funds and potential are directed solely or chiefly to the rheumatic field. At the University of Michigan the Rackemann Foundation has provided for a comprehensive, long-range study of arthritis, and in New York a large hospital has been built and dedicated to the treatment of, and research in, chronic diseases, arthritis being one of the three diseases selected. In Boston the Lovett and Commonwealth Foundations, with large-scale assistance from the State of Massachusetts, have inaugurated basic studies, already bearing significant results. It is much too soon to attempt to evaluate all that is being accomplished in this connection, but it is fair to state that by the time peace returns to the world, be this soon or late, the members of the American Rheumatism Association will have a full message to deliver.

It is at such a time that the postponed meeting of the *Ligue Internationale contre le Rhumatisme* should be held. Unusual stimulation will derive from renewing interchange of thought, and it is not too much to suppose that added impetus will also be given to those plans, which must then be formulated and executed, to bring about that stability which the world will then everywhere need.

RECENT STUDIES ON ARTHRITIS AND RHEUMATISM IN THE UNITED STATES*

BY PHILIP S. HENCH

DISEASES OF JOINTS RELATED TO TRAUMA

AFTER acute trauma to a small joint, such as the wrist or ankle, the bones of the adjacent hand or foot may rarefy and notable regressive changes may occur in overlying soft tissues (muscle atrophy, vasomotor and trophic changes in skin, perhaps swelling of soft tissues). This not uncommon condition is known as "Sudeck's atrophy" or "Leriche's disease." Little is known of its underlying pathology. It is now reported that a somewhat similar series of events also may occur after trauma without fracture to large joints.⁴³ A violent wrench or blow to a knee occasionally may lead to a severe disabling atrophy of the local

* Received for publication April 4, 1941.

muscles, sometimes with the appearance of one or more small areas of rarefaction in the spongiosa near the joint. In some cases more extensive rarefaction of bone occurs which may extend far along one or all of the bones entering into the formation of the joint; this rarefaction involves both spongiosa and cortex. Biopsy in two such cases indicated that rarefaction was due to hypervascularisation of affected tissues, especially of cortical bone, and pain arose from functional strain on weakened bones. Recovery is favoured by physical therapy and use, not rest, of the affected parts.

GONORRHEAL ARTHRITIS

Although gonorrhea still holds first place as a cause of sick days in United States naval hospitals, within six years the annual incidence has decreased more than 90 per cent.⁶¹ The greatest factor in producing this improvement was the realization that chemical prophylaxis was almost useless, "little more than a superfluous ritual, something like the use of a finger bowl at the conclusion of a dinner," but that rubber prophylaxis was about 100 per cent. effective. The incidence of gonorrheal arthritis is about 2 per cent. of the cases of gonorrhea in the navy. Gonococcal tenosynovitis of flexor tendons of hands may be more common than has been supposed: the gonococcus was responsible for a third of the cases of tenosynovitis in one series.³⁶

Diagnosis.—The cultural method of McLeod (1934), or one of its modifications, provides the most reliable diagnostic procedure. In a study⁵⁶ of 5,391 cultures and corresponding smears in cases of possible residual gonorrhea, the cultural method uncovered five times as many positive and suspicious cases as did the smear technic. Sulfanilamide does not affect the specificity of the gonococcal complement fixation test, but in a given case of gonorrhea the reaction may sometimes remain negative because the spread of the disease has been prevented by the drug, and hence an immunologic response may be lacking.¹⁹ Prompt reversal of the fixation test from a positive to a negative reaction can be used as a criterion of cure, but use of the test should not supersede clinical or bacteriologic evidence of cure. If fixation tests give positive reactions for more than five months, additional clinical and bacteriologic investigations are indicated. Negative fixation tests do not necessarily mean absence of gonococcal infection.

Treatment.—The literature under review contained innumerable papers on the treatment of gonorrhea with the sulfonamide drugs, but few on the treatment of gonorrheal arthritis therewith. Among a total of fifty-seven cases of gonorrheal arthritis considered in five reports^{12, 18, 47, 77, 89} sulfanilamide (*p*-amino-benzene-sulfonamide) produced a prompt cure in forty-five cases (almost 90 per cent.). Infected synovial fluids were sterilized within two to seven days; despite this, significant damage to synovial membrane sometimes occurred. Usually, but not always, the local genital focus also was cured. The number of cells in the synovial fluid diminished, and fluid accumulated much less rapidly with the use of sulfanilamide than with the older remedies. Sulfanilamide did not of itself hinder the formation of immune bodies,⁴⁷ but gonococcal complement fixation tests failed to become positive in some cases of gonorrheal arthritis in which infected synovial fluids responded promptly to the sulfanilamide.³ Best results were obtained when the level of sulfanilamide in the blood was 10 mg. per cent. or higher. This was accomplished by giving large doses of the drug at regular intervals day and night, and by keeping the fluid intake constant (2,000 c.c. daily). Under such conditions improvement should begin within forty-eight to ninety-six hours. If it does not, the condition is probably sulfanilamide-resistant, and some other form of therapy (alone or in conjunction with sulfanilamide) should be instituted.

