PONS AND MEDULLA, DISEASES OF THE.—It is a fortunate fact that the occurrence of vascular lesions, such as hemorrhage, embolus, and thrombosis, is rare in the neighborhood of the pons and medulla. They may of course occur in the presence of such a favoring element as cardio-vascular disease, which in turn may be due to a variety of causes, but when they are of any considerable size they are so quickly fatal that a determination of their exact location within the above structures is practically impossible. It is, moreover, not particularly easy, even though the lesion be so small as to be compatible with life, to locate it with absolute definiteness, and this in spite of the fact that the industry, both of the clinician and of the pathologist, has guided us to a remarkably clear comprehension of the physiologic values of the various nuclei, nerve fibres and tracts which lie in and traverse this anatomically complex territory.

In the case of extensive hemorrhage the victim is struck down so suddenly, and unconsciousness supervenes so rapidly that it is impossible to separate the damage to individual nuclei from the general havoc which the lesion entails. Certain features are, however, usually present which indicate in a measure the general situation of the extravasated blood. The respiration, for instance, rather quickly assumes the Cheyne-Stokes character, and this in itself should arouse a suspicion of the intimate relationship between the hemorrhage and the respiratory centre. Conjugate deviation of the eyes is also a fairly reliable indication of ponto-medullary hemorrhage, the eyes being turned toward the side opposite the lesion. The resultant paralysis is apt to be bilateral even though the hemorrhage be unilateral and differs from the flaccid type observed at the outset of an ordinary apoplexy in the tendency of the extremities to assume a degree of rigidity. This rigidity may be accompanied by a recurring shock-like tremor of a rather coarse type. The behavior of the reflexes is not sufficiently constant to be dependable, and there is nothing strikingly characteristic about the pulse and temperature.

In arterial lesions of lesser grades of severity the symptoms may be grouped in a variety of ways, dependent upon their site and extent. A lesion involving the pyramidal tract in the upper pons produces an ordinary hemiplegia, but if it be sufficiently extensive to include the facial nucleus, or even its roots, there usually results a so-called alternating hemiplegia; that is to say, a facial paralysis corresponding to the side of the lesion and a paralysis of the opposite side of the body.

A similar type is observed where the nucleus of the sixth nerve is included in the lesion. In other cases both the abducens and the facial nerves may be involved on the side of the vascular disturbance, and the resulting paralysis may be associated with hemiplegia of the opposite side of the body. Oftentimes the disturbance lies not exactly in the sixth nucleus, but near by in the conjoined centre for the sixth of the same side and the opposite rectus. This produces the conjugate deviation of the eyes away from the side of the lesion spoken of above.

The variety of clinical combinations which may occur in vascular lesions of the ponto-medullary region is relatively extensive. An examination of its anatomy reveals the fact that it contains the nuclei of the larger part of the cranial nerves, nuclei which serve also as trophic centres. It contains furthermore centres governing the respiration and the heart's action; likewise the great tracts and network of fibres which have to do with motion, sensation, and equilibration. The act of vomiting, the secretion of the saliva, and the vaso-motor activities of the body also doubtlessly depend upon centres located in this important region. Nowhere else in the central nervous system are so many important structures in such close proximity; hence it is easy to understand the eccentric grouping of symptoms arising from simultaneous destruction of nuclei and nerve tracts, both sensory and motor.

To attempt to give in detail all the clinical combinations to which acute vascular lesions of this region may give rise would be as fruitless as it is impossible, the element of fortuitousness being too strongly in the ascendant. Generally speaking the onset of trouble is marked by rather severe vertigo, which may be accompanied by vomiting of equal severity. Consciousness is seldom profoundly disturbed, hence the patient is able to observe and give an account of his troubles. These may consist of the alternating hemiplegia above mentioned, or may be further complicated by a more or less extensive loss of sensation, by ataxia of the upper or lower extremities, by difficulty in speech and in swallowing, by diplopia, or by a complete loss of control of the facial muscles which externalize the emotions.

As stated above, it is impossible to construct a semeiology which will fit every case. The point always to be emphasized is the eccentric grouping of symptoms indicating nuclear palsy combined with more or less extensive implications of the motor and sensory tracts.

The prognosis in this class of cases is fairly good as regards life. The damage to the nuclear elements is, however, practically permanent, the resultant paralysis being for the most part of the atrophic type.

Treatment is of little avail except in cases in which syphilis is the etiologic factor.

