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RHATANY.—(*Krameria*, U. S. P.; *Krameria Radix*, B. P.; *Radix Rhatania*, P. G.) The dried roots of several species of *Krameria*, especially of *K. triandra* R. et P., *K. livina* L., and *K. argentea* St. Hil. (fam. *Krameriaceae*).

The last mentioned is not now official in the United States Pharmacopœia, but will doubtless be so in the forthcoming edition. The *Kramerias* are low or semi-

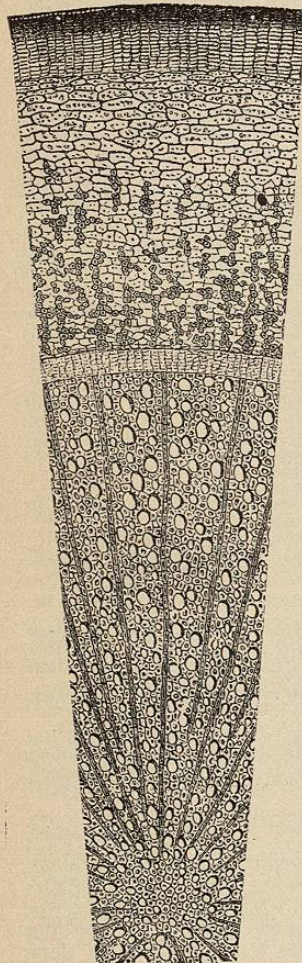


FIG. 4110.—*Krameria Triandra*; transverse section of root. (Bailon.)

prostrate shrubs of tropical or warm temperate parts of America. They have very long, thick roots, noted for the thickness of their bark. Since the active constituent exists mostly in the cortex, the thicker-barked varieties are the better. The first-named grows in the higher Andes and yields Peruvian *Krameria*, the poorest variety. The second comes from the Santa Marta region of Colombia, and is about intermediate in quality between the first and the third, which latter comes from Northern Brazil. This is usually sold as *Savanilla*, the genuine *Savanilla* now reaching the market only occasionally. *K. lanceolata* Torr., of the Southwestern United States and Northern Mexico, yields a good *Krameria*, but it is scarcely a commercial article.

DESCRIPTION.—*Peruvian Krameria*.—Root branches usually occurring with several or many attached to a short, hard, and woody tap root, which is 1.5-4 cm. ($\frac{1}{2}$ -1 $\frac{1}{2}$ in.) thick, roughly fissured and supports a knotty, several-to many-headed crown; of indefinite length, rarely exceeding 50 cm. (20 in.) and usually less than 1 cm. ($\frac{3}{8}$ in.) thick, cylindrical, flexuous or wavy, very flexible; externally light red-brown, more or less marked with dark, scaly patches, especially upward, otherwise smoothish, devoid of transverse fissures; fracture tough and splintery, the pinkish-brown bark occupying less than one-third of the radius, the wood yellowish or pinkish-white, finely radiate; inodorous and of a very astringent taste.

Brazilian Krameria.—Branches usually occurring detached from the tap root and crown, less flexuous than those last described, externally of a deep purple-brown or chocolate-brown and with numerous transverse cracks or fissures; fracture less tough than that of the last, the bark and wood both darker, the former occupying two-

fifths, or even more, of the radius, the taste more astringent than that of the last.

The most important constituent is from eight to twenty per cent. of *krameria-tannic acid* or *rhatania-tannic acid*, a brilliant deep red amorphous mass, soluble in alcohol and, if pure, in water also. It is usually only partly water-soluble, owing to the change of a portion of it to phlobaphene by dehydration. *Krameria-tannic acid* gives a dull green color with diluted acids, and is flesh-colored with gelatin. It is decomposed by dilute mineral acids into sugar and *rhatania* red.

Published statements as to the relative percentages of tannin in the different varieties are not reliable, since it is the very commonest occurrence for the varieties to be confused in commerce and in experiments.

Rhatany is a reliable and useful astringent, owing to its tannin, and is applicable to all conditions in which gallic or tannic acid is useful. The crude drug may be given in powder, in doses of 1-2 gm. (gr. xv.-xxx.), though a liquid preparation is preferable. The pharmacopœia provides an extract, the dose of which is two to four grains, a fluid extract, dose fifteen to thirty minims, and a twenty-per-cent. tincture, the dose of which is from one to two fluidrachms. *Henry H. Rusby.*

RHEUMATIN is the salicylate of saloquinine, and represents a large percentage of the salicylic radical in combination with quinine. It occurs in tasteless white acicular crystals, which are but sparingly soluble in water. Overlach finds its action practically specific in acute rheumatism, without any digestive disturbances, and distinct from that of a mixture of quinine and salicylic acid. Pieper found it valuable in trigeminal neuralgia as well as in rheumatism. The dose is 1 gm. (gr. xv.) three or four times a day. *W. A. Bastedo.*

RHEUMATISM, ACUTE ARTICULAR.—**DEFINITION.**—An infectious disease, caused by a germ or germs not yet identified, and characterized by (1) a general constitutional reaction; (2) an irregular febrile movement; and (3) non-suppurative inflammation of the connective-tissue structures of the joints, the muscles, and the heart.