A few reports⁴⁰ concerned the effect of fever therapy alone; "cures" were obtained in from 25 to 70 per cent. of cases; little or no relief resulted in 10 to 30 per cent.; in the rest improvement was moderate to marked. Fever sessions were usually for five to eight hours at 106° to 107° F. Failures were due to inadequate heating or to residual damage present prior to the use of hyperpyrexia.

The combined use of fever therapy with chemotherapy was found to be superior to the use of either alone. Such a combination was successful in from 90¹ to about 100 per cent.⁵⁹ of cases of gonorrhea or gonorrheal arthritis, resistant to either alone. Some physicians⁵⁹ used sulfanilamide for three or four days prior to one ten-hour session of fever. Others²⁷ gave 5 gm. of sulfanilamide daily for two days, then six or eight hours of fever (106.4° F.); of fourteen patients so treated eleven were cured.

Since the literature referred to appeared some physicians

have reported their belief that sulfathiazole (2-sulfanilamidothiazole) or sulfapyridine (2-sulfanilamidopyridine) is superior to sulfanilamide in the treatment of gonorrheal arthritis. But if a patient does not show notable response to the sulfonamide drug of choice within three or four days, the combination of that sulfonamide with fever therapy is recommended, rather than a trial of some other sulfonamide without fever therapy.

TUBERCULOUS ARTHRITIS

The incidence of tuberculous arthritis in the United States is still decreasing; in one New York hospital fusion operations on tuberculous knees were three times as frequent ten years ago as they are now.⁸⁸ Among recent cases of tuberculous arthritis, trauma preceded articular symptoms in only 37 per cent.⁸⁸ and pulmonary tuberculosis was present in only 20 per cent.⁹ Of greatest value for early diagnosis are biopsy of synovial membrane and aspiration of fluid for guinea-pig tests, but both should be done as one may give a positive, the other a negative result. In 82 per cent. of 222 tuberculous knees, biopsies revealed tubercles.

Treatment.—The current tendency is to treat children conservatively for a time, but to treat adults surgically, unless an upper extremity is affected, in which circumstance the physician may temporise for a while. Statistics prove again that the disease is serious and the mortality high.¹⁵ Operation alone will not cure the patient but may turn the tide in his favour. Some physicians⁴ were optimistic, others pessimistic about results of surgical treatment for tuberculous spondylitis. Too often bony fusion is only partial, not complete, and the disease progresses. But other physicians were no less pessimistic about the results of conservative non-surgical treatment of juvenile patients; after an average of three years of conservative treatment given to forty-seven juvenile patients who had tuberculous knees, the disease was still active in every affected knee; hence, “economical resections” to produce femorotibial synostosis were recommended.⁵⁷

Tuberculous Rheumatism.—No recent American reports on this supposed entity have appeared; it is not an accepted condition in the United States.

SYPHILIS OF JOINTS: CHARCOT JOINTS

Fifteen new cases of Charcot joints were reported with a summary of data on 586 cases collected from the literature.⁷¹ In from 5 to 10 per cent. of the cases of tabes Charcot joints develop; multiple joints are affected in a third of these cases. Joints are not always painless. Wassermann reactions may be negative on both blood and spinal fluid even when the condition unquestionably is due to tabes dorsalis. Arthrodesis is the treatment of choice, but should be done only when articular disintegration is not too far advanced. Solid fusion was obtained by this method in nineteen of twenty-four recent cases, and in forty of forty-six cases previously reported.^{30, 40}

BRUCELLOSIS: UNDULANT (MALTA) FEVER

Symptoms Referable to Muscles and Joints.—In brucellosis arthralgia is common but arthritis is rare. Occasionally the articular symptoms resemble rheumatoid arthritis or rheumatic fever. Hydrarthrosis sometimes occurs.⁴⁰

Diagnosis.—This is difficult and depends on certain laboratory tests. One test alone is of little value; data from several tests may be valuable; if agglutination, skin and opsonocytophagic tests all give positive reactions, the evidence is almost specific.¹¹ A positive test by even one method occurs ten times as often in cases of brucellosis as among normal persons; positive reactions to two or more different tests occur seventy times as often among patients who have symptoms compatible with brucellosis as among controls. But it is discouraging to find such tests negative "when they should be positive."