The medulla may be involved during the course of many diseases of the central nervous system, notably tabes, progressive muscular atrophy, multiple sclerosis, gliosis, and amyotrophic lateral sclerosis. It may also be the seat of tumor, abscess, or tuberculous disease. As none of these diseases can be classed as peculiar to the medulla no further consideration will be given them in this article.

The next disease of essentially medullary origin to be considered is the so-called

Progressive Bulbar Paralysis.

(Labio-glosso-laryngeal [Pharyngeal] Paralysis.)

It is to be classed among the rare forms of nervous disease. Its victims are, in the large majority, found among the aged. A so-called infantile type will be spoken of later. As to its etiology nothing definite is known, hence the usual train of causative factors comes in for mention, namely, exposure to cold, traumatism, mental wear and tear; and even abuse of function of the lips, tongue and palate, although it appears that women are less commonly afflicted than men.

Symptomatology.—The first thing that attracts the patient's attention is an unwonted fatigue after talking for any length of time, with a restricted ability to enunciate certain syllables. The initial disability lies, as a rule, in the articulation of the lingual consonants, *l*, *r*, *n*, and *t*. The tongue can at first still be protruded, but not to the normal extent, and there may be a difficulty in securing its proper apposition to the roof of the mouth for sounding the linguo-palatine consonants *t* and *d*. Up to this time the continuous sibilant *s* may be pronounced. With the increasing weakness of the lips whistling becomes impossible and there is an inability to utter the sounds in which the lips are chiefly concerned, such as *o*, *u*, *b*, *p*, and *m*. So imperfectly are the lips brought together and so sluggish is their separation that the labial explosives *b* and *p* degenerate into *m* and *u*. Finally weakness of the palate fails to shut off the nasal cavity, and a part of the expiratory air stream escaping through the nose gives a nasal quality to the voice, *b* and *p* sounding as *mb* and *mp*.

At this stage of the disease dysarthria is fully established. Words are run together and indistinctly articulated, with an intonation of a decidedly nasal quality. Single words may still by special effort be brought out clearly, but sustained speech of any clearness is impossible.

Either at this time or more commonly after the disease has been established a few months the patient experiences a difficulty in swallowing. Only by great effort can food be carried back through the pharynx to the

œsophageal opening. Fluids are constantly regurgitated through the nose, and at times are inhaled into the larynx causing choking and paroxysms of coughing. Ultimately neither fluid nor solid food can be successfully swallowed. Chewing also becomes progressively difficult.

Finally both phonation and respiration become involved. The voice is weak and monotonous and lacks modulation. Hoarseness may develop and go on to complete aphonia. Toward the end respiration becomes labored, and not uncommonly severe attacks of strangulation occur.

Examination of the larynx shows in the beginning nothing abnormal; later, paresis of the adductors is obvious. The masticatory muscles betray their weakness by imperfect closure of the jaw and restricted lateral movements of the same.

Bulbar paralysis is of the degenerative type. Atrophy is, however, not an early symptom and almost never keeps pace with the paralysis. It is usually first observable in the tongue, which becomes lax and feels flabby and spongy; the fibrillary twitching is very striking. Ultimately the organ undergoes a marked grooving and furrowing, and its total volume is much diminished. The lip muscles are rarely affected until late in the course of the disease. They then become thin and toneless. The muscles of the jaw are only rarely markedly wasted, although a fibrillary twitching is not infrequently observed in them at an early stage.

The electrical excitability of the diseased muscles is never greatly altered. Late in the course of the disease there may be some quantitative change to faradism, but examination is never very satisfactory.

When the disease is far advanced the expression of the face is very characteristic and striking. The mouth is open, the lower lip sunken; and drooling is constant. The fixed and expressionless lower part of the face contrasts strangely with the still mobile muscles of the upper face and eyes, which alone afford mimic externalization of intellectual activity. The patient is very emotional and cries easily, but even then the mouth is but little discomposed, whereas the respiratory muscles are thrown into a sort of spasm to which is sometimes added a peculiar respiratory stridor. The shrunken, furrowed tongue lies motionless on the floor of the mouth, articulation is almost annihilated, and the feebly mumbled speech incomprehensible. The respiratory movement is hurried and the pulse may run as high as 140 per minute. Emaciation is very marked.