HISTORY.—In former times articular rheumatism was confounded with gout. Sydenham, in the closing years of the eighteenth century, first made plain the difference between the two diseases.

NATURE.—Rheumatism is now regarded almost universally as an infectious disease caused by germs from without. Two other theories were formerly held: first, that it is due to the presence of an excess of lactic acid in the blood; second, that it is of neurotrophic origin. These views are no longer held by the best men. With regard to the first, it need only be said that it offers no reasonable suggestion as to the cause of the excess of lactic acid. An excess of lactic acid is almost always present, but it is no more logical to say that the lactic acid causes the joint troubles than that the joint troubles cause the lactic acid, or that the fever causes both.

The second, or neurotrophic, theory is open to objection on the ground that it offers no cause for the neurotrophic disturbances. Furthermore, if so serious and acute a disease as rheumatism be neurotrophic in its origin, we ought to find in every case serious disturbance of the central nervous system, while as a matter of fact such disturbance is very uncommon. Again, all other diseases of proven neurotrophic origin are of slow progress and conspicuously slow recovery, which rheumatism, under proper treatment, is not. The neurotrophic theory is really founded upon a confusion between articular rheumatism and rheumatoid arthritis. The latter disease is now regarded as neurotrophic, but its morbid anatomy and clinical picture are so different from those of rheumatism that the two diseases may be said to have nothing in common except the fact that they both affect the joints.

In favor of the germ theory of rheumatism we may urge the following arguments: (1) All other acute diseases with fever and constitutional reaction are now believed to be infectious. Most of them have been proven so.

(2) All other acute inflammations of joints—*e.g.*, pyæmic, gonorrhœal, tuberculous, and syphilitic arthritis—are known to be infectious. (3) Acute rheumatism has several times been found to occur in epidemics. (4) There are two cases on record in which parturient women, suffering from rheumatism, have borne children who shortly after birth developed fever and polyarthritis.

The bacteriology of rheumatism is still in doubt. In 1891 Achalmé, of Paris, claimed to have identified the germ. He isolated from the blood and pericardial fluid of, in all, eight rheumatic patients, a bacillus which he regarded as characteristic. It was found, however, that cultures of this bacillus, injected into animals, produced not the ordinary lesions of articular rheumatism, but local congestion, destruction of tissue, and gas bubbles. Westphal, Wasserman, and Malkoff, in 1899, found in a fatal case of post-rheumatic chorea a very few diplococci which produced in animals fever and non-suppurative polyarthritis. Poynton and Paine, of London, in 1900 found a diplococcus which may prove to be this same germ. They isolated it from eight cases of severe acute rheumatism, finding it in the blood, the pericardial fluid, the vegetations from diseased heart valves, the tonsils, and the urine. They also demonstrated its presence in the joint exudations of inoculated rabbits. These rabbits showed multiple, non-suppurative arthritis, valvular endocarditis, pericarditis, and moderate pyrexia. Passed along from one animal to another, the germ showed great constancy in its effects. These results are very striking, but up to the time of writing no confirmatory reports have been published.

A view which has gained some support during the past year is that rheumatism is due to the presence in the body, not of bacteria, but of toxins. F. W. Packard, of Philadelphia, has declared in favor of this view, and has also stated that in a large number of cases the intoxication results from an infected tonsil. It is certain that tonsillitis is of very common occurrence at the beginning of an attack of rheumatism, and it may be imagined that the lymphoid tissue of the tonsil, by its power of filtration (Manfredi) allows the toxins to pass through and stops the bacteria. The emigration of the inflammation from joint to joint, so often seen during an attack of rheumatism, seems to suggest a local intoxication rather than infection, and so also does the rapid and complete recovery under proper treatment. And salicylic acid, while a very weak germicide, is known to have a powerful chemical action upon toxins, *e.g.*, diphtheria antitoxin. There is need for further investigation along this line.

ETIOLOGY.—Rheumatism is seen everywhere. It is most common in temperate climates. In New York it occurs most frequently during the early months of the year. A series of 514 consecutive cases from the records of the New York Hospital gave the following results:

Season of year: July 1st to January 1st, 140 cases; January 1st to July 1st, 374 cases.

Sex: Of all ages, 337 males, 177 females.

Of cases under 20, 43 males, 44 females.

Age: Under 10 years, 6 cases, or 1.17 per cent.; 10-20 years, 81 cases, or 15.8 per cent.; 20-30 years, 200 cases, or 38.9 per cent.; 30-40 years, 130 cases, or 25.3 per cent.; 40-50 years, 66 cases, or 12.8 per cent.; 50-60 years, 23 cases, or 4.47 per cent.; over 60 years, 8 cases, or 1.55 per cent.

These figures are in general agreement with those for the Montreal General Hospital, quoted by Osler. It will be seen that rheumatism is pre-eminently a disease of early adult life, nearly sixty-five per cent. of the cases occurring during the period of greatest bodily and mental strain, or between the ages of twenty and forty. The difference in susceptibility between men and women is hardly explainable except upon the ground of difference in occupation and women's freedom from the alcoholic and tobacco habits.

Many observers claim a distinct hereditary predisposition (Osler, Church and Cheadle, Lyman). But, as many different conditions have in the past been grouped to-

gether under the common name of rheumatism, the importance of an hereditary predisposition may have been exaggerated.

