mals is the parent of that in man, but is so modified by transition that each succeeding epidemic is milder and less aggressive.

The contagiousness of influenza has long been a mooted question. The fact that inoculations thus far have been unsuccessful in transmitting the disease still remains the strongest argument for the negative side of the proposition. The doctrine that contagion is the most important if not the only method of its propagation has, however, been strengthened by numerous observations made during the recent epidemics and is now accepted by most clinicians.

The frequency with which epidemics, both in their general and in their local distributions, follow the regular lines of travel, the immunity of isolated households and communities, and the frequency with which local outbreaks have been traced to their sources leave, indeed, little room for scepticism. It has been abundantly proved that the spread of influenza is not materially affected by the direction of the prevailing winds; and, in fact, some recorded observations indicate that it may even travel more rapidly against than with the wind. The marvelous rapidity with which influenza sometimes spreads in a community once infected is readily accounted for by its remarkably short period of incubation. It is claimed by many that personal contact with infected individuals or materials is the only method of its propagation. The supporters of this doctrine contend that the dissemination of disease germs through the air must have its limitations. That they can be carried thousands of miles in air currents without dispersion or destruction, or the assumption, on the other hand, of a proliferation in the air itself, does violence to our knowledge of the life history of disease germs. There are, however, too many irregularities in the behavior of grippe epidemics, not necessary to be enumerated here, to permit us to accept personal contact as the only factor in its propagation. Hirsch has pointed out that notwithstanding the modern facilities of intercommunication and rapid transit, epidemics do not travel more rapidly now than under the old régime.

The passengers and crews of ships which have sailed from non-infected ports, and have held no communication with other ships, have been repeatedly attacked in mid-ocean.

The following striking instance is related by Sir Thomas Watson: The frigate *Stag* anchored at Berry Head, on the Devonshire coast, all on board well, April 3d, 1833, the very day on which Watson saw his first cases of influenza in London. The breeze was off the land, and in half an hour after dropping anchor forty men were down with influenza; six hours later the number was increased to sixty, and soon reached one hundred and sixty.

The period of incubation is very variable, both in individual cases and in different epidemics. It may develop almost immediately after exposure, from which it has received one of its popular names, *Lightning Catarrh, Blitz-Catarrh;* but in other instances there is an incubation period lasting from a few hours to several days.

Dr. Goodhart has recorded some startling instances of the suddenness with which strong men engaged in their ordinary vocations were stricken with the disease.

Influenza is no respecter of sex or age, though males between the ages of twenty and fifty years seem most susceptible to the infection.

One attack does not confer immunity from subsequent ones, and a few persons even experience a second seizure during the same epidemic. An epidemic, as a rule, lasts from four to eight weeks in a given locality, although many run a shorter course and often end as suddenly as they began. The rate of progress varies greatly, not only in different epidemics but also in the same epidemic as it spreads over different districts.

There is no causative relation between influenza and other epidemic or infectious diseases. The statement that prevalent infectious diseases abate in frequency and intensity upon the appearance of grippe is not sustained by facts. Neither is there any ground for the popular belief that cholera follows in the wake of influenza. In some instances, notably in 1831, 1847, and 1856, the two diseases have been closely associated in point of time, but the official report of the French commission fully indorses the conclusion of Gluge and Smolensky that the association was purely accidental.

Morbid Anatomy.—The anatomical lesions found after death give meagre information as to the pathology of influenza. A fatal termination is almost invariably due to complications, and the structural changes found post mortem are characteristic of the secondary disease, and not of influenza. Death rarely occurs in uncomplicated cases. The lesions peculiar to influenza are almost exclusively localized upon the respiratory mucous membrane. The mucous lining of the larynx, trachea, and bronchial tubes is hyperæmic, swollen, and covered with frothy or viscid muco-pus. The catarrh may extend to the finer bronchi, but is ordinarily limited to the trachea and larger tubes. The bronchial glands are sometimes enlarged and softened. The gastric and intestinal mucous membrane is more or less congested in a considerable portion of the cases. The solitary and agminate glands of the intestine are not usually implicated.

Kernig, of St. Petersburg, found the spleen enlarged in all cases which came under his care.

