

OBSERVATIONS ON THE ÆTIOLOGY OF RHEUMATISM.

BY CAPTAIN N. GRAY HILL, *M.C.*,
Royal Army Medical Corps (T.A.).

RHEUMATISM is a very evasive subject to deal with, and in spite of the interest that has been focused upon it and the painstaking search that has been made for the causative organism, really very little is as yet known concerning the ætiology of the disease. There is little agreement as to whether there is any real connection between the more chronic rheumatic or rheumatoid diseases that are met with chiefly amongst adults and only rarely seen in children, and the more acute conditions that are chiefly diseases of children and young people and come under the heading of juvenile or acute rheumatism, chorea, rheumatic carditis and rheumatic fever. There seems to be a tendency for the clinicians to differentiate these diseases into two main groups, but there are many who would follow the teaching of Sydenham and regard them as being very closely allied or even phases of the same disease.

Pathological investigations afford substantial support for the view that the various rheumatic conditions are but manifestations of one disease, the brunt of the attack tending to fall on the heart in children and on the joints in adults. But in both the disease is widespread in the body, and it is rather variable in the way it makes its presence shown. If the Aschoff body is the characteristic lesion of rheumatism and of real pathological significance, then acute rheumatism, together with rheumatoid arthritis, Still's disease, and certain other forms of chronic rheumatism must be regarded as having a common ætiology.

Now, turning to the disease that for want of a more satisfactory name we must call acute or juvenile rheumatism, although it is really a disease of a very persistent, subacute or recurrent nature, and is not strictly confined to children, we have a condition characterized by attacks of transient arthritis and chorea and a more or less progressive carditis. All three of these conditions are rarely present at the same time, and in many cases the diagnosis must be made on the discovery of any one of them. Prolonged observation of the patient will only too frequently show the development of the other two, as well as other less common or less typical signs of the disease, and this in spite of any therapeutic measures that may be taken.

Many theories have been advanced as to the chief ætiological factor in the causation of acute rheumatism. It is generally assumed that some organism must be responsible and there are those who hold that it is caused by the bacillus described by Achalone, or by protozoa, or by a filter-passing virus, but the opinion now most in favour is that the

disease is associated with an infection by some type or types of streptococci. Since the end of last century the streptococci have been suspected as being the causative organism, and quite a strong case was made out against the streptococci of the viridans type. This view was held in the British Medical Association report published in 1926, as a result of the work of a sub-committee dealing with rheumatic heart disease in children. The committee reviewed the recent investigations that had been made into the bacteriology of rheumatic infections and the conclusions arrived at were that there was no rival to the streptococcal theory, and the only difficulty was to place and accurately describe the rheumatic streptococcus, a non-hæmolytic coccus that apparently resembled the *S. salivarius* very closely. The hæmolytic streptococci were but briefly mentioned in the report.

Research done since 1926 seems to have tended towards the acquittal of the viridans group and turned suspicion upon the hæmolytic organism. This change was in the first place largely due to the work carried out in America, notably by Swift and his collaborators; and most of the more recent researches, both in England and America, have pointed the same way.

Now, although there are strong grounds for suspecting that the hæmolytic streptococcus plays a part in the causation of acute rheumatism, proof that it does is definitely lacking and while further bacteriological research is of the greatest importance, it may be well to review any other ætiological factors that concern the disease, and see what light they may cast on this obscure problem.

As Tertius Clark has pointed out, one of the few observations concerning acute rheumatism that is agreed to by all investigators is that the disease does not occur in the low-lying tropical countries at the present day. In the hot sub-tropical countries the disease is known, but in the territories lying between 23° 28' N. and 23° 28' S. it does not occur. If a satisfactory answer could be given as to why the people inhabiting these regions are free from active rheumatism, a real step forward would be made in our knowledge of rheumatic diseases.