The above symptomatology develops on the basis of a paralysis of cranial nerves which are purely motor, and there is never implication of nerves which are sensory or sensorial. Curiously enough, however, in certain cases there is to be observed a peculiar heightening of tendon reflex irritability in the facial and masticatory muscles.

Diagnosis.—Bulbar paralysis has so many features that are peculiar that its differentiation from other affections of the medulla should present no special difficulties. The gradual character of its onset and development, its practical restriction to persons of advanced age, the symmetrical implication of purely motor nerves with absence of sensory and sensorial disturbances, and the association of paralysis with atrophy are all factors which serve to crystallize out the disease from other affections of the same region. The features which further distinguish it from acute bulbar paralysis and from the pseudo-bulbar form will be considered later. Tumors of the medulla involve all structures in their neighborhood; hence, sensory nerves suffer as well as motor; furthermore tumors produce the usual train of symptoms characteristic of a general increase of intracranial pressure.

Pathological Anatomy.—The essential morbid change in bulbar paralysis is a progressive decay of the motor nuclei of the facial, hypoglossal, and glosso-pharyngeo-vago-accessory, and occasionally of the trigeminal. The ganglion cells of these nuclei lose their processes, shrivel, and gradually disappear. The intranuclear reticulations and the intra- and extrabulbar roots undergo the same destruction, the change in the latter being sufficiently marked in certain cases to be obvious macroscopically. In some cases the pyramidal tracts are involved.

Prognosis.—The disease is, for the most part, steadily progressive and invariably ends fatally. Its duration varies from one to three years. Remissions rarely occur, although in any case there may be protracted periods during which there appears to be no advance in the symptoms. In quickly progressing cases the disease may run its course in less than a year. Death usually ensues by reason of asphyxia, bronchitis, inhalation pneumonia, inanition, or some intercurrent disease.

Treatment.—Many drugs have been tried, but none is of any special value. Strychnine in gradually increasing doses, arsenic, nitrate of silver, and the iodides are among those most strongly recommended. Forced feeding should be instituted early in the attempt to keep up the nutrition, and later, when dysphagia is established, the food should be introduced artificially into the stomach in order to avoid the very imminent danger of inhalation pneumonia.

A galvanic current of two or three milliampères passed from one mastoid to the other is recommended by Oppenheim.

Vocal gymnastics may be tried in the effort to improve the speech.

The Hereditary (Familial) Type of Progressive Bulbar Paralysis.—A few cases of a peculiar hereditary form of progressive bulbar paralysis have been observed among members of the same family, usually among the offspring of consanguineous marriages. The victims are practically always true degenerates. The peculiarity of the disease in these cases is that it usually affects the upper facial territory first and its effects are most marked in this region, ophthalmoplegia, especially ptosis, being associated with the bulbar phenomena. These latter do not differ from those observed in the ordinary form.

The paralysis is in most cases of the atrophic type and is associated with partial reaction of degeneration.

In 1895 Oppenheim described an infantile form of pseudo-bulbar paralysis. It was observed by him in connection with cerebral infantile diplegia, and consisted of a bilateral paralysis or paresis of the muscles of the tongue, palate, pharynx, and larynx, which gave rise to the characteristic dysarthria, dysphagia, etc. The paralysis was associated with spastic athetotic movements of the affected muscles. Atrophy and fibrillary twitching were absent.

Oppenheim considers the pathologic basis of the disorder to be a bilateral disease or a developmental defect in the central convolutions.

The Acute (Apoplectiform) Type of Bulbar Paralysis.—*Symptomatology.*—Certain cases have definite prodromes, such as pressure in the head, ringing in the ears, vertigo, sleeplessness, and spots before the eyes. The main symptoms develop suddenly. Intense vertigo or even a genuine apoplectic shock with complete loss of consciousness may usher in the attack. Vomiting may accompany the vertigo. In a few cases general convulsions of an epileptiform character have been observed.

Almost immediately after onset a labio-glosso-laryngeal paralysis is found in full development. This is manifested by characteristic dysarthria, dysphagia, etc. Although the paralysis is bilateral it rarely affects the two sides equally. In the majority of the cases the extremities are also involved in the same varying degrees. There may be paralysis of both arms with simple weakness of the legs, or there may be simple hemiplegia, the latter usually on the side opposite to that on which the bulbar nerves are most involved. The onset of all these symptoms may be less sudden, a few days or even a week being required for their full development.