Symptoms.—The complexus of symptoms of influenza is exceedingly varied, and this variability extends not only to different epidemics, but also to individual cases of the same epidemic. In many cases the attack closely resembles an ordinary catarrh, with little fever and slight hyperæmia of the naso-pharyngeal mucosa; again, it assumes the form of an intense infectious fever, with profound involvement of the nervous centres, while between these extremes are found cases of almost every grade of severity, and almost every combination of symptoms.

Many attempts have been made satisfactorily to classify the protean forms of the disease. The classification most generally followed by recent writers, one which is a modification of that long ago proposed by Hufeland, is into:

1. The nervous form.
2. The catarrhal or respiratory form.
3. The gastro-intestinal form.

It is estimated that in the recent epidemics about fifty-five per cent. of the cases belong to the nervous, thirty per cent. to the catarrhal, and fifteen per cent. to the gastro-intestinal form of the disease. These estimates will undoubtedly have to be changed for different localities. According to the observation of the writer, nervous symptoms predominated in about eighty-five per cent. of the cases in the epidemic of 1889–90, while in that of 1891 the catarrhal and gastric forms were more common and severe, but still constituted a small percentage of the cases. The division is, however, purely arbitrary, and finds its chief value in emphasizing the fact that the brunt of the attack may fall upon any one of the three great systems.

Influenza usually begins abruptly, but is occasionally preceded by a feeling of indisposition or malaise of from a few hours' to several days' duration. A distinct chill, or, oftener, a mere chilliness, is at once followed by a rise of temperature and the symptoms of a naso-pharyngeal catarrh, with cough, sore throat, frontal headache, pains in and general soreness of the limbs, depression of spirits, and sometimes with gastro-intestinal disturbances.

The fever is remittent in type, variable in intensity, rarely exceeds 104° F. in uncomplicated cases, and subsides by lysis, rather than by crisis. As a rule, the temperature reaches its maximum at the beginning or early in the attack, and often drops below normal during convalescence.

A subnormal temperature has also been noted by many during the progress of the disease, accompanied usually by surface coldness, feeble circulation, and other evi-

dences of depression. The later epidemics were peculiar in the large number of cases in which the fever took on a continuous type, and persisted for two or three weeks, resembling in many of its features a mild typhoid fever.

Anomalous cases were also recorded in which the whole course of the disease was afebrile, and, according to Eichhorst, these were particularly liable to nervous explosions.

The pulse is moderately increased in frequency and changeable in rhythm and quality. The tendency to cardiac asthenia, so pronounced in grave cases, often becomes a serious menace in those of moderate severity. An extraordinary slowing of the pulse is sometimes observed. The pulse may register only in the forties or fifties and naturally excites fears of some cerebral complication. This abnormal retardation belongs to the natural history of the disease, although it is often erroneously attributed to remedies, especially if digitalis or other cardiac sedatives have been administered.

Coincidently with the fever, and sometimes preceding it, the symptoms of an acute catarrh of the upper air passages are manifested.

There are frequent paroxysms of sneezing, a feeling of stuffiness in the head, the eyes are suffused and watery, and coryza with an abundant secretion of mucus speedily follows. The mucous membrane of the nose, mouth, frontal sinus, pharynx, and larynx is congested. The voice becomes hoarse or reduced to a whisper. Cough is rarely absent, usually severe, and recurs in paroxysms which harass the patient day and night. At first it is harsh and brassy and attended with a scanty muco-serous expectoration, which, as the disease progresses, becomes abundant, muco-purulent, and often blood-streaked.

Sharp pains in the sides and under the sternum, dyspnœa, and suffocative paroxysms are experienced, and, as was long ago pointed out by Graves, of Dublin, often without any recognizable intrathoracic lesion. The catarrhal process does not, as a rule, extend below the larynx or trachea, but if it should invade the lower air passages, the deepening of the symptoms at once announces the fact and the illness assumes a more serious aspect.