Treatment.—A few recent cures were considered the result of specific polyvalent serum, brucellin, or fever therapy,⁴⁰ but sulfanilamide is being used more widely than other remedies. Thirty reports on this therapy were summarised;⁷ results were "most encouraging." Treatment with sulfanilamide resulted in "cures" in sixty-eight (92 per cent.) and in failures in six (8 per cent.) of seventy-four cases; relapses occurred after recovery in fourteen cases (about 20 per cent.). Failures and relapses were mostly from under-treatment. Recoveries were rapid; symptoms left within two to twelve days. Recommended dosage was about $\frac{1}{2}$ grain (0.032 gm.) per pound (0.5 kg.)

of body weight per twenty-four hours, divided into six doses and continued for from three to four days after subsidence of fever (example: for a man weighing 150 pounds (68 kg.), 4 to 6 gm. or 60 to 90 grains daily); maximal dosage was 6 gm. in twenty-four hours. Some physicians were disappointed with the results of sulfanilamide; temporary improvement sometimes was followed by recurrences, and in some cases the bacteremia was affected but not the clinical picture.^{10, 40}

ARTICULAR DISEASES CAUSED BY PNEUMOCOCCI, MENINGOCOCCI, OR HEMOLYTIC STREPTOCOCCI

With the advent of highly effective chemotherapy against pneumococci, meningococci and hemolytic streptococci, articular disease, resulting from these organisms, is diminishing almost to the vanishing point. In the literature under review for this report no cases of pneumococcal or meningococcal arthritis and only one of arthritis from hemolytic streptococci were reported; in the latter case complete articular function was restored following use of sulfanilamide.⁷⁶

ARTHRITIS WITH LYMPHOGRANULOMA VENEREUM

Arthritis may occur with lymphogranuloma venereum as noted by Hellerstrom (1929) and by Frei (1938). The articular and osseous changes were^{22, 90} considered in two recent reports. The arthritis pursues a variable course, but is usually chronic with a marked tendency to relapse. Intermittent hydrarthrosis may occur. Occasionally joints are acutely swollen, painful and tender. The arthritis is usually polyarticular and tends to affect knees, ankles and wrists. It persists for weeks or months. According to some physicians changes in bones (necrosis) and joints are apparent in roentgenograms, but in other cases²² there was no obvious destruction of bone or cartilage, and roentgenograms revealed only periarticular swelling and intra-articular effusions. The synovial fluid varied considerably in character, but was not purulent. Cultures of synovial fluid on common bacteriologic media were sterile, but in all cases the Frei reactions were positive.

ARTHRITIS WITH HAVERHILL (RAT-BITE) FEVER

There are presumably two types of rat-bite fever: (1) Sodoku or Japanese rat-bite caused by a spirochete, the *Spirillum minus*; and (2) that caused by the *Streptobacillus moniliformis* or *Haverhillia multiformis*. Evidence is accumulating that Haverhill fever is the same as the second type of rat-bite fever. Clinically Haverhill fever and the second type of rat-bite fever resemble each other closely, and the etiologic agent appears to be the same. A complete clinical account of Haverhill fever (erythema arthriticum epidemicum) was given; thirteen reported cases were reviewed and one was added.²⁵

RHEUMATIC FEVER

Clinical Data.—In the United States there are probably 1,000,000 persons who have rheumatic carditis; the disease causes 40,000 deaths annually.³⁸ A study of the families of ninety-six rheumatic children and of thirty-three non-rheumatic children (controls) in Baltimore supported the belief that heredity predisposes to rheumatic fever; a family history of rheumatic fever was obtained about four times as often for the rheumatic children as for the controls.²⁸ New groups of rheumatic cases were reported—1,068 in one group,³¹ 122 in another.⁶² Differentiation between the rheumatic and non-rheumatic “growing pains” of children was given: non-rheumatic pains tend to appear at the day’s end, are in muscles of legs and thighs rather than in joints, seldom involve the upper extremities, and are not associated with other signs of rheumatic activity or with abnormal sedimentation rates, leukocyte counts, or anæmia. They usually represent muscle fatigue of overactive children.⁴⁰ The abdominal pain which is a common manifestation of juvenile rheumatism usually is not associated with nausea, vomiting, diarrhoea or constipation, but occasionally simulates appendicitis or peritonitis,⁸⁴ and has led to error in diagnosis, and to appendectomy.

