Bashford, and many others, had by chance succeeded in transmitting mouse tumours with perfectly dry tissue the situation in cancer-thinking would have been entirely different, and we should have been spared the confused speculations which now dominate cancer research.

There is one final point I wish to refer to—namely, whether viruses are of intrinsic or extrinsic origin. It is now almost the custom to consider the viruses of the filterable tumours as particles of chemical nature made by the infected cells. Indeed, this mode of thinking has now gone so far that the word "virus" has been objected to, though the grounds of objection do not appear to us to be valid. We are not wedded to a word; they may be called anything so far as we are concerned. It is more important to discover perfect ways of getting and handling them, to find out how they act, and to learn if possible how to control them. The problem of discovering the nature of viruses, whether made by cells or of extrinsic origin, is not confined to cancer viruses; it is a part of the general virus problem. There was a time when the bacteriophage was allied to cancer viruses as being a product of the bacterial cell, but that has now passed. The argument concerning biogenesis or abiogenesis of the Pasteur-Bastian period does not interest us, and its repetition now, with viruses taking the place of bacteria, seems to be sterile from the beginning.

Conclusion

The experimental evidence described above points to the conclusion that cancer has a continuing cause and that this, in mammals as in birds, is a virus.

LONG-TERM CARDIAC OBSERVATION OF CHILDREN

BY

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The proper assessment of cardiac signs found in a child is of considerable importance to its future. Many children in whom murmurs are heard have no disability, and the greatest danger is that their activities may be restricted and the seeds sown for the development of cardiac neurosis. In rheumatic heart disease a normal school life with games can often be allowed when the disease is inactive, even when valve lesions are known to be present. With the advance of cardiac surgery it is desirable that cases for which it may be necessary should be diagnosed as early and as accurately as possible and submitted for operation at the most suitable time.

The choice of a career which will not need to be changed on account of a disability that is likely to increase should be made before leaving school. It is difficult for one who has done nothing but manual labour to find a sedentary occupation in middle life, and this can be avoided by choosing suitable employment from the start. For these and other reasons there are great advantages in children with cardiac abnormalities being under regular observation at cardiological centres. There are many questions in cardiology which can be settled only by watching patients over a period of years. J. W. Brown (1939) has done much in this way to increase our knowledge of the natural history of congenital heart disease. By similar observation much may be added to our understanding of the course of rheumatic heart disease.

What happens in the years between the acute or sub-acute phase seen in the child and the young woman who is discovered to have mitral stenosis during pregnancy?

Is the development of the stenosis due to recurrent activity of the rheumatic infection, or, once started, does the narrowing progress steadily without evidence of further activity, or are both factors at work? What happens to the innocent murmurs so common in childhood? At what age do they disappear?

A Cardiac Clinic for Children

With these considerations in mind a children's cardiac clinic was started eighteen months ago, and a report of the first 200 cases is here given. Apart from its intrinsic interest, the appreciation of doctors, parents, and, not least, the children themselves is encouraging and makes the clinic a happy one. As an investigation of this kind requires observation over a period of many years it is desirable that the observer should start while young enough to allow continuity of at least twenty years. It is with the idea of encouraging others who may be interested to take up such work that this preliminary report is presented.

The work has been made possible by the willing co-operation of the local school medical authorities. An afternoon is set aside and four to six children are seen by appointment each week. The number attending on each occasion is kept small so that full and unhurried examination may be made. It also means that no one is kept waiting very long—a point which makes them more willing to come again when asked.

Children showing any cardiac abnormality whatsoever at routine school examinations are placed on a list and referred to the clinic. The net is purposely cast wide to include all conditions, ranging from innocent murmurs to serious heart disease. A careful history is taken, followed by clinical examination, electrocardiograms, and cardioscopy. Twelve-lead electrocardiograms consisting of V1-6 and augmented unipolar limb leads in addition to the standard leads are now being taken in all cases, and routine phonocardiograms are to be started shortly.