Nervous symptoms are uniformly present, but vary greatly in intensity. In some epidemics, notably in 1889–90, they predominated over all other symptoms. Severe headache, usually frontal, and pain in the eyeballs are rarely absent. The head pain comes on suddenly, is nearly continuous, dull, and throbbing, with frequently recurring paroxysms of atrocious severity. It is exaggerated by pressure or movement, and is often associated with hyperæsthesia of the scalp and neck.

With the headache there is stiffness and soreness over the entire body, as if it had been beaten, and a backache which in its intensity is suggestive of dengue or smallpox.

The patient either lies perfectly quiet, to prevent the suffering which the slightest movement causes, or tosses restlessly about in the futile effort to find a position of comfort. Sharp neuralgic pains dart along the principal nerve trunks, but show a decided preference for the trigeminal, intercostal, lumbo-abdominal, and sciatic nerves. These neuralgias are often intermittent, but do not exhibit the periodicity of ordinary malarial neuralgias.

Persistent insomnia or unrefreshing snatches of sleep filled with painful dreams add to the patient's distress. Delirium of a mild type is usually present, and is often marked when the fever is slight. In exceptional cases it becomes so furious as to overshadow all other symptoms. Coming on late in the disease it often announces the onset of some complication.

Vertigo, especially on rising, and muscular tremor are not uncommon. Convulsions and coma are rare, but may develop with the initial fever or at any subsequent period.

The extreme muscular weakness, amounting at times to a serious depression of the vital powers, is a peculiar feature of influenza. The debility is wholly disproportionate to the amount of fever or the severity of other symptoms, and generally reaches far into convalescence.

The mental condition harmonizes with the physical depression. When thoroughly under the grippe influence, the patient shrinks from mental as he does from physical exertion, is vacillating, foreboding, and often becomes a veritable "Jacques" in his melancholy.

While restlessness and wakefulness characterize most epidemics, others are equally marked by somnolence. Thus the remarkable epidemic of 1712 is known as the *sleeping sickness*, from the almost universal presence of this symptom.

The disturbances of the digestive organs are generally mild and consist of anorexia, coated tongue, epigastric tenderness, abdominal pains, and constipation. The tongue is heavily furred, flabby, deeply indented by the teeth, and tremulous. The breath, as a rule, is peculiarly offensive. Nausea and vomiting sometimes usher in the attack and may continue throughout its course. At times the force of the disease is expended in the intestinal tract and causes severe colicky pains, tympanites, and obstinate diarrhœa. The stools, at first bilious and fetid, soon take on a dysenteric character or become larger and watery, like the discharges of cholera nostras, and are accompanied with vomiting, leg cramps, and rapid prostration. The digestion remains impaired for some time after the subsidence of the acute symptoms, and not only retards convalescence, but favors a return of the gastro-intestinal derangements upon the slightest indiscretion of diet.

An enlarged spleen is commonly present and bears testimony to the systemic infection.

The urine is scanty, high-colored, and contains abundant urates. Albumin and casts, hyaline and epithelial, are present in a limited number of cases not necessarily of the gravest type. The integrity of the kidneys is rarely permanently impaired. Cystitis is sometimes met with, and retention of urine in elderly persons is tolerably common.

The presence of an hemorrhagic tendency has been remarked by many observers. Epistaxis and menorrhagia are the most, and cerebral hemorrhage the least common of the accidents dependent upon this tendency.

Eruptions are occasionally seen, of which herpes, urticaria, and erythema constitute the chief examples.

The disease attains its height on the second or third day and then rapidly declines, covering a period of from four to seven days in its full evolution; but in the graver cases, or in those disturbed by complications, recovery may be indefinitely delayed.

Convalescence is often announced by the appearance of some critical discharge, such as profuse sweating, a copious secretion of bronchial mucus, a free discharge of sedimentary urine, or a profuse diarrhœa.

After complete apyrexia has ensued, there is not infrequently a temporary return of the fever and other symptoms not dependent upon the presence of a complicating disorder. This new outbreak is usually of brief duration, and should be considered an exacerbation rather than a relapse. It is apt to appear on the fifth or seventh day of the disease, and is oftenest seen in those who have committed some error of diet or have undergone some exposure. True relapses are, however, not uncommon or free from danger.