It would appear that it is not simply a question of racial susceptibility to acute rheumatism. Although the question is not yet finally settled, it would seem that all races are susceptible. As with almost all other maladies there are probably definite variations in the severity of the reactions and the degree of resistance shown by various peoples, classes and communities; but the general result of the work of the American investigators carried out in the large cities of the north of the United States suggests very strongly that when people of the various European nations, negroes and Chinese live under conditions approximately the same, they all suffer from acute rheumatism and show all its typical manifestations.

It has been stated that the Chinese living in China and the native population of Africa are immune from acute rheumatism, but several

recent publications have thrown doubt on this, and suggest that this immunity is only partial if it exists at all. It would seem probable that in a country such as China, there must be a large number of the children in indifferent health who, if they lived in England or America would receive serious attention and be regarded as cases of subacute rheumatism, may be passed over unnoticed in the presence of more serious and more obvious pathological conditions.

Even in countries where fairly elaborate statistics relating to public health are kept, the available information is very limited when we turn to those diseases that do not occur in spectacular epidemics and do not cause immediate death. Diseases such as acute and subacute rheumatism are too indefinite to allow of compulsory notification, and statistics relating to deaths due to cardiac disease will not be identical, or even in strict relationship to the incidence of rheumatic carditis.

In the past it has only been on rare occasions, such as a general mobilization, that a large proportion of the population has been examined medically and the findings recorded numerically. There can be little doubt that the findings of the medical officers examining recruits during the Great War did much to show us the appalling amount of rheumatic heart disease that was present in this country. With the further extension of the public medical services and the facilities for the medical examination of children on lines such as have been developing during the last few years in almost all parts of the world, it may be hoped that more exact knowledge of the health of the citizen will in the future be available, but for the present the information to be had in most countries is very meagre. Fuller investigations may show a fairly widespread prevalence of acute rheumatism in China and other parts that are at present believed to be free of the disease.

If, however, further researches go to substantiate the view that in China rheumatism is rare or unknown amongst the native population, it is a point of great interest. Any natural immunity they may possess is not carried by the Chinese who emigrate, and this would suggest that the absence of the disease must be due either to some local climatic condition or to the absence of the causative organism and consequently the chance of infection. Likewise if it is proved that the negro population inhabiting large districts in Africa are free from the disease the reasons must be local, the immunity can scarcely be racial. Descendants of the same stock living in the United States of America are very prone to develop rheumatism; some observers believe them to be more susceptible than the white population in the more northern States.

Those who believe that acute rheumatism is the outcome of infection by hæmolytic streptococci lay emphasis on the fact that organisms of this type have, in the past, rarely been found in tropical countries. Coburn has carried out most careful work bearing on this point. He had cases of acute rheumatism transported from New York to Porto Rico and showed

that as they approached the tropics and while they lived in Porto Rico the hæmolytic streptococci disappeared from their throats and the patients became free from all signs of active rheumatism. Return to the northern climate was associated with both the return of the hæmolytic streptococci and the recrudescence of an active rheumatic disease.

A more exact knowledge of the geographical distribution of the hæmolytic streptococci and more especially of those strains that have been cited as being associated with acute rheumatism, would be of the greatest interest.

In this country it is very difficult to appraise the influence of the hæmolytic streptococci; they are too prevalent. It is commonly believed that erysipelas, scarlet fever, acute tonsillitis, puerperal fever and other less well defined diseases are the result of infection by certain strains of hæmolytic streptococci that apparently resemble each other closely; but in addition it would seem that a large proportion of our population is composed of people who are, at least for some portion of the year, "healthy carriers" of identical, or almost identical strains of streptococci. So we must formulate the hypothesis that most of us develop a fairly high degree of resistance to the toxins or other noxious substances produced by these streptococci. The problem is abstruse, and the exact role of the pathogenic streptococci hard to allot.

The diseases that have been ascribed to streptococcal infection seem to be influenced by environment and locality. Scarlet fever, like rheumatism, is unknown in the tropics, and Bach has pointed out that in different countries acute rheumatism seems to take rather different forms, locality having the greatest influence, the economic circumstances being of but secondary importance in determining the most prevalent manifestation. The distribution of erysipelas and puerperal fever seems to be less well known, though the former is commonly associated with poverty.