If the child is very nervous or fretful the blood-pressure reading, electrocardiography, and cardioscopy may be postponed until the next attendance, as it is considered important that its memory of the visit to the cardiac department shall not be unhappy. This greatly facilitates subsequent examination. Teleradiographs are taken in cases showing abnormality on screening. Blood counts and sedimentation rates are done in certain cases. A report is sent to the school medical authorities and to the patient's own doctor. Arrangements are made for re-examination after an interval of six or twelve months or sometimes earlier.

Report of First 200 Cases

The distribution of the 200 cases is shown in Table I. There were 96 boys and 104 girls. It will be seen that approximately 40% had, or were suspected of having,

TABLE I.—Distribution of Cases

Cases with Organic Heart Disease.	
I. Congenital malformations (44):	
Fallot group (one with congenital heart-block)	7
Pulmonary stenosis	10
Ventricular septal defect	6
Patent ductus arteriosus	3
Coarctation of aorta	3
Atrial septal defect	3
Congenital heart-block	1
Observation—congenital heart disease	11
II. Rheumatic Heart Disease (37):	
Mitral stenosis (six with active disease)	21
Mitral stenosis and aortic incompetence	2
Observation—mitral valvular disease or cardiac enlargement	14
Cases without Organic Heart Disease (119):	
Innocent murmurs	96
Physiological third heart sound	5
Depressed sternum	1
Splitting of first heart sound	1
Anaemia	1
Displacement (scoliosis, 1; pulmonary fibrosis, 1)	2
Irregularities (sinus arrhythmia, 1; extrasystoles, 2)	3
No abnormality detected	10

organic heart disease. The remaining 60% are classified under the most prominent feature discovered. Innocent murmurs provide the majority. Many of those with murmurs also showed a third heart sound, but unless the triple rhythm was the only feature cases were not classified under it. Those with organic lesions are divided into congenital malformations and rheumatic heart disease, the former showing a slight predominance.

The "observation" group is useful and may well prove the most important over a long period. In it are placed cases that cannot be passed as normal at the first examination, but in which the signs are so slight that a definite diagnosis of heart disease is not justified. It will be of great interest to see which way these cases develop—whether the suspected abnormalities disappear, or whether a clear pattern of heart disease emerges. The group is also used for cases of congenital heart disease in which the nature of the lesion is obscure. With increasing experience more accurate diagnosis becomes possible and fewer have to be placed in this group, but there will always be a number in which a complete diagnosis cannot be made during life.

CASES WITH HEART DISEASE CONGENITAL MALFORMATIONS

Fallot Group.—Ages ranged from 5 to 16 years. With one exception these seven cases had all been diagnosed as having heart disease in infancy; development was poor and disability varied from moderate to considerable. All showed varying degrees of enlargement on cardioscopy, but the "cœur en sabot" which has been described as characteristic of this condition was seen only twice. Blood pressure tended to be low. The expectation that all such cases will show steadily increasing disability is not supported by follow-up studies. Of six cases, four showed improvement during the first year of observation, one remained the same, and one showed increased disability and was referred for operative treatment. The improvement in two was striking: one who could walk only a few yards when first seen can walk a mile; another who used to squat had not done so for six months and was walking well. Bearing in mind the limited improvement that can be expected from a successful operation, it is desirable that surgical treatment should be reserved for those whose disability is very great and in whom progressive deterioration is occurring.

Pulmonary Stenosis.—In the majority of these ten cases the heart lesion was discovered at examination for some other purpose, and in half of them remained unnoticed until the first routine school examination at the age of 5. Disability was generally slight and physical development fair. Because of the impressively loud murmur there is a tendency to restrict the activities of such children far more than is necessary. Most of these are now playing games happily without symptoms.

Ventricular Septal Defect.—Like the preceding group these children's murmurs were usually discovered accidentally and all but one had been forbidden to play games. Of the six children in this group the only one to complain of shortness of breath was later found to have a mid-diastolic murmur and is really a case of mitral stenosis. Electrocardiograms were normal apart from slight prolongation of the P-R interval in one, and prominent S waves in lead I in two. Screening revealed slight right-sided enlargement in three; the rest were normal. All are now living an ordinary school life.