Laboratory Data.—Results of the formol-gel reactions were found to parallel generally those of sedimentation rates, but some physicians⁶ stated that formol-gel reactions were positive in rheumatic fever only in the presence of carditis. If this observation is confirmed, the test would afford information of considerable clinical importance. In the absence of a specific

test for rheumatic fever the sedimentation rate of erythrocytes affords the most delicate index of rheumatic activity.

Cause, Prognosis, End Results.—A follow-up study, made on 1,000 rheumatic children seen between 1921 and 1936, revealed that by 1936, 239 patients were dead, 744 were living, and 17 could not be traced.⁵ Of the 744 living, 605 (81 per cent.) had no physical limitations (312 had no clinical evidence of cardiac damage), 118 (16 per cent.) had slight to moderate limitation, and 21 (3 per cent.) had great limitation of cardiac reserve.

Ætiology.—It is agreed that infections, especially hemolytic streptococcal infections of the upper respiratory tract, commonly initiate rheumatic attacks, but it is not agreed that such infections are "specific" provocatives. Among 749 patients, respiratory infections preceded 58 per cent. of the first attacks of rheumatic fever; in the rest the initial attacks were apparently "spontaneous."⁴⁴ No new data to support the theories of bacterial allergy or vitamin deficiency appeared. "Pleuro-pneumonia-like micro-organisms" were reported⁸² to have been recovered from the articular exudate of a patient with rheumatic fever, and from chorio-allantoic membranes inoculated with rheumatic exudates, and from "pneumonic lungs" of similarly inoculated mice, but later it was admitted that the "organisms" were either artefacts or micro-organisms recovered from the inoculated mice, and were not related to rheumatic fever.⁴⁰

Treatment.—Sulfanilamide is not beneficial, but may be actually harmful in cases of active rheumatic fever or when given during the "silent period" after the onset of a precipitating sore throat.¹⁷ Some physicians^{2, 73} regarded fever therapy as beneficial, not only in cases of rheumatic chorea and polyarthritis, but also in cases of rheumatic carditis. Such therapy presumably lessened the number of recurrences of rheumatic fever and lowered the extent of cardiac damage. Other physicians²³ disagreed; hence the use of fever therapy for rheumatic manifestations other than chorea should be considered experimental.

Prophylaxis.—Although sulfanilamide is valueless in the treatment of active rheumatic fever, it appears to be most effective in the prevention of the hemolytic streptococcal infections of the throat which so commonly provoke rheumatic recurrences. Eighty children who had inactive or quiescent rheumatic fever each received 2 to 3 gm. of the drug daily for four to eight months; of these eighty children seventy-nine

escaped hemolytic streptococcal infections and rheumatic recurrences; only one child had a respiratory infection followed by a vague illness, which may have been atypical rheumatic fever.¹⁷ Another group of thirty juvenile and adult rheumatic patients each received 15 to 20 grains (1 to 1.3 gm.) of sulfanilamide daily for seven months during each of two winters; among them no rheumatic attacks developed, but four of thirty control rheumatic patients, not given the drug, suffered from five major rheumatic attacks.⁸⁶ If these findings can be generally corroborated, the importance of these studies can scarcely be exaggerated.

RHEUMATOID (ATROPHIC) ARTHRITIS

Clinical Data.—A clinical analysis of 267 new cases was reported; in some of the cases 10 to 50 per cent. of the original body weight was lost within a few months.⁵⁸ Another example of the remarkable ameliorating effect of hepatitis with jaundice was reported.⁵¹ A patient who had rheumatoid arthritis developed jaundice from cinchophen: "From the very onset of his jaundice he was completely free of the pains in his knee-joints with which he had suffered persistently over a period of ten years." Within six weeks the jaundice disappeared; then the pains in the joints returned. A somewhat similar effect was noted in five cases of cinchophen toxicity and urticaria without jaundice.⁶³ With the onset of the urticaria in three cases, or just after its disappearance in two cases, there was marked diminution of articular pain, tenderness, swelling and stiffness. Relief was complete in three cases, almost complete in two cases, and lasted from six weeks to five months. Thus it would appear that actual hyperbilirubinemia is not a necessary feature of this phenomenon.