Dyspnœa and even Cheyne-Stokes respiration, with marked increase of the pulse rate, may be present early and may last for a very long time.

Various sensory disturbances are not unusual, and the patient may complain of painful paræsthesiæ in some parts of the body or extremities.

The expression of the face is characteristic; more so in

fact than in the early stage of the chronic type of bulbar paralysis, because the disease renders the facial muscles fixed and expressionless in a very short time.

The paralysis of lips, tongue, and soft palate is naturally not often associated with atrophy—first, because this phenomenon requires time; and, second, because it is the supranuclear part of the nerves which is usually affected. The nucleus itself may be directly affected, though rarely, and in such cases the characteristic atrophy with electrical changes may be found in the affected muscles.

The symptomatology is much more variable than in the chronic bulbar form, and naturally varies with the extent and seat of the lesion. The same eccentric grouping of bulbar nerve paralysis, with paralysis or paresis and sensory disturbance in the trunk and extremities spoken of under vascular lesions of the bulb in general, is to be expected.

Pathological Anatomy.—By far the commonest cause of the acute form of bulbar paralysis is thrombosis with softening. Both hemorrhage and embolism do occur, but with nothing like the same frequency. Poliencephalitis inferior acuta may determine the symptoms above described, and like symptoms are also ascribed to the pressure of a dilated atheromatous basilar artery.

Certain authors have observed the occurrence of an acute bulbar paralysis associated with weakness of the extremities during the course of typhoid; sometimes with a fatal outcome. In the latter cases streptococci and other organisms were found in various parts of the central nervous system without any very marked histological changes.

Prognosis.—Death may result, in very acute cases, within a short time from inhalation pneumonia or cardio-respiratory paralysis. In less severe cases the symptoms are slowly regressive and may gradually disappear, although restoration of function is seldom absolute in all the affected parts.

Treatment.—In cases suspected to be of syphilitic origin the prompt and free use of specific medication is demanded. Otherwise treatment should in the main follow the lines indicated in the therapy of cerebral vascular lesions in general. In the cases which arise in the course of an encephalitis of the ponto-medullary region antiphlogistic and derivative measures are appropriate. Very large doses of calomel may serve a useful purpose even in cases not syphilitic.

It is very important to make every effort to keep up the nutrition from the beginning. As paralysis of the muscles of deglutition may be absolute even from the outset, artificial feeding often becomes indispensable. In the later stages of surviving cases electricity may prove useful.

Labio-glosso-laryngeal Paralysis of Pseudo-bulbar and Cerebro-bulbar Origin.

In very rare cases after a patient has experienced a number of minor apoplectiform attacks a condition resembling the labio-glosso-laryngeal paralysis of bulbar origin, without any implication of the bulb itself, may result.

The pathologic substratum of such cases is a diffuse atheromatosis of the cerebral vessels, which causes a gradual destruction of the cortical representations of the facial, hypoglossal, and motor trigeminal nerves.

To produce a fairly complete analogue of the genuine bulbar type both cortices must undergo considerable destruction in the regions above indicated, with secondary changes in the cortico-bulbar projections. As these changes are all distinctly supranuclear, atrophy and electrical changes in the affected muscles are wanting.

Clinically, while the above picture is in the developmental stage, the patient is observed to have a series of mild shocks which differ in nowise from the ordinary. It is only when the cumulative effects of these various shocks are manifest in a bilateral paralysis or paresis of the muscles of the face, tongue, and jaws with accompanying disturbance of speech, swallowing, etc., that the resemblance to the bulbar paralysis begins. Even then the likeness is not complete, since severe disturbance of the respiration and of phonation is ordinarily absent.

The mental state of such patients differs markedly from that observed in the genuine form of bulbar paralysis in that some type of psychosis, or even dementia, is usually present. So-called bulbar crying and laughing is, on the other hand, commonly present, and may be very marked.

The paralysis is not necessarily limited to the face and tongue areas, so that hemiplegia or diplegia may be present.

A further type—the cerebro-bulbar—described by Oppenheim, differs from the above only in the fact that with the cerebral arterial break-down is associated a similar condition in the bulb. The lesions are never large and the bulbar symptoms are of gradual onset.

Symptomatically, bulbar phenomena are found associated with marked mental deterioration. Both bodily and mentally the patient is in a most deplorable state. With the usual disturbance of speech, mastication, and deglutition is associated spastic paralysis of the extremities on one or both sides. Attacks of dyspnœa and Cheyne-Stokes respiration either come on spontaneously or result from excitement, from paroxysms of spasmodic hiccough, or from attempts at motion. The optic nerves may undergo neuritis with consequent atrophy. The bladder and rectum may or may not be involved.