Patent Ductus Arteriosus.—One of the three cases in this series—a boy aged 9—has no symptoms. He is being watched but not operated upon meantime, as I agree with the view expressed by Benn (1947) that in symptomless cases the risk of operation may be greater than the risk of

bacterial endocarditis or heart failure. The other two cases showed unusual features and are here briefly described.

One of these two patients was a girl aged 13½, the condition of whose heart was first noticed during pneumonia at the age of 4. Subsequently she suffered from recurrent respiratory infections and was often away from school for long periods. At one time she was in hospital for a year, and later she attended school for half-days only. She had an over-anxious mother and there is some doubt if all this care was really necessary. Her general condition was poor, and in addition to signs of pulmonary fibrosis there was considerable cardiac enlargement with the typical machinery murmur below the left clavicle. Blood pressure was 160/30 at rest and 170/0 after exercise. In view of her poor general condition and the size of her heart it was thought that there might be some other heart condition as well as the patent ductus. She was therefore seen by Sir John Parkinson, who agreed that operation was advisable, as the prognosis without it was bad and it might bring great improvement. She was operated upon at the London Hospital by Mr. Vernon Thompson, who found a short and very wide ductus (8 mm. in length and 11 mm. in diameter), which was tied. She made an uninterrupted recovery, and her general condition has since improved greatly. Six months after operation a systolic murmur developed in the pulmonary area and has persisted unchanged (six months). Such murmurs are sometimes heard after operation for patent ductus arteriosus, and no satisfactory explanation for them has yet been given. They are not always evidence of recanalization.

The other patient, a girl, had had a patent ductus tied at the age of 7 on account of poor physical development. She made a satisfactory recovery and was in excellent health for a year after operation. She then began to get attacks of pain across the sternum, associated with severe dyspnoea and cyanosis. They had no relation to exertion or food, but were associated with a slight rise of temperature. The attacks became more frequent, she lost weight, and her general condition deteriorated. The heart sounds remained closed and the electrocardiogram and x-ray film were normal. Blood culture was negative and there was no evidence of embolism. These attacks were puzzling, but they were considered cardiac in origin and it was thought that bacterial infection must have occurred, possibly in the stump of the ductus. After a six-weeks course of penicillin her general condition improved greatly. She has gained weight, and the attacks, though still occurring, are milder and much less frequent.

Coarctation of the Aorta.—It is probable that this condition is very much commoner than has been thought, and when it becomes a routine to palpate the femoral arteries in all cases showing hypertension or neck pulsation many more cases will be found. Of the three cases, two, aged 15 and 9, are symptom-free. The third, aged 7, is easily tired and has had cramp in the legs at night for the last two years. Her blood pressure is normal. She was diagnosed by Dr. J. W. Brown at the age of 2½. The Crafoord operation of resection of the coarctation and end-to-end anastomosis of the aorta is a severe one, and in symptomless cases the operative risk may well be greater than the danger of rupture of the aorta, bacterial aortitis, or heart failure. A remote risk of the operation may be from weakness at the suture line when atheromatous changes occur in the aorta. For these reasons it would probably be wise to reserve operation for young patients showing symptoms of cardiac embarrassment or ischaemia of the legs, because in them the prognosis without operation is bad enough to warrant the risk.

Atrial Septal Defect.—All three patients were girls. In diagnosis the radiological appearance of enlargement of the pulmonary artery, including its right branch, with pulsation of the pulmonary vessels, was found the most useful sign. One had mitral stenosis as well (Lutembacher's syndrome), and she and one other had some shortness of breath on exertion. The third had no symptoms. This condition rarely causes heart failure before adult life and is unlikely

to be recognized in childhood unless cases with murmurs are examined radiologically.