Exposure to cold, especially *damp* cold (Lyman), is the exciting cause in a certain number of cases. Men who lead outdoor lives, exposed to all kinds of weather, and who are—as this class often is—somewhat alcoholic, are very liable. Second and third attacks are common. Of the 514 cases quoted above, 64 had had one previous attack, and 43 more than one; so that one attack of rheumatism confers no immunity as regards subsequent attacks.

MORBID ANATOMY.—Typical rheumatism always attacks more than one joint. A case of monarthrititis without history of previous attacks should be viewed with doubt. The inflammation is exudative in type, with congestion and a fibrino-serous exudate, containing a few leucocytes, in all the tissues of the joint proper, and also in the cellular tissue and tendon sheaths around the joint. There are rarely, if ever, in an uncomplicated case enough leucocytes to make the exudate purulent. The synovial fluid, with which the joint cavity is distended, is sometimes of acid reaction and may be blood-stained. The cartilage cells in the joint cartilages proliferate, and the intercellular substance splits up, assuming a velvety appearance. All these changes are susceptible of rapid repair.

The blood shows increase of fibrin, fats, cholesterin, and extractive matter. The serum remains alkaline. Urea and uric acid are not increased. Red blood cells are much diminished. No disease produces pronounced anemia quicker than acute rheumatism.

The urine is acid, high-colored, and of high specific gravity. It deposits, upon standing, a sediment of amorphous urates and sometimes uric-acid crystals.

There is an excessive excretion of sweat. This is of neutral reaction, but quickly becomes acid if the patient's skin be not kept scrupulously clean.

CLINICAL HISTORY.—In the majority of cases the first symptom noticed is lameness of one or more joints. This may be preceded, during a few days, by the symptoms of an ordinary coryza or acute pharyngitis or tonsillitis. The slight lameness and soreness are usually overlooked, and the patient continues to follow his ordinary occupations. After a few days more the symptoms grow worse, swelling and redness appear in the affected joints, the pain increases until the least motion causes agony, there is a febrile movement, with or without distinct chills, anorexia, constipation, and profuse sweating, and we have the full clinical picture developed. In a few cases the disease is ushered in by a rigor, with an immediate development of all the symptoms; or the case may begin in a mild way, and later develop suddenly the graver and more acute type.

When the disease is once established, it shows very little tendency to spontaneous termination. Under the older systems of treatment it would run for many weeks. The inflammation may move entirely in a few hours from one part of the body to another—from knee to wrist, from wrist to ankle, or from one leg or arm to the other. Of the location of the disease it is a noteworthy fact that it shows a marked tendency to attack the same joint on both sides of the body. In the above-quoted series both knees were involved in 213 cases, the left knee alone in 79, the right knee alone in 59. All the joints of the body showed at least a plurality of cases of symmetrical involvement. The knee is the most frequent seat of inflammation, 351 cases showing affection of one or both. The ankle came second in my series with 256 cases; next the wrist, 125 cases; shoulder, 116; foot, 109; hand, 97; elbow, 78; hip, 44; and lastly the sternoclavicular joint, 1 case. The fever is irregular, rarely very high except in cases of hyperpyrexia, and yields more readily to the salicylates than do the joint troubles.

COMPLICATIONS.—Of these the most important are those which affect the heart. Indeed, were it not for the cardiac complications, an attack of rheumatism would be little more than a disagreeable incident in a man's life.

Endocarditis ordinarily adds but little to the severity or immediate danger of the attack, but it leaves permanently damaged valves which, except in a very few cases, never regain their perfect function. As to the frequency of this complication authorities differ. Of the 514 cases quoted above, 152, or 29.57 per cent., showed murmurs distinctly valvular. Of these 104, or more than two-thirds, gave the signs of mitral insufficiency. Only two showed a pure mitral stenosis, while 24 showed a double mitral lesion. In 22 cases there were murmurs at the base of the heart, of which 8 were systolic, 6 diastolic, and 8 double.

Rheumatic endocarditis is usually an inflammation of the connective-tissue portion of the endocardium of the valves. The endothelial covering, according to MacLagan, is affected only secondarily as a result of friction caused by changes in the shape of the valve. By this means the endothelium is rubbed off, leaving a rough spot upon which the fibrinogenic elements of the blood coagulate, forming so-called "vegetations." Poynton and Paine report diplococci in the base of the valve, but not near the surface. Malignant ulcerative endocarditis is very rare in rheumatism. Where it occurs, it is probably always due to secondary infection.

Rheumatic endocarditis usually gives no symptoms. It is generally discovered by the attending physician, who must always be on the lookout for it. In bad cases there may be indefinite pain referred to the præcordium, or slight dyspnoea and palpitation. There may be embolic attacks, due to detachment of a vegetation.

Pericarditis, either dry or with effusion, often occurs. It shows the ordinary morbid anatomy of an exudative inflammation of a serous membrane. The symptoms vary according to the character of the exudate. In dry pericarditis there is great pain in the præcordium, with a violent and irregular pulse. The characteristic "saw-saw" murmur may be present, or there may be only a systolic murmur, or a faint clicking sound, or even no murmur at all. With effusion we get muffling of the heart sounds, upward displacement or total disappearance of the apex beat, increase of the præcordial dullness, and the patient complains of great weakness and urgent dyspnoea on the slightest movement. Generally, but not always, there is increase in the fever, and there may be a distinct chill at the invasion of the pericarditis.