Iritis develops in about 2.5 to 4.5 per cent. of cases of rheumatoid arthritis.⁴

Laboratory Data.—A moderate hypochromic anæmia and leukopenia are characteristic of this disease, but during exacerbations leukocyte counts may rise to from 9,000 to 13,000 cells per cubic millimeter of blood, and occasionally higher.⁵⁸ The concentration of serum protein is normal; values for serum albumin are normal or slightly subnormal; those for serum globulin are normal or somewhat elevated; the albumin-globulin ratio is often reduced.^{64, 70} It was suggested that these data

may indicate hepatic dysfunction.⁶⁴ Regardless of the severity of the disease or the age of the patient concentrations of serum phosphatase were found to be essentially normal;⁷ therefore, if a patient with rheumatoid arthritis presents an elevated value for serum phosphatase some coincident bone disease—for example, a malignant lesion or osteitis—should be suspected.

Ætiology.—No new data of significance were reported to support or refute the theory of infection or that of bacterial allergy.⁴⁰ Using the plethysmograph as a “more accurate method” for measuring circulation in fingers than skin thermometers, physicians²⁹ found no consistent vascular reactions or alterations in rheumatoid arthritis; circulation was diminished in some cases, increased or normal in others. Despite the current (but waning) interest in sulfur therapy no significant or characteristic alterations in sulfur metabolism were noted in this disease.⁴⁰ Patients who have rheumatoid arthritis generally have subnormal values for vitamin C in serum and seem to require large amounts of the vitamin.^{35, 72} Until methods for studying the intermediate metabolism of vitamin C are available, the abnormalities observed cannot be interpreted finally. There is a growing belief that the liver plays a rôle in the production of rheumatoid arthritis,⁶⁴ but the data on liver function in this disease are so far impossible to interpret. Evidence was presented to suggest that environmental stress (poverty, grief, family worry) bears more than a chance relationship to the onset and exacerbations of rheumatoid arthritis.¹⁶ Psychotics, however, are relatively immune to arthritis.³⁴

Treatment.—The value of removing infected foci remains debatable, but American physicians agree generally, if unenthusiastically, that patients with rheumatoid arthritis who have infected foci are in a “less fortunate position” than those who have arthritis alone; hence genuine foci of sepsis should be removed. Most American physicians also will agree with the remark of a British colleague⁸⁵ regarding vaccines, “in the present state of our knowledge of the ætiology of rheumatism in general, and of rheumatoid arthritis in particular, the use of vaccines cannot either be endorsed or rejected.” A few physicians still exhibit intemperate enthusiasm for such remedies as bee venom and chaulmoogra oil, but these remedies are chiefly in the discard.⁴⁰ No effective antirheumatic diet or vitamin has been discovered, but diets rich in vitamins are indicated on general grounds.

Physicians who consider the use of massive doses of vitamin D of little value in rheumatoid arthritis are now more numerous than the protagonists of this remedy.⁴⁰ Sulfur therapy was again damned with faint praise: its day is about done.

Chrysotherapy has been under investigation in the United States for only about four years. Three reports thereon recently appeared. Of one group of fifty-three patients with rheumatoid arthritis, given myochrysine, only 6 per cent. were cured, 34 per cent. were improved markedly, 25 per cent. were moderately improved; the rest were not benefited appreciably.⁴⁸ In fifty other cases gold sodium thiosulphate was employed; results were "poor" in 52 per cent., "fair" in 36 per cent., "good" in 10 per cent., and in only 2 per cent. was "cure" effected.⁷⁵ Another group of eighty patients received gold thiosulphate or aurocein; 17 per cent. were not improved, 39 per cent. were moderately improved, 44 per cent. were markedly improved, none were cured.⁶⁸ Ankylosing spondylitis was less affected than rheumatoid arthritis. From these reports it will be seen that American results have been consistently less striking than those reported from abroad, either because of greater conservatism in the appraisal of the former, or because of the tendency in the United States to use gold in fewer early and more late, resistant cases, or to use smaller, less toxic doses. The maximal individual doses in the cases in the groups noted were 50 mg. in one group, 100 mg. in the other two; courses consisted of a total of 1 gm. in two groups, 2 gm. in one. Toxic reactions occurred in 15, 49 and 63 per cent. of the cases in these three groups. They were generally mild, but occasionally severe; none were fatal, but exfoliative dermatitis, agranulocytosis and oedema of the glottis necessitating tracheotomy were noted. The mode of action of gold was not determined. It was noted that the reticulo-endothelial cells of synovial membranes in normal animals retained little gold, but in infected animals and in cases of synovial effusion with rheumatoid arthritis the synovial cells retained much gold.⁵⁰ It can be concluded that American physicians are not as enthusiastic about chrysotherapy as are their British and European colleagues. Some physicians⁶⁸ considered it superior to any other available remedy, but still not the ideal one, since it will not always stop the disease even in early cases. Others⁷⁵ considered it "too dangerous for general use," and only suitable

for patients unrelieved by older remedies. Others⁴⁸ concluded that it is not a safe procedure but is worth the risk.