Observation: Congenital Heart Disease.—In this group of eleven cases are three with loud systolic murmurs internal to the apex. No thrill has been felt, but it is considered probable that they are cases of ventricular septal defect. Two other cases show cardiac enlargement on screening. In another it is probable that the disability is entirely due to bronchitis and that the heart is normal. The remaining five cases are suspected of having pulmonary stenosis, atrial septal defect (2), patent ductus arteriosus, and the Eisenmenger complex. When the diagnosis is considered to be established they will be placed in the appropriate groups.

RHEUMATIC GROUP

This group comprises all the cases of proved and suspected mitral stenosis, those with a history of rheumatic fever or chorea with a noticeable systolic murmur, and those suspected of having active rheumatic infection. No cases of aortic incompetence without mitral stenosis have been seen in this series, though it is expected that in some of the cases of slight cardiac enlargement an early diastolic murmur may be heard on future examination.

Mitral Stenosis.—Of the 21 proved cases of mitral stenosis 13 were girls and 8 boys. Seventeen were between the ages of 10 and 15. Fourteen gave a history of rheumatic fever or chorea. In seven no history suggestive of rheumatic infection could be obtained. The commonest physical sign was a systolic murmur at the apex, which was heard in all. The first heart sound was loud in 15 and mid-diastolic murmurs and presystolic murmurs were heard in 14 and 6 respectively. The diastolic murmurs were always better heard lying than standing, and best when lying on the left side after exercise. On cardioscopy 16 showed enlargement of the left auricle in the right oblique position with barium in the oesophagus. Two others showed slight general enlargement with a straight left border, and three were normal on screening. None had severe disability, and, provided there had been no recent rheumatic activity, they were not restricted beyond what they could do in comfort. Two who had active carditis were admitted to hospital. Another, when apparently well, developed an acute infection with consolidation of the left lower lobe and died in a week.

Of the 13 cases under observation for mitral stenosis 8 are females and 5 males. Seven gave a history of rheumatic fever or chorea and had systolic murmurs with or without a loud first sound. Three had systolic murmurs with cardiac enlargement on x-ray examination. Three others had systolic murmurs only, but of such a character that these could not be passed immediately as innocent murmurs. It should be emphasized that the cases in this group are not restricted in any way whatsoever, but are being watched at intervals of six to twelve months to see how they develop.

CASES WITHOUT HEART DISEASE

These cases are most important, for they are healthy children whose whole lives may be blighted by a mistaken diagnosis of heart disease. A few examples may be quoted.

Girl aged 7; parents told "heart bad" when she was 2 years old. Never allowed games or drill, and spent one day a week in bed.

Girl aged 14. Examined on account of nose-bleeding at 5; told "valvular trouble." Since then had never been allowed games, drill, swimming, or dancing.

Boy aged 14½. Heart examined at 4; no games or drill since.

All these children have healthy hearts and are now playing full games without distress.

Innocent Murmurs.—These account for nearly half the total number of cases. They have been classified and their characteristics described by Evans (1947). The majority are better heard in the reclining posture. They have a soft blowing character and are usually diminished or abolished by deep inspiration. They do not occur early in systole, and a gap can often be detected between the first sound and the murmur. It is hoped that phonocardiography may assist in distinguishing these murmurs more clearly. Table II

TABLE II.—96 Healthy Children with an Innocent Murmur

Type (Evans's Classification)	No.	Boys	Girls	Third Heart Sound Present
Murmur of reclining posture ..	90	54	36	71
Murmur of upright posture ..	4	—	4	1
Parasternal murmur ..	2	1	1	2

shows the great preponderance of murmurs better heard in the reclining posture and the high proportion in which a physiological third sound was heard in such cases.

Triple Rhythm.—A third heart sound was heard in 100 cases. In five it was the only sign. In 83 it occurred in healthy hearts, in 3 with congenital heart disease, and in 14 cases under observation for possible rheumatic or congenital disease. The distribution is shown in Table III.