Complications and Sequelæ.—While there has been of late a tendency to exaggerate the frequency and importance of the complications and sequelæ of influenza, the fact remains that there is scarcely another disease so liable to intercurrent disorders or to serious after-effects. The more common of these are divisible into two groups: First, those which are the direct outgrowth of the lesions in the mucous membranes and parenchymatous tissues; and, second, the sensory-motor derangements, which result from the action of the grippe toxin upon the cerebro-spinal centres. Among the rarer affections belonging to the first group may be mentioned circumscribed ulceration of the vocal cords, abscess of the larynx, œdema of the glottis, and paralysis of the muscles of the throat.

and bronchial irritation. Troublesome cough is readily controlled by the old-fashioned Brown's mixture, or by small doses of codeine in syrup of wild cherry.

In recent epidemics the writer has gotten excellent results from heroin (gr. $\frac{1}{3}$–$\frac{1}{4}$) either alone, or when secretion was free, in combination with ammonium chloride (gr. v.–x.) and syrup of squills (♏ x.–xv.).

In the graver types of influenza, or when the course is anomalous, care must be taken not to overlook complications, which often, especially those of intrathoracic origin, steal on insidiously. These must be managed according to the principles of treatment laid down on other pages of this HANDBOOK.

Delayed convalescence will call for a prolonged course of tonics, and, in many cases, for an outing at the seashore or in the mountains. *William Judkins Conklin.*

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INGROWN TOE-NAIL.—This affection is characterized by an inflammation of the soft parts underneath and alongside the edge of the toe-nail. It may be congenital, but more commonly it is met with in adults. In occasional instances it would seem to be hereditary. Its most frequent location is on the outer side of the great toe, although it not infrequently involves both sides of the toe, and even of both large toes. The disease seldom occurs in the smaller toes, and is of comparatively slight importance when it does.

Beginning insidiously with pain and soreness underneath the side of the nail, which are increased by pressure, the affection often terminates in suppuration and ulceration. The granulations become exuberant, the parts about the nail become hypertrophied, and the whole toe is swollen, tender, and painful, rendering the patient totally unable to wear a boot, or even to walk. The nail also becomes deformed. Its edges curve in and act as a foreign body, constantly irritating the inflamed tissues. Pus collects underneath the nail, decomposes, and tends not only to aggravate the suffering, but to keep the toe in a filthy condition. The duration of the disease is often protracted, many people suffering from it for months or even years, before obtaining permanent relief.

CAUSE.—Tight or ill-fitting boots are frequently the cause of this affection. High and narrow heels, narrowness of toe, and insufficient length, are common and important defects in boots, shoes, and slippers. Every step taken upon a high heel tends to push the foot farther into the shoe, and thus to crowd and cramp the toes, and not infrequently the affection under consideration is the result. The accumulation of dried epitheliai débris under the nail also acts as an irritant. Paring the corner of the nail too closely tends to produce this disease by allowing the soft parts which grow more rapidly, to rise up and obliterate the groove that the nail should occupy. As this latter comes forward again it necessarily impinges upon the soft tissues, and may excite inflammation. A markedly convex nail bordered by thick masses of soft tissues predisposes the toe to this affection.

TREATMENT.—This may be palliative or radical. The cause should be removed, if practicable. The nail should be trimmed squarely across the end, and the edges should be allowed to project beyond the free margin of the flesh.

The soft parts are to be kept well pressed back from the nail at its root and sides, and the epithelial débris is to be frequently removed. The boots should be of good length, wide across the toes, and should have low, broad heels.

In the lighter cases relief may at times be obtained by scraping the nail thin with a knife or, better, with a piece of glass, and cutting a deep notch in the centre of the free border. A bit of lint or of cotton may be drawn under the edge of the nail to raise it from the sensitive matrix, and to give exit to any pus which may have accumulated underneath. The same object may be obtained by means of an elastic cord passed under the border of the nail, the ends being secured to the dorsum of the foot by adhesive plaster. Agnew made use of a piece of cork, cut in a peculiar shape, to separate the nail and the flesh. Should there be much inflammation at any time, it is to be treated with water dressings, or with flaxseed-meal poultices. A starch poultice is also an admirable application in many cases.