Results from iontophoresis with choline and histamine preparations, from doses of bile salts, roentgen therapy and artificial fever therapy continue to be unimpressive.

A new type of arthroplasty has captured the interest of American orthopedists and rheumatologists; it involves the insertion of vitalium moulds over reconstructed femoral heads in cases of destructive and ankylosing arthritis of hip-joints.⁷⁴ Experience to date with this procedure indicates that, under the protection of the inert mould of "neutral" metal, highly developed hyaline cartilage re-forms in association with a newly formed capsule of dense fibrous tissue with a true synovial lining. The mould need not be removed. A final appraisal of the procedure cannot be made yet, but results are distinctly encouraging so far.⁴¹

PRIMARY OSTEO-ARTHRITIS

Clinical Data.—An analysis of 466 cases was reported;⁵⁸ in this group Heberden's nodes affected women nine times as often as men. Although primary osteo-arthritis usually only affects persons more than forty years old, premature cases are not infrequent, and in 30 per cent. of the cases in this series the disease developed before the patient was forty years of age; twelve patients were less than twenty years of age.

Laboratory Data.—Serum phosphatase is normal in hypertrophic arthritis but is elevated in certain bone diseases such as malignancy and Paget's disease.⁷⁸ Most patients who have hypertrophic arthritis are in the cancer-bearing age. If the question of coincidental malignant disease arises in a case of obvious hypertrophic arthritis, the presence of an elevated serum phosphatase would suggest that the patient is suffering from more than his primary osteo-arthritis.

Ætiology.—No new data of striking significance have appeared. The theory that osteo-arthritis results from degeneration secondary to arteriosclerosis of articular vessels was not supported by the results of a study which showed no relationship between vascular changes in synovial vessels and the articular alterations present.⁴⁹

Treatment.—Recent reports were rather nihilistic, serving to do away with therapeutic débris rather than proposing new

remedies.⁴⁰ "Vitamins are harmless and may be used if the spiritual support of pills is required."⁵⁸ Few physicians were impressed with the results from injections of sulfur, vitamins, vaccines, bee venom, chaulmoogra oil or gold, or from roentgen therapy, fever therapy or iontophoresis with vasodilating drugs. Local injections of, and regional anaesthesia with, procaine were recommended.⁷⁹ In general synovectomy is not indicated since the synovial membrane is rarely affected.⁸¹

OSTEO-ARTHRITIS SECONDARY TO ASEPTIC NECROSIS OF BONE

Seven cases of aseptic necrosis of bone resulting in osteo-arthritis of adjacent joints were reported.⁴⁶ In four cases massive infarction of bone resulted from caisson disease, in three cases no cause was found. Necrosis of bone was produced by injury of tissues from release of nitrogen bubbles produced by too rapid decompression. When necrotic bone was situated at the epiphyses and bordered on joints, varying amounts of articular collapse occurred. Cartilage overlying the involved parts broke down and was replaced by fibro-cartilage; a more or less extensive secondary osteo-arthritis resulted. Attempts to produce such lesions in dogs by air emboli were unsuccessful.

BACKACHE AND SCIATICA

A hitherto unreported type of backache was described.⁵⁴ This consisted of a localised painful condition between two or more spinous processes; pain was aggravated by flexion and not relieved by heat and massage. Superficial tenderness was present and roentgenographic, neurologic and orthopaedic examinations gave negative results. Pain was due to chronic localised inflammation of the interspinal ligaments; degenerative and inflammatory changes were present in the resected ligament. Another "new syndrome" was described and variously called "the dorsolumbar syndrome,"⁴⁵ "first lumbar nerve neuralgia,"⁸³ or "causalgia of the twelfth dorsal and first lumbar nerves."⁴² Present in some cases were unilateral pain over the lower part of the back, iliac crest and midlumbar region with hyperesthesia of skin supplied by the affected nerves, and also abdominal pain and tenderness of variable severity; in other cases backache was minimal and abdominal symptoms were "intractable"; the latter led to useless abdominal operations. Pain was relieved by peri-

neural injections or by paravertebral sympathetic block with procaine.