TABLE III.—100 Cases of Triple Rhythm

Cases without Heart Disease (83):	
Alone	5
With innocent murmurs	75
With anaemia, scoliosis, and pulmonary fibrosis (1 each) ..	3
Cases with Congenital Heart Disease (3):	
Atrial septal defect	2
Coarctation of aorta	1
Cases under Observation (14):	
For mitral valvular disease	8
For congenital heart disease	6

Depressed Sternum.—Only one case occurred in this series. Evans (1946) has pointed out that with this deformity the heart may be flattened between the spine and the depressed sternum. This may give rise to a systolic murmur and also give an impression of cardiac enlargement by outward displacement of the apex beat. This apparent cardiac enlargement may be noted on cardioscopy in the antero-posterior position, but the true cause may be suspected from the unusual translucency of the cardiac shadow and be proved by examination in the oblique position. With deeper depression of the sternum the heart may be dislocated to the left, causing great displacement of the apex. The condition is harmless, and is important only as a possible cause of unnecessary invalidism.

Splitting of the First Heart Sound.—It is surprising that this was heard only once among 200 children, for it is a common sign. Its importance lies in the fact that it is often mistaken for the presystolic murmur of mitral stenosis. Splitting is best heard in the upright posture over the lower sternum; the first sound is not loud and there is none of the crescendo quality of the true presystolic murmur. It is in fact a simple splitting and not a murmur.

Displacement of the Heart.—Scoliosis is the commonest cause of displacement of the apex beat in children, and when this is outwards it may give rise to a suspicion of cardiac enlargement. The condition is usually recognized by observing that one shoulder is higher than the other. It is most easily seen on screening, when by rotating the patient to correct the deformity the normal size of the heart is apparent.

Other Factors

Blood Pressure.—This was recorded in 180 cases, and the results were examined to see whether there was any striking difference according to age, sex, or the presence of heart disease. The numbers are too small for statistical

analysis, but it was found that in healthy children under the age of 10 the systolic blood pressure was less than 100 mm. Hg in 60% of boys and 30% of girls.

Electrocardiography.—Only standard leads and CR1 were taken in the majority, as twelve-lead cardiograms were not started until late in the series. The more complete records should help in the assessment of right or left ventricular preponderance. It is not proposed to give here a detailed description of the present findings, but two observations can be made. Sinus arrhythmia of a degree easily perceptible to the eye without measurement was seen in 97 out of 195 cases. Of these, 68 out of 117 were in healthy hearts, 14 out of 42 in the congenital group, and 15 out of 36 in the rheumatic group, including three with active carditis. This supports the view that sinus arrhythmia is of no value in helping to determine the condition of the heart.

It has been suggested that a physiological third sound, prominence of the pulmonary artery on cardioscopy, and inversion of the T wave in CR1 may be linked as a triad of physiological right ventricular preponderance. The direction of the T wave in CR1 was therefore studied in 94 cases showing a third heart sound. It was inverted in 12, diphasic (—+) in 32, flat in 1, diphasic (+—) in 5, upright in 42, and bizarre in 2.

Radiological Examination.—The ease with which the cardiac silhouette can be seen in children contrasts pleasantly with the difficulty so often encountered in obese adults. The child's heart tends to look a little larger in relation to the size of the chest. Cardioscopy is of great assistance in attempting to separate the congenital malformations and in the early diagnosis of mitral stenosis. It is also of value as a check on clinical observation, and in more than one case in this series the appearance of cardiac enlargement led to re-examination, with the discovery of signs that had been missed before.

Restriction and Cardiac Invalidism

The proportion of those whose activities had been restricted on medical advice is shown in Table IV. In those without heart disease it was encouraging to note that

TABLE IV

Group	No.	Activities Restricted on Medical Advice				Total
		No Symptoms	Slight Symptoms	Moderate to Severe Symptoms	Unnecessary Cardiac Invalidism	
Healthy hearts ..	119	29	9	1 (neurosis)	39	39
Congenital ..	44	17	7	7	24	31
Rheumatic ..	37	16	2	8 (6 active)	18	26

although in the first hundred of the series 26 out of 55 had been restricted, in the second hundred only 13 out of 64 had had their activities curtailed. In view of the rapidity with which a cardiac neurosis can develop it is surprising that such a high proportion of those restricted had remained symptom-free. In contrast was a girl, referred on account of an innocent murmur, who complained of shortness of breath for the first time during the fortnight while waiting for an appointment at the cardiac department.