One of the best local applications to repress exuberant granulations is the powdered nitrate of lead. It is to be dusted upon the parts every day, until a crust is formed, underneath which healing will frequently take place. Should the crust become loosened by the suppuration, it may be removed and fresh powder applied, until the granulations show a tendency to a healthy cicatrization.

The cause of the affection having been removed, many cases of only moderate severity may be satisfactorily managed in the manner above described. Not infrequently, however, either from neglect or from improper treatment, the tissues have become so extensively inflamed that more radical measures are required. Several methods for obtaining a permanent cure have been recommended. The old one of splitting the nail and removing a portion without destroying the matrix has very properly been discarded, as the benefit derived from the procedure was usually only temporary, and the trouble was very apt to reappear with the growth of the nail. Removal of the entire nail with destruction of the matrix is seldom, if ever, necessary.

The operation which was brought to the notice of the profession many years ago by Dr. B. E. Cotting, is efficient, and, barring a rather tedious convalescence in some

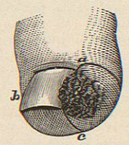

FIG. 2799.

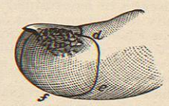

FIG. 2800.

cases, is satisfactory. It consists in removing all of the soft parts overlying the infleshed nail, leaving the latter uncovered and freely exposed, as is indicated in Figs. 2799 and 2800. The cicatricial contraction following the healing of this wound tends to prevent the nail from again becoming embedded in the soft tissues. This is a very good operation, but the following is preferable from the fact that the convalescence is much shorter, and the results are as good.

The nail is split so as to remove about one-quarter of it on the affected side. The incision is to be extended well back toward, but not into, the joint. Another incision extends from this one along the side of the toe near the nail, thus removing a very thin strip of the inflamed tissues, leaving a clean fresh wound. Particular care should be taken to remove the matrix along with the bit of nail. Unless this is done thoroughly, the new growth of nail will very likely give the same trouble as the present one. This is the key to the success of the operation. The wound is to be closed with sutures, one or two of which may be passed through the nail, or that portion of the flap may be kept in place with adhesive plaster. If the operation is done under careful aseptic precautions, the wound should be well in a week, and the patient enabled to wear a loose shoe soon after. This is the best operation thus far suggested for a radical cure of this troublesome affection. *George W. Gay.*

INHIBITION.—Inhibition is derived from the Latin word meaning restraint. It refers to any influence which controls or retards. From a physiological standpoint, inhibition is commonly referred to as any influence which restrains or even prohibits movement of the parts concerned. Although some of the most striking illustrations of inhibition have to do with the retardation of movement, it by no means follows that inhibition should be limited to this kind of phenomenon alone. There is some evidence that under certain conditions, or in particularly susceptible individuals, sensation (pain, etc.) and chemical activity, as represented by changed secretions, may be inhibited to a greater or less extent. The term inhibition in its physiological sense first came into use from the study of the action of the vagus nerves upon the heart. This phase of the subject will therefore be dwelt upon in some detail.

HISTORICAL.—In their experiments in 1845 the Weber brothers showed that when an interrupted electric current was used for stimulation, and one electrode was placed within the nostril of a frog and the other on a cross section of the myel at the level of the fourth or sixth vertebra, the stimulus caused the heart to stop beating. This experiment led to the discovery of the function of inhibition. By further experiments the Webers localized more definitely the source of inhibitory power as being situated between the optic lobes and the calamus scriptorius—or, in other words, in the region of the oblongata. Later, Eckhard, by using a mechanical stimulus—the prick of a needle,—more minutely localized the inhibitory centre in the frog, and found it to be between the cerebellum and the tip of the calamus scriptorius. Labordi, also by the needle method of excitation, located the vagus centre in the cat at a point in the middle of the spinal bulb, lying in the lateral part of the floor of the fourth ventricle. At this spot there is situated a mass of gray matter, which forms the accessory nuclei of the hypoglossal, spinal accessory, and glossopharyngeal nerves.