Rupture of the intervertebral disks is currently a favourite subject; the literature under review contained more than thirty reports thereon. Some were especially informative.^{8, 20, 21, 26, 53} The clinical features in more than 600 cases in which protruded disks were proved at operation to be the cause of low back pain, generally with sciatica, were reported. The features were described in my previous report to this journal.³⁹ For diagnosis, myelography with air was considered less dangerous, but less satisfactory, than myelography with lipiodol. In summary, patients who have recurring low back pain and sciatica (with or without a definite history of trauma), exaggerated spinal flexion or torsion, a positive Kernig or Lasègue sign, diminished Achilles reflexes and a value for protein in the spinal fluid of more than 40 mg. per 100 c.c., should be suspected of having protruded disk, and myelograms should be made after injection of air or lipiodol. Facetectomy alone was inadequate; laminectomy and removal of the protruded disk and the hypertrophied ligamenta flava so often present relieved the great majority of patients so treated. But laminectomy should not be done until conservative therapy (rest in bed, heat, traction) has failed and the sciatica has become recurrent.

SPONDYLITIS

Spondylitis Ankylopoietica.—Data on 106 cases were reported.⁸⁰ The usual treatment (hyperextension in bed, use of plaster half-shells, physical therapy, corrective exercises, then braces) gave results which were unsatisfactory to one physician who devised a superior plan: preliminary correction of spinal deformity by hyperextension in bed for two weeks, then the application of a plaster jacket which was left on for weeks, to be replaced by new ones as posture improved. Reported results indicated rapid relief of muscle spasm and pain, marked improvement in sleeping despite the jacket, prevention of further spinal deformities, improved posture and position of spine and chest, retardation of vertebral bridging and prevention of progressive involvement of the hips.⁸⁰

Spondylitis Osteo-Arthritica.—The importance of industrial trauma as a provoking and aggravating factor of spondylitis osteo-arthritica was stressed. When a worker more than forty

years old, who has symptomless, perhaps unsuspected spondylitis osteo-arthritis falls down and hurts his back, the cost to his employer is likely to be about \$3,000.⁶⁰ Such cases are costly to industry, but industry must absorb the cost, for routine roentgenograms of elderly workmen are not worth the cost, and if done would result in placing many on the "employment junk heap."

GOUT AND GOUTY ARTHRITIS

Clinical Data.—A diet high in fat, low in carbohydrates and protein, provoked attacks of gouty acute arthritis in five cases of gout nine out of the ten times it was used.⁵² Another physician, however, could not provoke attacks thereby in four cases and regarded this provocative test as unreliable.⁴⁰ A case of gout producing ankylosis in many joints was reported.¹³

Ætiology.—An interesting attempt was made³² to associate gouty attacks with interference of the function of renal nerves. Cinchophen was found to increase the excretion of uric acid of intact animals but not of animals with denervated kidneys. Ergotamine in appropriate doses blocks sympathetic impulses to the kidney. When given in a case of gout, ergotamine produced a mild attack of gouty arthritis with diuresis of chlorides and reduction in excretion of uric acid. Thus interference with impulses through renal nerves produces effects similar to those in gout.

Treatment.—No significant additions to orthodox treatment were reported. The newer studies on the physiologic effects of colchicine on cell mitosis in animal tissues have not as yet afforded an explanation of the dramatic efficacy of colchicine in acute gouty arthritis.

Uric Acid Problem.—A new method for estimating the "true uric acid concentration" of blood by means of uricase was described.⁶ Normal human blood contained an average of 3 mg. per cent. of uric acid by older methods but only 2 mg. per cent. by the "uricase method": approximately a third of the colour produced was considered due to substances other than uric acid. The effect of certain polyhydric alcohols and sugars on excretion of uric acid was studied:³² sorbitol, given intravenously, notably increased the urinary uric acid of dogs. The effect of cinchophen on the excretion of uric acid of normal dogs was compared with that of dogs with unilateral denervation of a kidney;³³ ureters of

the dogs were first exteriorised. Cinchophen decreased the urinary volume both from the normal and from denervated kidneys and increased the excretion of uric acid by normal kidneys. After denervation of one kidney cinchophen no longer increased the excretion of uric acid from either kidney. Thus unilateral denervation produced effects similar to bilateral denervation. The coincident administration of ergotamine and cinchophen acted like denervation.

PSORIATIC ARTHRITIS

“ True psoriatic arthritis ” affects about 1 per cent. of patients who have cutaneous psoriasis, according to one writer.²⁴ Psoriatic arthritis was defined as “ a form of atrophic (rheumatoid) arthritis associated with psoriasis and exhibiting a reasonable amount of synchronous activity, as evidenced by remissions and relapses, in the articular and cutaneous manifestations.”⁸⁷ The characteristics in twenty-two “ typical cases ” were described:²⁴ the skin lesion appeared at an average of 6·6 years before joints became involved. Almost any joint was affected, but hands, knees and feet were affected most often. In most cases nails of fingers and toes were affected. Psoriasis frequently disappears during pregnancy.⁵⁵ In the cases observed lesions usually began to disappear at the end of the first trimester and the disease steadily improved during the rest of pregnancy. Whatever the effect of the first pregnancy on the psoriasis succeeding pregnancies produced a similar effect. Unfortunately these studies did not include comments on the effect of pregnancy on the psoriatic arthritis.