What limitation should be placed upon the activities of children with heart disease is a more controversial subject. All would agree that while any suspicion of active rheumatic infection exists rest should be advised, and in certain cases of congenital heart disease with severe disability there is no choice, for the heart itself imposes limitations. Patients with coarctation of the aorta in which a sudden strain may prove fatal should also have their activities limited.

These cases, however, are in the minority, and there are large numbers of children with gross signs of definite heart disease who have little or no limitation of exercise tolerance. Should they be prevented from enjoying the activities in which they are so keen to take part? On this subject we have the authority of Sir James Mackenzie (1917), who stated: "Children with a heart the efficiency of which is impaired will not injure it by over-exertion. Children are very sensitive to distress provoked by cardiac inefficiency and will themselves abstain without being told. . . . I cannot recall a single instance where I could reasonably attribute heart failure to a child's voluntary exertions. The same reasoning applies to the games of boys and girls; when they exert themselves and find pleasure in doing so it may be taken for granted that no harm results."

If this opinion is accepted—and I think it should be—the restriction in all those cases without symptoms or with only minimal symptoms becomes unnecessary, and these children may be allowed to indulge in games, their own feelings being the best guide. It is my opinion that from a cardiac point of view the only valid reasons for stopping a child's normal school activities are active rheumatic infection or disease causing cardiac embarrassment of a degree which makes exertion uncomfortable.

Discussion

The main objectives are that children with heart disease shall lead as full and happy lives as possible, and that no suspicion of heart disease shall be allowed to remain in the minds of those who are healthy. Too often the child with some innocent or benign cardiac condition has been kept from games, drill, swimming, and dancing—in fact all the pleasures of school life. School medical officers may change, and newcomers are chary of questioning the judgment of their predecessors. Once the child has been placed on the restricted list few dare to raise the ban, and it may be treated as an invalid through the whole of its school life. It is not surprising in these circumstances that it grows up neurotic.

It is not advocated that children with severe disability should be driven to undertake activities which they can perform only with difficulty. Even those with impaired efficiency may be able to join in all but the more strenuous forms of competitive sport. The majority of these children who have been deprived of physical exercise in school are most anxious to join in with the others, and in unofficial games are often reported to be above average in the activity they display. They resent bitterly not being allowed to lead a normal life, and their joy at being told that they can do so knows no bounds. It is inevitable that such liberation of children who have been over-protected for years will sometimes cause parents to wonder whether the past restriction has been really necessary. Such difficulties are encountered only in the early months, and disappear when all cases are being referred to a cardiac clinic as soon as an abnormality is noticed and before restriction is instituted.

It might be thought that this work should be confined to centres where all the more specialized investigations, such as angiocardiology, kymography, and cardiac catheterization with blood gas analysis, are available. The proportion of cases in which these are necessary for diagnosis is small, and while they add to the observer's interest they are not often essential for the benefit of the patient. It will be agreed that cardiac surgery should be undertaken only at a very few centres, so that a small number of surgeons may acquire the necessary experience to perform these operations with the greatest efficiency. When these special investigations are considered necessary they could be carried out at such a centre before operation. It would

be impossible to provide enough of these highly specialized clinics to examine more than a small proportion of the children with cardiac abnormalities. It should not be difficult, however, to cover the country by a series of centres, so that every child in whom any cardiac abnormality is suspected should have the benefit of examination and supervision by a physician specializing in cardiology. In this way much unnecessary cardiac invalidism would be prevented.

Summary

The work of a children's cardiac clinic is described, and a report presented of the first 200 cases seen.

It is suggested that the setting up of similar clinics in areas where they are not already in operation would add to our knowledge and be of great benefit to the children.

I should like to thank Dr. John Matthews, senior school medical officer, Brighton, for his willing co-operation, and Miss V. Amato, cardiographer to the department, for her technical assistance.