Myocarditis is rare in rheumatism. It is seen in middle-aged or older patients, whose aortæ and coronary arteries are not of the best. Fatal cases which come to autopsy show a slight degree of granular degeneration of the heart muscle, due to the systemic poisoning.

Respiratory Tract.—As stated above, coryza, pharyngitis, and tonsillitis are often seen early in the disease. Laryngitis and bronchitis occasionally occur. Pleurisy and pneumonia are sometimes found, usually in the cases with heart complications. Among the five hundred and fourteen cases mentioned there were fifteen pleurisies and five pneumonias. The pleurisy is generally accompanied by serous effusion. The pneumonia is patchy, and lobular in type. According to Osler, severe and fatal pulmonary congestion is sometimes seen.

Nervous System.—The peripheral nerves are sometimes affected by rheumatism. The sciatic nerve is the most common seat of trouble, but occasionally a part or the whole of the brachial plexus is involved. These complications are sometimes slow to yield to treatment. More severe are the cerebral complications. Rheumatic meningitis is certainly very rare, and probably in some cases salicylic-acid poisoning has been mistaken for it. The cerebral symptoms most commonly seen are delirium, stupor, and occasionally convulsions. These symptoms, in connection with excessively high temperature, constitute the condition known as hyperpyrexia, which is always grave and often fatal. The high temperature (sometimes reaching 110° F.) seems to be due to paralysis of the heat control centre in the medulla.

Chorea is sometimes, especially in children, seen in association with rheumatism, but more frequently combined with endocarditis than with polyarthritis. It is apt to

occur late in the disease. The nature of the connection between the two diseases (rheumatism and chorea) is not known.

Eye.—Rheumatic iritis is certainly a genuine disease. It presents the ordinary appearance and symptoms of iritis, and yields to salicylates. It is usually mild. Iridocyclitis with destruction of the eyeball belongs rather to gonorrhœa than to rheumatism.

Skin.—Sudamina are common, as might be expected from the profuse perspiration. Erythema nodosum has been reported by Osler. Scarlatiniform erythema is seen from time to time. Purpuric spots occurred in three cases in my series.

Subcutaneous Tissues, Fascia, etc.—Occasionally, in severe cases, small lumps are noticed under the skin in the neighborhood of affected joints. These are called "rheumatic nodules." They consist of fibrous tissue with a number of small round cells. Poynton and Paine report having found diplococci in some of them.

COURSE AND PROGNOSIS.—As to whether or not rheumatism is a self-limited disease authorities differ. It is certain, however, that the disease without treatment runs a tedious and uncertain course, and is liable to relapse, and to develop a low form of chronic arthritis, the so-called chronic rheumatism. The prognosis is almost always good as to life. Only two deaths occurred in the five hundred and fourteen cases cited. This is a low ratio, less than 0.4 per cent. Probably the usual mortality is between 0.5 and 1 per cent. It would seem from the literature (and Lyman indorses this) that the disease runs a milder course in America than in England. The fatal cases are those with severe acute heart and lung complications, or hyperpyrexia. As regards complete recovery the prognosis must always be guarded on account of the heart complications. Most of these leave permanent damage, to give trouble perhaps many years later. Life insurance men say that second and third attacks are less likely to affect the heart than first attacks, perhaps because the second and third attacks come later in life. It is certain that the most serious rheumatic cardiac lesions are seen in young persons. The mitral valve, when not too extensively damaged, is able sometimes to adapt itself to new conditions, and regain perfect competency.

DIAGNOSIS.—Articular rheumatism may be confounded with gouty, gonorrhœal, or septic arthritis, with tuberculosis and syphilis, with acute septic epiphysitis, and with arthritis deformans. *Gout* occurs late in life, in its acute form is monarticular, and the history of inherited tendency, of faulty hygiene, and possibly of previous attacks, helps to distinguish it. *Gonorrhœal arthritis* is also frequently monarticular, the joint has less of the appearance of an acute inflammation, is less painful, and an urethral discharge may be discovered on careful examination. *Tuberculosis* is also monarticular, and of subacute or chronic type. At the beginning of the second stage of *syphilis* there are sometimes joint pains with the slight febrile movement which precedes the roseola. Here the history usually serves, and the appearance of the rash dispels doubt. Septic arthritis and acute epiphysitis are always due to some septic focus elsewhere in the body, the course of the temperature is pyæmic, and the symptoms do not respond to salicylates. Some forms of rheumatoid arthritis are occasionally mistaken for rheumatism, but careful examination will almost always reveal the characteristic deformity of the affected joints. Rheumatism may, however, occur in a patient who is already the victim of rheumatoid arthritis. Here the diagnosis may be difficult, and one may have to rely upon the progress of the inflammation from joint to joint, or upon the test of treatment. It may be repeated here that without the history of previous attacks, a certain diagnosis of rheumatism is impossible unless more than one joint is involved.