The prognosis in both the pseudo-bulbar and the cerebro-bulbar forms is very grave, although life may be prolonged for a considerable period of time.

The treatment recommended is that already described elsewhere.

Asthenic Bulbar Paralysis.

(Myasthenia Gravis Pseudoparalytica.)

To Erb (1879) is due the credit of calling attention to a symptom complex which so closely simulated that about to be described under asthenic bulbar paralysis that it must be considered its nosological analogue. It was not, however, until the appearance of Oppenheim's case in 1887 that this singular disease began to attract the attention which has been increasingly accorded to it up to the present moment.

Etiologically, little or nothing definite is known about it beyond the fact that it appears to result from the action of some toxic agent upon a congenitally predisposed nervous organism. Its association with tumors of the mediastinum and of the thymus gland has been noteworthy in specific instances. The predominance of the disease in early life is striking, but persons of advanced years are by no means exempt.

Pathology.—Up to the present time the most searching anatomic investigations have failed to reveal any organic changes in the medulla, bulbar nerves, or muscles. Congenital nervous defects and peculiarities have been observed in connection with certain cases, and a certain amount of stress has been laid upon the same as regards their morbid value, but it remains extremely doubtful if such stress has been rightly placed. The disease, in last analysis, appears to be a true neurosis.

Symptomatology.—This comprises the usual dysarthria, dysphagia, and masticatory weakness with their associated palsy of the lips, tongue, palate and jaw observed in the ordinary types of bulbar paralysis. Added to this is a paralysis of the upper part of the face with imperfect closure of the eyelids. The paralysis also extends to the trunk and extremities, and attacks of dyspnœa are frequent. In a certain number of cases the involvement of the eye muscles, notably ptosis, is the earliest and most striking symptom. Atrophy and reaction of degeneration in the affected nerves and muscles are absent throughout the entire course of the disease regardless of its duration.

Jolly in investigating the behavior of the affected

nerves and muscles to electrical stimulation observed a peculiarity which he designated "myasthenic reaction." He found that where a tetanizing faradic current was applied (either to nerves or muscles) at intervals of a few seconds, the muscular contraction grew progressively weaker and gradually vanished completely, but that the muscle regained its irritability after a short rest. He further found that if the current were passed through a muscle without interruption for the space of a minute or even less, the muscular contraction gradually died away, but was again obtainable by the same sort of stimulation after a minute's rest.

Analogous phenomena have been observed in voluntary attempts to use the muscles of the jaw or extremities. A patient may take one bite of an article of food and then be totally unable to bring the jaws together with any force, but after resting a while may regain enough strength to chew for a few moments.

The course of the disease is very peculiar. The complete development of symptoms may require many months, although in certain cases the time required has been much briefer. Remissions are common, and the full development of symptoms may be followed by a regression, but so treacherous is the malady that when recovery seems fully established, there may be a fresh outbreak of the most rapid character and the symptom complex again be complete in a startlingly short time. Intercurrent attacks of dyspnœa and tachycardia and febrile movements are common.

The disease has on the whole so many peculiarities that differentiation is not difficult. The combination of bulbar symptoms with weakness of the muscles of the trunk and extremities, the frequent involvement of the external ocular muscles (manifested mainly by ptosis), the retention by the affected muscles of their normal volume, the absence of reaction of degeneration in the presence of the peculiar "myasthenic reaction" mentioned above, the characteristic tiring of affected muscles on voluntary motion, the lack of definite sensory and sensorial disturbance, the absence of mental weakness and disease, and the complete lack of any tangible pathologic substratum in the brain, nerves, or muscles unite to form a clinical and anatomical picture that is *sui generis*.

The Prognosis is always serious. Nevertheless the most alarming cases may end in complete recovery. Recovery is, however, never assured until there has been a freedom from symptoms for a period of many months. to the present time the majority of cases have terminated Up fatally.

Treatment.—The proper care of this type of bulbar paralysis requires unusual skill. A complete rest treatment, such as is followed in the severest form of neurasthenia, should be carried out in bad cases to the minutest detail. The patient should be allowed to do almost nothing for himself, even to swallowing food, which, by the way, should be selected so as to combine the maximum of nourishment with the least tax upon the digestive organs. Even the use of the stomach tube for artificial feeding is not devoid of danger, as its introduction may induce fatal suffocation. If mastication can be permitted with safety in a given case, care should be taken to allow the patient to rest between mouthfuls.