COMPARATIVE.—The different conditions existing in the various groups of animals respecting the form, structure, innervation, and temperature of the heart itself, are naturally correlated with some difference in reaction to inhibitory influences. As will be shown later on, different parts of the heart will respond in a different degree to inhibitory stimuli. Even among the various Invertebrates investigated, some have been shown to possess a regulative mechanism for the heart. Ransom has shown that in the octopus and in the squid, both inhibitory and accelerator nerves are present. The American crab, *Callinectes hastatus*, is also provided with accelerator and inhibitory nerves which pass into a pericardial plexus. The land snail, *Helix*, possesses cardiac inhibitory nerves as shown by numerous observers. The sea snail, *Aplysia*, on the other hand, has been found to possess an accelerator but no inhibitory nerve

The presence of a cardiac inhibitory mechanism in numerous Invertebrates would naturally strengthen the supposition that a similar condition should exist in the Vertebrates. Such an assumption has hitherto been generally accepted without question or proof to the contrary. A recent article by Greene (*Amer. Jour. Physiol.*, 1902) shows that in the hagfish, *Polistotrema stouti*, there are no cardiac regulative nerves whatever. In the literature at present available the writer has been unable to find any other record of the absence of an inhibitory cardiac mechanism among the Vertebrates. There are, of course, examples where much cardiac resistance has been shown toward inhibitory influences, but some restraining effect has been obtainable. Greene concludes that in the hagfish, one of the lowest of the Vertebrates, a condition exists comparable to the heart of an embryo before the nerves have entered it, and that any regulation of the heart's action must depend upon conditions which affect the cardiac muscle directly, such as tension, nutrition, etc. The volume and pressure of the blood coming to the heart and the changes in the pressure upon the viscera by the body movements undoubtedly exert a decided influence upon the hagfish heart.

Gaskell concludes, from his observations among the cold-blooded animals, that, with the exception of the Amphibia, stimulation of the vagus has little or no inhibitory effect upon the ventricle, although other parts of the heart are affected.

Greene states that among the Elasmobranchs several sharks and rays have been shown to possess inhibitory nerves for the heart, and has himself demonstrated the presence of such nerves in one species of shark, but any specific action upon the ventricle itself is not mentioned. Among the Teleosts, Gaskell mentions the eel and toadfish as examples of this group in which the ventricle shows little or no inhibitory effects. Fishes are mentioned in the original list of animals given by the Weber brothers in which cardiac inhibition was produced by vagus stimulation, but here again there is no specific mention of the ventricle. In the Amphibia (frog, toad, newt, and necturus), on the other hand, the ventricle is inhibited in the same way as is the auricle.

Knoll (*Arch. f. d. ges. Physiol.*, Bonn, Bd. xlvii., S. 595), among other things, states that in the heart of the pigeon, which was included in his experiments, the ventricles reacted normally to vagus stimulation in the same way as the atropinized ventricles of the mammal. As atropine paralyzes the inhibitory nerve endings, stimulation of the vagus, under this condition, exerts no inhibitory effect upon the mammalian ventricles. It seems reasonable, therefore, that the inference to be drawn is that the pigeon ventricle is normally insensible to inhibitory influences from excitation of the vagus. This fact has an interesting relationship to the view commonly held that the birds sprang from the reptiles.

In the group of Mammals (cat, dog, rabbit, rat, hedgehog, guinea-pig) it has been well demonstrated that vagal stimulation inhibits the action of the ventricles as well as the auricles.

In classifying the results obtained, so far as ventricular inhibition is concerned, the Amphibia and Mammals may be placed in one group, characterized by ready ventricular response to vagal excitation; and, following Gaskell, the Teleosts, Reptiles, and pigeon may be placed in another group in which there is little or no ventricular response when the vagus is excited.

As the writer is unable at the present time to obtain definite information with regard to the specific effects of vagal stimulation upon the ventricle of the Elasmobranchs, it is doubtful to which group they should be assigned. Nor is there any information available as to the effects upon the ventricle of the Dipnoans—the lung-breathing fishes. Gaskell suggests that it may be assumed that the same phenomena may be found in this group as in the Amphibia. The hagfish apparently holds a unique position among Vertebrates, on account of the absence of any extrinsic nervous mechanism for regulating the action of the heart.