycin McVay et al (1952).

Areotta (1952) treated a case with a lymphonodular extract and penicillin and proposed a synergistic action of the extract with the antibiotic. The value of his conclusion is questionable. Hunter & Westrick (1957) consider some of the types of treatment recently employed.
Although there is little basis for its efficacy, Iodine is possibly the best known drug. Goldsworthy (1947). Scott Young (1958) considers its use in a recent paper, and the use of sulphanamazine.
BLASTOMYCOsis

North American Blastomycosis, Gilchrist's disease.

Blastomycosis is a chronic granulomatous disease occurring in a systemic or cutaneous form, either of which may produce oral manifestations but which do not commonly do so. Cecil & Loeb (1956), Burket (1957).


Primary cutaneous Blastomycosis may spread to involve the oral cavity. The initial lesion is a small red papule which increases in size and is ultimately capped by a crust. Epithelial hyperplasia produces a verrucous appearance. Minute epidermal abscesses form at the margins of the lesion, but break down with the formation of slightly painful crater-like ulcers with hard raised edges. Cecil & Loeb (1956). Regional lymphadenopathy and general symptoms are absent in this case, although the latter are very severe in systemic Blastomycosis.

Erich (1947) describes a hyperplastic growth on the buccal mucosa, which appeared neoplastic, was verrucous, inflamed and accompanied by small pustules.

Palatal and lingual involvement have been reported by Burket (1957) who also emphasises a careful investigation in all cases of "loose teeth". They may be the first manifestations of pathology.

Involvement of the gingiva and jaw has been reported by Grich (1932).

The diagnosis is made on the appearance of the lesion, culture of the pus and demonstration of the organism by biopsy and the complement fixation test. Cecil & Loeb (1956).
Although electrocoagulation is sometimes effective with local lesions, stilbamidine and 2-hydroxystilbamidine have revolutionised the treatment of Blastomycosis. Pariser, Levy & Rawson (1953).

**SOUTH AMERICAN BLASTOMYCOSIS.** Lutz's Disease is a usually fatal, chronic, granulomatous disease affecting the skin, mucous membranes and organs, at present confined to South America. The portal of entry is frequently about the mouth, Cecil & Loeb (1956), and Bogliolo (1950) has suggested along the teeth and through the periodontal tissues. The causal organism is Paracoccidioides brasiliensis.

A papular lesion or ulceration frequently begins on the oral mucosa. The lesion is painful, granulomatous, productive and pyogenic. Artagaveytia-Allende (1949).


The treatment is the same as for the North American variety.
HISTOPLASMOSIS. Darling's Disease

is a disease lacking ethnic discrimination occurring in semi-tropical regions throughout the world. It may manifest itself in a benign pulmonary form or less commonly in a severe generalised form, involving the Reticulo endothelial system. Cecil & Loeb (1956)

Usually isolated from soils, Beneke (1957), the causative organism, a yeast-like fungus, Histoplasma capsulatum is a small aerobe surrounded by a clear capsule. Dubos (1948). On Sabourauds medium the colonies are slow growing and produce a cottony white mycelium which becomes brown with age. Beneke (1957)

A modified Z-N stain can be used to advantage in the search for H. capsulatum in the tissues. Rawson (1948)

Clinically the lesions have been described as granulomatous, ulcerative or nodular. Curtis et al (1947). A vegetative form described by Levy (1945) coincides with the granulomatous form of Curtis. The lesions may involve any or all the oral structures Stones (1954). The frequency of oral involvement has been recorded as 20% of patients affected, Levy (1945), and as 30% by Smoke & Heid (1953).

A number of cases of lingual involvement have been reported; the tongue may be red, swollen and very painful; small white spots appear, only to heal over to form a small linear trench. Curtis et al (1947)

Nutman (1949) has described a white area, resembling leukoplakia, covering the dorsal surface, and petechiae covering the ventral surface of the tongue.

Levy's case showed ulceration with serous discharge. The ulcers which were quite shallow had a purulent base and erythematous borders. They may be localised, or accompanying a generalised infection, and are covered by a grey, Stones (1954); Rawson, Collins & Grant (1948) or pinkish exudate.

Other lesions described by Levy (1945) include involvement of the angles of the mouth with resultant rhagades and of the soft palate which may have a greyish appearance and is studded
with small haemorrhagic patches and a nodular uvula.

Weed & Parkhill (1948) stress the need for biopsy as the ulceration of histoplasmosis may simulate many other lesions. Kemper & Bloom (1944) describe a case with lesions resembling those of Kala azar.

Treatment is not always successful and the prognosis should be guarded. Plotnick & Cerri (1957) report a case involving the labial and buccal mucosa which was cured by the intralesional injection of freshly prepared Nystatin with 5 per cent glucose in water.

Other treatment for local lesions has included irradiation, surgery, sulphonamides and antibiotics. Stönes (1954).
MONILIASIS.