TREATMENT.—The patient must be put to bed and kept there. His pajamas or night gown should be of flannel, and he should lie between blankets whenever possible. The bowels must be opened freely at the out-

set. The best purgative is one grain of calomel, given in quarter-grain doses every fifteen minutes, and followed, four hours later, by a Seidlitz powder, or a full dose of citrate of magnesia, or half an ounce of Rochelle salts. No more bed clothes should be allowed than just enough to give reasonable warmth. If their weight cause pain or discomfort, they must be supported upon some kind of a framework. The patient must be sponged off with warm water, often enough to keep his skin perfectly clean. The copious sweat rapidly undergoes acid fermentation, and if not removed causes itching and soreness. The diet should consist mainly of milk. This may be varied, from time to time, with small quantities of beef tea and clam broth. Plenty of water should be allowed, or vichy, or soda water, or lemonade. These drinks help to keep the urine bland, and ease the strain upon the kidneys. The drug of drugs to be used is salicylic acid in one of its forms. It may be given as the salicylate of soda, or as oil of wintergreen, or as salicin. Salicylate of soda is the cheapest, and most patients bear it well, but it sometimes upsets the stomach. Oil of wintergreen is said to be quicker in its action, but it has no advantage so far as the stomach is concerned, for patients quickly tire of its penetrating odor and taste. Salicin is less active than the other two, but delicate stomachs bear it better. Whichever of these drugs is chosen must be pushed to the limit of toleration. This, and only this, should be the limit of dosage. Salicylate of soda is usually given in watery solution, the other two usually in capsules. It is best to begin by giving twenty grains every two hours, and to continue this until deafness and tinnitus aurium begin to develop, when the dose should be lessened, or the intervals lengthened, or both. It is good practice to give ten or twenty grains of bromide of sodium when the tinnitus begins. Elderly people, whose arteries and kidneys are worn, do not bear salicylates well. Such patients must be carefully watched, and the dose regulated to suit them. Symptoms of poisoning sometimes develop quite rapidly. The writer has seen maniacal delirium, lasting two days, as the result of two and one-half drachms of oil of wintergreen, given in the course of twenty-four hours. Should poisoning occur the salicylates must be discontinued, bromides and chloral must be given, the heart being carefully watched, and in most cases no permanent harm results. As the pains subside, and the temperature comes down, the dose of salicylate may be reduced, but the medicine must be continued for several days after all pain has disappeared, otherwise the symptoms may return. Some authorities claim that relapses are more frequent under the salicylates than under the older systems of treatment. This does not seem to be the case, provided the medicine be continued long enough. The salicylates have no effect upon a cardiac lesion, once established, but by their action in shortening the disease and lessening its virulence and severity, they certainly protect the heart to some extent.

How the salicylates act is a question difficult to answer. They are not strongly antipyretic and analgesic, like acetanilid and phenacetin, and, according to Miquel, they are rather feebly antiseptic, salicylic acid being effective in preventing bacterial growth in a strength of 1 to 1,000, while salicylate of soda requires a strength of 1 to 100. Salicylate of soda has been found useful in relieving unpleasant symptoms due to diphtheria antitoxin, and if we suppose rheumatism to be due to intoxication rather than to infection, this may be the answer to the question. The efficacy of the salicylates is beyond question, but the reason for this efficacy needs further investigation.

There are some unfortunate patients who, on account of idiosyncrasy, cannot take salicylates at all. For these we must rely upon the old-fashioned alkaline treatment. Twenty grains each of citrate and bicarbonate of soda may be given every two or three hours. The results of this treatment are not brilliant.

Local treatment of the affected joints is advisable, with the idea rather of increasing the patient's comfort than

of affecting the course of the disease. The joints must be kept at rest in the least uncomfortable position attainable. They should be protected by bandages of flannel, or lightly packed in cotton batting or wool. They may be dressed with a ten-per-cent. ointment of salicylic acid, or with pure oil of wintergreen, or with guaiacol, dissolved in olive oil, or incorporated with lanolin or lard. The joints must not be handled at all. The writer has seen most exquisite agony in a case under his care, caused by an ill-advised friend of the patient, who insisted upon gently stroking her inflamed wrist. The manipulation gave momentary comfort, but within an hour the wrist swelled almost to twice its normal size, and throbbled until it was necessary to use iced cloths to relieve the pain. Ice has been commended as an application in rheumatism, also heat in various forms. In some cases hot or cold applications are of use, the choice lying with the one which gives the greater comfort, but in most cases protection and ointments will give all the comfort attainable. Occasionally after an obstinate case of rheumatism, one or more joints exhibit a low grade of chronic synovitis. These are best treated by blistering, followed by a tight bandage.