ARTHRITIS WITH PERIARTERITIS NODOSA

Arthritis and muscle pains may be associated with periarteritis nodosa; hence rheumatologists should become familiar with it. The disease is so pleomorphic in its manifestations that in most cases diagnosis is not made except on post-mortem examination. A synopsis of the subject appeared.³⁷ In 27 per cent. of 101 cases of periarteritis nodosa reported in the literature arthritis occurred. Unfortunately the characteristics of the arthritis were not described.

ARTICULAR PHYSIOLOGY

Theories on the origin and nature of a synovial fluid were reviewed.⁶⁵ It was concluded that normal synovial fluid, in cows at least, is a dialysate of blood plasma to which is added mucin of unknown origin.

EXPERIMENTAL ARTHRITIS

A chronic migratory and progressive proliferative poly-arthritis resembling somewhat human rheumatoid arthritis was produced consistently⁶⁷ in mice by injections of a filterable pleuropneumonia-like organism isolated from the brain of a normal mouse. No tissues but joints seemed affected. A second strain of the organism produced a disease more like rheumatic fever. Similar organisms could not be found in cases of rheumatoid arthritis or rheumatic fever.⁴⁰

Various types of streptococcal arthritis were produced experimentally,^{14, 66} but the arthritis, although somewhat similar to human rheumatoid arthritis, could not be said to have been of the human type.

CAMPAIGN AGAINST RHEUMATISM

British physicians have repeatedly called attention to the inadequacy of hospital facilities for British arthritics. The same difficulty exists in the United States, where most hospitals are "geared" financially and psychologically for the care of acute illnesses and injuries only, and have little room for, and less interest in, cases of chronic arthritis. Even our largest city and county hospitals can accept arthritis only for short examinations or brief periods of treatment. But, unlike their British colleagues, American physicians as a group have not adopted the view that the study and treatment of chronic rheumatic diseases is the business of the nation or of the body politic, and is one that can no longer be left entirely to voluntary effort. Therefore the campaign against rheumatism in the United States is proceeding along rather different lines from the campaign in the British Empire. American physicians continue to be more interested in clinical investigations, or what might be called the scientific aspects, rather than in the broad sociologic and epidemiologic aspects, of the rheumatic diseases. American physicians still are committed

to the idea that the solution of the problem of rheumatism and chronic arthritis will come, perhaps in the not too distant future, as a result of the work of some brilliant, hard-working physician or small team of clinical investigators working away in an adequately equipped hospital or clinic.

To date, therefore, the American Rheumatism Association has not sponsored any sociologic investigations or surveys on the incidence and contributing causes of rheumatic diseases. It has continued to sponsor the formation of an increasing number of rheumatism clinics and small-study groups in various cities, to encourage individual research, and to create a forum for the prompt and critical appraisal of such research at the annual meetings of the Association. In view of the splendid results which have been accomplished by civic and national efforts against the scourge of tuberculosis, it would seem obvious that much good could be done by enlisting the same civic and national interests against the much greater scourge of rheumatism. Convinced of this, the executive council of the American Rheumatism Association is fostering the formation of groups of interested laymen and welcoming them as associate (lay) members of the organisation. In furthering this movement the sociologic studies of British workers have been found most useful as "ammunition." Thus the work in the United States and that in Great Britain have complemented each other in a very useful way.

Preoccupied with the problems of war, British rheumatologists may find it difficult to realise that to date (March, 1941) American medicine has been but slightly affected by the war. But more serious tasks are now confronting it, and if, despite them, the campaign against rheumatism can be continued with as much zeal as that evidenced by the latest (Fourth) Report of the British Empire Rheumatism Council, American medicine will be doing well indeed.

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A STUDY OF CERTAIN BLOOD TESTS WHICH REVEAL COLLOIDAL ABNORMALITIES IN RHEUMATIC CONDITIONS*

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INTRODUCTION

IN chronic rheumatic conditions in which the blood is often characterised by a decreased suspension stability, there often occur alterations in the amounts, proportions, or nature of the proteins and perhaps other colloidal blood constituents. Discussions of these colloidal abnormalities have been made fre-

* Received for publication April 10, 1941.