The drug treatment consists in the administration of tonics. In certain cases the preliminary production of diaphoresis has been beneficial. Against the use of electrical stimulation it cannot be too strongly cautioned.

Joseph W. Courtney.

PRESCRIPTION-WRITING.—A medical prescription is a written order to the pharmacist to take certain quantities of certain medicines, deal with them in certain pharmaceutical ways, "put up" the product in certain form for dispensing, and label the package with certain directions for use. Correctness in prescribing, therefore, relates to the three several matters of the *selection of the ingredients* or *composition* of the prescription, the *fixing of quantities* or *computation* of the prescription, and the actual *writing of the order* in technical style, or *expression* of the prescription. These several topics will be considered *seriatim*, in the order named.

I. The Composing of a Prescription.—Assuming that a prescription is intended, as always should be the case, to fulfil a single therapeutic purpose only, then the first point that presents is whether, under the circumstances of the case, a *single* medicine of the appropriate kind should be prescribed, or a *team* of such medicines. As regards this point, no general rule can be laid down—the matter will depend partly upon the nature of the therapeutic indication, and partly upon the respective peculiarities of the individual drug and the individual case. Thus to provoke *emesis*, a single drug is commonly prescribed; to excite *diuresis*, a team; while for *purging* the medicine will be single, if it be castor or croton oil, but multiple, if the selection be from among the resinous cathartics. The advantage of a team of similar medicines in prescription may be, on the one hand, a more *effective*, or, on the other, a more *kindly* accomplishment of the specific purpose in view, or it may be both possibilities combined. Thus, by a wise association in prescription of allied drugs, a maximum of therapeutic effect is attainable with a minimum of by-derangement. Having fixed upon the active member, or team of members, of the prescription, the next point is whether the medicinal working of the same may not be made even more effective or more kindly than would otherwise be the case, by the further addition to the prescription of some special substance. Such increase in both lines—effectiveness and kindliness—may result by a chemical action upon the drug, on the one hand, or by a medicinal impression upon the system of the subject, on the other. Thus, as an instance of the working of a chemical action, stands the fact that the efficacy and kindliness of operation of a dose of *salicylic acid* are both enhanced by the addition to the acid of a solution of a sodic carbonate, whereby the salicylic acid, which under its own form is both insoluble and irritant, becomes the more soluble, and at the same time far less harsh, body, sodium salicylate. As instances of an associated medicinal impression by an unrelated drug affecting the operation of the active member of a prescription may be cited the rather mysterious enhancement of the diuretic action of digitalis by the associate action of calomel, and the neutralizing of the griping of the rougher cathartics by the associated antispasmodic action of the pungent volatile oils, or of neurotics, such as belladonna or hyoscyamus. In the category of additions to a prescription for the purpose of enhancing *kindliness* of operation, belong *flavoring* substances. For an agreeable, or, at least, a not offensive potion, is not merely *pleasanter* than an ill-tasting one to swallow, but is also, by the very reason of non-offensiveness, far less likely than a nauseous dose to destroy appetite or derange digestion. The art of prescribing pleasant mixtures is therefore one of genuine advantage to the patient, as well as to the prescriber! Agreeability of taste is, of course, far more important in the case of fluid than of solid mixtures, and is attained, in the case of fluids, in part by wisdom in the selection of the active member of the prescription, and in part by the addition to the prescription of *sugar*, or of *syrup*, or of preparations of the more pleasantly flavored *aromatics*. Lastly, in composing a prescription, comes the thought of a possibly necessary substance to give *volume*, or, in the case of a powder or pill, to give *form*, or, in the case of a fluid mixture, to serve as a diluent, or as a solvent. The character and relative proportion of such a member of a prescription will vary so greatly in different cases, that no general rule affecting the selection of vehicles can be formulated. Members of a prescription for the several purposes named are commonly referred to as, respectively, the *basis*, the *adjuvant*, the *corrigent*, and the *excipient*, or *vehicle*, of the prescription. In the association of different substances in a prescription, no matter what the purpose of the several ingredients, regard must always be had for the mutual *chemical* relations of the things so brought into mutual contact, lest undesirable