Of the complications of the disease, endocarditis calls for little or no direct treatment. The patient must be kept absolutely quiet, with the head low. If the heart be overacting, ice may be applied. Very rarely, if ever, does rheumatic endocarditis cause urgent cardiac weakness. Should this appear, the salicylates must be stopped, and a little strychnine may be very cautiously administered. No more than necessary should be given, for every extra heart beat may cause the endocarditis to spread. Pericarditis, on the other hand, calls for active treatment. An ice bag, or a cold coil, should be applied over the heart, aconite, in one-drop doses of the tincture, may be given under careful observation, and morphine or codeine may be needed to relieve the pain. If effusion appear, blisters and diuretics are required, and if these fail to cause absorption the pericardium may require tapping. Of the nervous complications, the neuralgic pains are best treated with local applications of pure oil of wintergreen, or of menthol, twenty-five per cent. in alcohol. Hyperpyrexia must be treated by cold baths. No other antipyretics are of the least use. Alcohol and strychnine are also needed. The treatment of this condition is quite similar to that of sunstroke, to which it is probably akin. The neurasthenic and melancholic conditions seen sometimes during convalescence require appropriate care, but these conditions have no peculiar features depending upon the rheumatism that caused them.

The skin complications require no treatment. The treatment of the respiratory complications is on general principles.

The after-treatment requires tonics, general hygienic regulation of the daily life, and avoidance of over-exertion. It is well to have the throat carefully examined and, if necessary, treated, for there is ample warrant for believing that future attacks may occur as the result of infection of a diseased tonsil. *Donald M. Barstow.*

RHEUMATISM, CHRONIC ARTICULAR.—DEFINITION.—A chronic affection, characterized by stiff and painful joints.

ETIOLOGY.—The impression is gaining ground that chronic, as well as acute, articular rheumatism is of bacterial origin, although the responsible micro-organisms have not as yet been identified. The disease, according to continental writers, is a frequent sequel of acute rheumatism, but in North America it is more commonly independent of antecedent acute or subacute attacks. It occurs most frequently after the middle period of life, especially among those who, in addition to contending with the hardships of poverty, must engage in occupations of a laborious character which involve exposure to cold and dampness, such as day laborers, farmers, hunters, washerwomen, and the like.

PATHOLOGY.—The cavity of the joint is not infrequently dry. The synovial membrane and its villi are

thickened and injected, and adhesions may form between the opposing surfaces. The articular cartilages are distorted, perhaps eroded and partly absorbed in cases of long duration. The capsule and ligaments of the joint and the tendon sheaths adjacent to the affected articulation are thickened. Atrophy of the muscles in the vicinity of a chronically rheumatic joint is by no means uncommon, especially when single large articulations (knee, shoulder, hip) are involved. Atrophy from disuse is likely to occur if the joint becomes ankylosed. Peripheral neuritis and pressure from exudation on the muscles themselves or their nutrient vessels have also been designated as factors in the muscular wasting.

SYMPTOMS.—The conspicuous symptoms are pain and stiffness in the affected joint. Most commonly the onset is slow and insidious. The pain usually becomes more severe during rainy weather, particularly in the variable climatic conditions of spring and autumn. The stiffness is most marked in the morning and after rest, and lessens after exercise. The pain is apt to be increased by movement, and is often very troublesome at night. The affected joints may be tender upon palpation, but swelling, if present, is usually slight. The inflammation is rarely of sufficient intensity to cause redness of the joint. The course of the disease is as a rule afebrile, but if many joints participate in an exacerbation there may be a slight and transient rise of temperature. The disease may be monarticular, involving a single large joint, the knee, shoulder, or hip in particular, but generally a number of joints, both large and small, are implicated. The joints, if the disease is of some duration, are likely to creak or grate when moved, because of the dryness and roughness of the articular surfaces. In cases of long standing the joints are enlarged and distorted, the mobility is decreased in varying degrees, and they may become completely ankylosed. Muscular atrophy takes place, and the patient may, in the severest cases, become bedridden. The joint changes when established are usually persistent, and do not shift from one articulation to another as in rheumatic fever. In mild cases the general health may remain wellnigh unimpaired, but in the severer and more painful cases gastric disturbances, emaciation, anaemia, and neuralgias may be present with varying intensity. Other complications are not common, but chronic endocarditis, with resultant valvular defects, may be associated with the joint changes.

DIAGNOSIS.—Chronic articular rheumatism may require to be differentiated from chronic articular gout and arthritis deformans, although in the majority of cases the diagnosis is easily made.

Gout is more apt to affect the smaller joints. There is usually a history of acute attacks involving the great toe-joint, tophi if found are distinctive, and the evidences of arteriosclerosis and granular kidney are much more common in gout than in chronic rheumatism.

It is difficult, and readily may be impossible to distinguish between arthritis deformans and chronic rheumatism in the early stages. In more advanced cases the former presents greater deformity of the joints, while rheumatism tends rather to ankylosis with comparatively slight alteration in shape, and moreover is likely to attack a larger number of articulations than arthritis deformans. It is proper to state that by some writers arthritis deformans is regarded as an advanced stage of chronic rheumatism.

PROGNOSIS.—The presence of chronic rheumatism is, as a rule, not incompatible with a long life, but it is essentially a chronic ailment, and the majority of cases are obstinately resistant to all therapeutic measures. In exceptional cases great improvement or apparent cure may take place; in many the disability and pain may be much relieved; in some the disease may seriously affect many joints and render the patient helpless.

TREATMENT.—If circumstances permit, the patient should live or at least spend the winter months in a warm, equable, dry climate, such as that of Southern California or the South of Europe. Otherwise the utmost care should be taken to shield the subject from

dampness, cold, and bad weather by good shelter and warm clothing. The digestive functions should be maintained in good order, enemata and laxatives being employed when they are required. The diet should be regulated so that it is digestible and ample in order to keep the nutrition of the body at its best. Moderate exercise should be taken when possible. A daily cold sponge followed by a good towelling is usually helpful, and those who find that the sponging disagrees with them should employ the dry friction alone.