Moniliasis is the infection caused by the yeast-like organism Candida albicans. It may produce an acute or sub-acute (or chronic) infection of the mouth, vagina, skin, nails, bronchi and lungs and occasionally a septicaemia, endocarditis or meningitis. The organism now known as Candida albicans was discovered by Langenbeck in 1839. Cecil and Loeb (1956)

Although in some cases it occurs idiopathically, oral moniliasis is associated with poorly under-nourished children, in pregnant women and mothers with vaginal moniliasis who infect their young children, in enfeebled adults and children suffering from tuberculosis, avitaminoses, carcinomata and the wasting diseases. Thoma (1954). It may follow the usage of broad spectrum antibiotics; Lighterman (1951) describes such a case.

Although general conditions are all important in its aetiology, local conditions may predispose.

Antibiotic therapy frequently disturbs the oral flora, while alterations in salivary flow, oral temperature and pH may also act in favour of the proliferation of the yeasts. Lelkes (1957)

The causal organism Candida albicans may be identified in smears of scrapings of suspected lesions prepared by the wet potassium hydroxide method. Lilienthal, Harris and Arnott (1956) Films stained by Gram's method show Gram positive hyphae and round or oval yeast-like forms, some of which may show buds. Low and Dodds (1947). They readily grow on Sabouraud's medium after two to four days' incubation, Cecil and Loeb (1956), producing soft creamy white colonies. Low and Dodds (1947). Candida albicans is lethal for rabbits, agglutinates in specific serums and forms typical chlamydospores on corn meal agar. Cecil & Loeb (1956)

The organism is found in 6% of mouths and in 18% in the faeces of healthy individuals. Raubitschek (1947).

The lesion is soft, elevated, painless and pearly white, looking very much like a patch of coagulated milk. It is firmly
adherent to the underlying mucosa, however, and its removal leaves a bleeding surface. Any portion of the mouth is affected and extension to the Respiratory and Digestive tracts may occur, Thoma (1954), although it is extremely rare according to Tolhurst et al (1955).

Monilial glossitis is highly contagious according to Schaffer (1951), who describes the lesion as varying from a pin size to large, white, elevated and irregular plaques. Although the membrane is firmly adherent in the early stages it is less so in later stages and is readily peeled off. Thoma (1954) describes the tongue as smooth and red with furry patches.

Cases of what has been described as denture sore mouth are in many instances monilial infections, often in debilitated persons suffering from some chronic disease state. Thoma (1954). These lesions are not always plaque-like, and beneath dentures they are often erythematous, tender and painful, with associated adenopathy. Burket (1957). Angular cheilosis of monilial origin is described by Finnerud (1944).

There may be confusion clinically in differentiating between monilial infections and traumatic lesions, lichen planus and leukoplakia, especially when the buccal mucosa is involved, and in these cases histopathological and bacteriological aids must be utilised in the establishment of a diagnosis.

Scales et al (1956) describe a granulomatous lesion, a red lobulated swelling with a broad base attached to the palate.

Chronic latent oral moniliasis may lead to the development of leukoplakia and epithelioma. Thoma (1954)

Histopathologic examination shows marked degeneration of the epithelium. The organism is demonstrated in the stratum granulosum, which shows hydropsical degeneration. Thoma (1954)

In the treatment of cutaneous lesions Montgomery & Casper (1945) draw attention to the use of fungicidal remedies only when the acute phase subsides. Following clinical cure the use of a mild fungicide a few times a week is desirable to prevent recurrences.
Various antibiotics, fungicidin, candididin, candidin, ascosin and trichomycin are active in vitro against the organism, but their clinical value in relation to their toxicity remains to be determined. Tolhurst et al (1955)

Nystatin is a new development and was isolated by Hazen and Brown (1951) from Streptomyces noursei. It is well tolerated and no sensitivity reactions have been reported. Pace and Schanz (1956) consider its use in the treatment of monilial vaginitis.

A complete dietary analysis should be carried out in all cases. Lilienthal, Harris and Arnott (1956)

For local treatment Arnott & Jolly (1958) recommend a lotion of Mycostatin (Squibb) with sodium carboxymethyl cellulose ("Edifas").

Hydroxystilbamidine has been successfully used in some cases. Stenderup (1957). A 20% aqueous solution of sodium caprylate is often effective in the treatment of oral lesions. Burket (1957). Other local applications are considered by Thoma (1954), but in the light of recent therapeutic measures will not be considered further.
MADUROMYCOSIS. Madura Foot

is a chronic infection affecting principally the foot, but in rare instances other parts of the body. It is characterised by multiple abscesses and sinuses, and the development of granulation and connective tissues. Cecil & Loeb (1956)

A case involving the jaws is reported in the Soviet Medical Treatises. Abstracted (1957)

Botryomycoses of the hard palate is also reported.