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HOG-STOMACH EXTRACT AND CASEIN HYDROLYSATE IN PEPTIC ULCER

BY

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It is notoriously difficult to evaluate the results of treatment in a disease such as peptic ulcer which follows an irregular course of relapse and remission. A spontaneous remission (especially if it should last for several weeks) is apt to be falsely attributed to the method of treatment in operation at the time. A system of study has been evolved in this clinic which would seem to avoid such a fallacy. The purpose of this paper is to describe the experimental method and to illustrate its application by reporting an investigation of two forms of treatment recently advocated—namely, the administration of hog-stomach extract and of casein hydrolysate.

Method of Study

The test substance is administered for three months and then withheld for three months, this sequence being repeated without reference to the presence or absence of dyspepsia. By the end of twelve months there are available for comparison two test periods and two control periods, during which (in the absence of benefit from the test substance) relapses can be expected with equal frequency. It is to be noted that relapses normally terminate spontaneously, and consequently the first improvement after the beginning of therapy must be discounted.

There can be little doubt that, in general, relapses tend to be more frequent in winter than in summer, and for this reason it was felt that the clinical trial should cover the period of a full year. The possibility was foreseen that in

the periods between the administration of the test substance the patients might regard themselves as untreated. To minimize this the proposed plan of treatment was explained at the start; partly through this explanation, and partly through conversation with other patients undergoing the same test, the control periods came to be accepted as an integral part of a planned course of treatment. Finally, patients were interviewed at the same intervals of time during the test and control periods so that the records might have the same degree of precision.

All the patients selected for study had radiological evidence of duodenal or gastric ulceration, and in each case the periodicity of relapse and of remission was well defined. Every patient had had symptoms for many years (average $12\frac{1}{2}$ years) and the chance of spontaneous cure was considered to be remote. No change was made in the customary dietary habits of the patients save in one small group treated by intensive casein hydrolysate therapy (see below). Alkalis were permitted when pain was severe.

Hog-stomach Extract

The beneficial effects of feeding human gastric juice from normal subjects to patients with peptic ulcer have been described by Morrison (1945a). In an attempt to explain the prompt relief of symptoms it was suggested that the normal gastric mucosa is capable of elaborating a principle which protects the stomach from self-digestion and peptic ulceration. Developing this hypothesis, Morrison (1945b) was successful in preventing the occurrence of cinchophen ulcers in dogs by feeding them a preparation extracted from the mucosa and submucosa of the hog's stomach and duodenum. This was done with the intention of providing the "protective factor."

We present the results of a clinical trial of "pepsac," a commercial extract of fresh hogs' stomachs, in patients with peptic ulcer.

Dosage.—Pepsac was administered in doses of one tablespoonful (approximately 30 g.) three times a day in any vehicle palatable to the individual. In order to avoid destruction of any thermolabile active principle the temperature of the mixture was not allowed to exceed blood heat.

Results.—Observations were made on 41 patients (33 duodenal ulcer, 7 gastric ulcer, 1 stomal ulcer), with the following results:

Incomplete trial	..	..	..	..	8
? Incomplete trial or ? failure	..	..	..	..	7
Failure	..	..	..	..	17
Benefit	..	..	..	..	9

The patients given an incomplete trial include six who could not tolerate the preparation and two who defaulted. Seven patients continued to have severe disability, and the trial was abandoned in favour of in-patient hospital treatment; it is a matter of opinion whether these should be classified under "incomplete trial" or "failure." The 17 patients classed as failures (15 duodenal, 2 gastric) experienced no improvement in either the frequency or the severity of their relapses. In the remaining 9 patients (5 duodenal, 3 gastric, 1 stomal) some degree of benefit was obtained: in four of these the relapses became shorter and the remissions longer, and in five the periodicity was unchanged but the attacks were said to be less severe. The chart provides a diagrammatic representation of the clinical progress in two experiments and illustrates the method of study. During the period of investigation only one patient failed to gain weight.

Comment.—In most cases the addition of pepsac to the diet led to no symptomatic improvement despite a gain