Local treatment is of prime importance. Counter-irritation should always be used, by means of stimulating liniments or by painting with tincture of iodine; by the application of a series of small blisters; or by "striking" the painful joint with the Paquelin cautery, or, what answers as well, with a glass rod, the end of which has been heated in an alcohol flame. The application of ichthyol and iodine, salicylic acid (gr. xxx. to ʒi.) or belladonna ointments, is at times of much service. Systematic massage and passive movements are useful, especially for the prevention of ankylosis and atrophy, and for the lessening of swelling and stiffness. Electrical treatment may or may not be of service, but is always worth a trial.

Hydriatic measures of various kinds should not be omitted. At home a hot bath at night often mitigates pain and secures a more restful sleep; so also do hot fomentations of the painful joints. Or, finally, the affected joint may be wrapped in three or four thicknesses of linen wrung out of cold water and covered with flannel and oiled silk or, in lieu of the latter, thick brown paper.

Complete and systematic hydriatic measures, including also the hot-air treatment (baking the affected joints) generally require a daily visit to, or, if practicable, a stay of some duration in, an establishment provided with the necessary apparatus and trained attendants, particularly in the sanatoria which avail themselves of natural medicinal and thermal waters. Among the latter are the Hot Springs of Arkansas and Virginia, Richfield Springs of New York State, Banff on the Canadian Pacific Railway in the Rocky Mountains, Mt. Clemens in Michigan, and Santa Rosalia* in Mexico. Here and in Europe a variety of baths—Turkish, Roman, sand, mud, and peat—have been employed. Thorough and persistent hydrotherapeutic treatment usually secures great relief, and even in obstinate cases a permanent cure is sometimes obtained.

Medicinal treatment is not very satisfactory. As a rule the administration of iron, quinine, strychnine, arsenic, and other reconstructives is helpful; so also is a course of cod-liver oil, mixed fats, or extra butter and cream in the dietary. Iodides, guaiacum, colchicum, alkalies, and bichloride of mercury, are occasionally useful. The salicylates are unquestionably beneficial during marked or subacute exacerbations.

Glentworth R. Butler.

RHEUMATISM, MUSCULAR.—(Synonyms: Myalgia, rheumatic myositis.)

DEFINITION.—A disease characterized by (1) stiffness and soreness on motion of certain muscles; (2) tenderness on deep pressure over certain points in their substance; and occasionally (3) a general constitutional reaction.

CAUSE.—Muscular rheumatism is probably, like the articular variety, a local manifestation of a general toxæmia. Of the primary causes little is known. Some cases are probably of infectious origin. Others seem to belong to the group of auto-intoxications whereof gout is the classic type.

MORBID ANATOMY.—Adler (New York *Medical Record*, vol. lvii., p. 529) describes the process as follows: In one or more places hyperæmia, sometimes accompanied by

* Santa Rosalia, a city of Southern Chihuahua, Mexico, on the Mexican Central Railway, 325 miles south of El Paso. It is celebrated for its hot sulphur springs, long known to be curative by the natives, and much resorted to by invalids. They are especially useful in inflammatory rheumatism. Population estimated at 8,000.—From "The Universal Cyclopædia and Atlas." Newly revised edition. Appleton & Co. 1901.

small hemorrhages, takes place, followed by emigration of cells into the interstitial tissues, crowding between the bundles of muscle fibres and even between the single fibrils. Soon the interstitial tissue proliferates actively, bringing about an infiltration of the muscle, which varies in extent and density according to the intensity of the process. In the milder cases the process ends here, the infiltrating material is absorbed, and the muscle returns to practically the normal condition. In severe cases, however, there is more extensive formation of new connective tissue, which compresses the muscle fibres so that they degenerate and are absorbed. In cases of the severest type, there results a hard white mass of cicatricial tissue, in structure like a bit of tendon. Often the process is not confined to the muscles. The neighboring joints, fasciæ, tendons, and especially nerves, may be involved. The nodules are recognizable on palpation by a trained hand. They are not necessarily found in the spot where the pain is felt, for if a nerve be involved in the pain will usually be referred to the peripheral distribution of that nerve.

CLINICAL HISTORY.—The disease most commonly affects one of four localities as follows: (1) The deltoid muscle; (2) the lumbar muscles (lumbago); (3) the intercostal muscles (pleurodynia); and (4) the sterno-mastoid muscle (torticollis, wry-neck). The relative frequency of these locations is hard to ascertain, for many patients are not sick enough to go to bed, and hence go to the dispensary rather than to the hospital. Less frequently we find the trouble located in the muscles of the head, especially the suboccipital region, and occasionally in the muscles of the jaw. Adler (*loc. cit.*) reports three cases of rheumatism in the abdominal muscles, one case simulating biliary colic, the other two suggesting appendicitis. No one of the voluntary muscles is altogether exempt.