The class distribution of juvenile rheumatism has been mentioned by many observers and the view was at one time held that in England the children of the wealthier classes were almost immune to the disease, though further investigations seem to have thrown doubt on this. Glover and Bradley have given instances where rheumatism has occurred amongst public school boys during recent years.

Like scarlet fever, juvenile rheumatism seems to change its form during a period of years. A definite cycle of rise and fall in the severity of the attacks has not been worked out with the precision possible in the case of scarlet fever, but it probably occurs. The disease that Cheadle so clearly described as being prevalent in London towards the end of last century is now rare, and almost unknown in London to-day; but in New York and certain other of the eastern States of America a disease similar to that described by Cheadle appears to be prevalent at the present time.

Many attempts have been made to show that acute rheumatism is an epidemic disease, and though endemic in most parts of the world it has

been regarded as liable to occur in epidemic form. Epidemics of acute tonsillitis caused by certain strains of hæmolytic streptococci have occurred amongst children either known to be rheumatic or believed to be healthy, and exacerbations of rheumatism or the development of an initial attack has been thought to follow the epidemics; but the number of these outbreaks that have been reported has not been large.

It would be interesting to know if there has ever been a local epidemic of acute rheumatism occurring suddenly in an isolated community, such as the inhabitants of a lonely island or very secluded valley. A detailed report of a localized but severe rheumatic epidemic would be invaluable—with the rapid development of modern transport an isolated community will soon be a thing of the past.

Although acute tonsillitis caused by hæmolytic streptococci is highly infectious, acute rheumatism seldom, if ever, spreads through a family or school in a way really analogous to scarlet fever or measles. Paul has made a very close study of the subject and with the help of ingenious charts brought forward evidence to show a certain infectivity of the disease; he suggests that while some members of the group develop frank rheumatic fever, others show the indefinite or very subacute manifestations of the disease. Further work on the lines suggested by Paul would be interesting but very difficult to carry out, the personal factor is apt to play a large part and it is almost impossible to reduce the findings to a fair statistical basis.

Dissatisfied with the poor results obtained by investigation based on the assumption that acute rheumatism is an infectious fever caused by an organism that only awaits discovery, some investigators have turned their attention to other possibilities. The influence of diet and of the content of the food has been closely examined. The work is still in hand and the question not yet settled; but recent publications do not suggest that research along these lines is going to point to the primary ætiological factor.

It is true that a very ill-balanced diet or one grossly deficient in vitamin A may predispose to the onset of acute rheumatism, as it may to many other diseases, and there can be no doubt that an ample but simple and well-balanced diet is an essential adjunct to the successful treatment of juvenile rheumatism; but this again is true of such a large number of diseases of such very varied origin that it can scarcely be taken as of great significance when dealing with the knotty problem of the causative factor.

Warner's work dealing with the administration of vitamins A and D to children known to be rheumatic, would suggest that the belief that rheumatic children are definitely deficient in these vitamins is ill-founded.

Acute rheumatism is a disease that has not in the past been associated with famine and actual starvation, nor is it recorded as occurring in persons subject to great hardship and privation. The staple diet in different countries may have something to do with the various manifestations of the

disease that have been noted, and it is possible that the better feeding of the population has had an influence in reducing the fulminating attack which the older writers seem to have considered as characteristic of rheumatism, but up to the present we have no exact knowledge on this point. It is worthy of further investigation. The causation of acute rheumatism is still an open question and nothing that may have bearing on the subject should be discarded without careful examination.

CONCLUSION.

At the present time, the view most commonly held is that the hæmolytic streptococcus is closely associated with rheumatism. That it is the causative organism has not yet been proved, and it is even possible that further clinical or laboratory investigations may place the whole rheumatic problem in a very different setting.