The disease may be ushered in by a chill, a febrile movement, and all the signs of an acute infectious disease. This is uncommon. Most patients develop their symptoms gradually, and the disease runs a subacute course, although it is rarely without some fever. The pain is not usually excessive. It is increased by attempts to use the affected muscles, and also by lying upon the affected side. It is dull and aching in character, and very tiresome and wearing. In some cases, where nerves are involved, the pain is paroxysmal and radiates over a wide surface. Such cases are often puzzling.

DIAGNOSIS.—In typical cases this is very easy. Lumbago and wry-neck are common enough, and not easily confused with anything else, although in the former case pyelitis, and in the latter, deep cervical cellulitis, must be thought of. Deltoid rheumatism has been confused with necrosis at the upper end of the humerus. Intercostal rheumatism may be mistaken for pleurisy. Suboccipital rheumatism may be confused with neuralgia, neurasthenic headache, or migraine. Abdominal rheumatism may simulate disease of the liver and gall bladder, the appendix, or the uterine adnexa. In doubtful cases the diagnosis must be made by palpation of all the muscles in the region where pain is felt. "The infiltration varies in size, shape, and consistency. After subsidence of the acute stage the infiltrations may be recognized by careful palpation. . . . They may be round, fusiform, or flat, hard and firm or soft and doughy, with surface smooth or uneven. . . . While normal muscles react upon a certain vigorous grip with contraction of the part touched, the diseased tissue will react with diminished vigor or not at all; it also shows diminution of the normal elasticity. After the acute stage is past, although the muscle resumes its function without pain, yet the diseased areas remain tender upon pressure. . . . When examining, it is necessary to compare the two sides of the body. Aside from other changes, the diseased side will always be found abnormally sensitive" (Adler, *loc. cit.*).

COURSE AND PROGNOSIS.—The course is uncertain. Some cases clear up rapidly, others are very obstinate. In a general way it may be said that muscular rheuma-

tism runs a slower course than the articular variety, and also has a greater tendency to relapse, as slight lesions usually remain in the muscle substance after the subsidence of the attack. It also has a strong tendency to become chronic. Therefore the prognosis as to complete recovery should be guarded.

TREATMENT.—In all but very mild cases the patient should be put to bed whenever possible, in order that the affected muscles may be at rest. A brisk purge is essential, if it be our aim to promote elimination of the toxins. Further treatment depends upon the cause of the attack, in so far as the cause can be made out. If the affection be a true rheumatism, the salicylates must be given in full doses for two or three days; if it be an auto-intoxication, the salicylates are generally useless, and an eliminative treatment, as for gout and allied conditions, must be adopted. An exclusive milk diet, with the bowels freely opened every day, is useful, and this may be given to the walking cases, provided they will take enough—at least four quarts a day, and six if possible. Milk is diuretic, and comparatively free from toxalbumins. Local treatment, in the shape of counter-irritation in various forms, is usually necessary. It may take the form of a blister, or a few quick strokes with the actual cautery at white heat, or acupuncture, or painting the skin over the affected muscle with guaiacol, or the oil of wintergreen, or a twenty-five-per-cent. alcoholic solution of menthol crystals. W. G. Thompson recommends injections of sterilized water into the deeper parts of the substance of the muscle. Adler commends massage very highly, but declares that the masseur must be specially trained to the work. Of course massage cannot be used until after the acute stage is passed.

The after-treatment of these cases is highly important. The patient must keep his skin in healthy activity by daily bathing. Overclothing must be avoided. The test of this is, that there shall be sufficient for comfort, but it must be so regulated that in any ordinary weather the skin shall not be moist except after brisk exercise. Moderate and regular daily exercise, in open air and daylight, promotes complete oxidation of the food, and thus protects the system against auto-intoxication. Regarding diet, it may be said that the albumins should be somewhat restricted. Alcoholic liquors should be taken only in small quantities. A good whiskey, well diluted, is probably the least harmful stimulant. Large quantities of water—four pints a day—should be taken to keep all the urinary salts in complete solution. Over-fatigue and sudden violent exertion are to be avoided.

Donald M. Barstow.

RHEUMATOID ARTHRITIS.—(Synonyms: Rheumatic gout; deforming arthritis; chronic rheumatic arthritis; rheumatic joint; osteo-arthritis.)

DEFINITION.—A chronic and progressive disease of the joints characterized by deforming changes in the synovial membranes, cartilages, and bone, with peri-articular bony outgrowths which interfere to a greater or less extent with the mobility of the affected articulations.

ETIOLOGY.—As a rule the disease develops between thirty and fifty years of age, although it may occur in children under twelve. It exists with preponderating frequency in women, from one-half to four-fifths of the cases occurring in this sex, especially at the time of the menopause. Sterility and uterine or ovarian disease apparently predispose. There is in some cases a family history of a tendency to gouty or other disease of the joints, or to tuberculosis of the lungs; and two or more cases may occur in the same family. Worry, grief, mental shock or overwork, exposure to cold and dampness, insufficient diet, and local traumatism appear at times to be exciting causes. There are two theories as to the essential cause of the disease: one, that it is of nervous origin; the other, that it is a chronic infection. According to the former theory the disease is akin to the arthropathies of nervous origin. Thus the joint changes in arthritis deformans are very similar to those which may occur as a result of locomotor ataxia, syringomyelia,