During the period January 1 to July 8, 1950, 2,227 children received two doses of 0.5 ml. of P.T.A.P. and 1,796 children received one dose. The latter were mainly "booster" doses. These 4,023 children were injected intramuscularly in the left arm. The age grouping is shown in Table V.

TABLE V.—*Ages of Children Inoculated with P.T.A.P. From January 1 to July 8, 1950*

Age:	1—	2—	3—	4—	5—	6—	7—	8—	9 and Over
No. of children	477	263	128	114	358	1,426	824	433	—

In this group of P.T.A.P.-inoculated children we had six cases of poliomyelitis. One of these occurred within a month after inoculation. This is the case, already mentioned, in which facial paralysis occurred 23 days after inoculation. In the remaining cases the periods between inoculation and onset of illness were 32 days, 45 days, 55 days, 4 months, and 5 months. The three children with the shorter periods showed involvement of the face or legs but not of the arms. The other two had extensive paralysis of limbs, with the arms least involved.

Discussion

The Belfast epidemic does not offer enough material for discussion of the possibility that an inoculation produces the onset of poliomyelitis. Comment is confined to the extent of the association between site of paralysis and site of inoculation.

It would seem reasonable to define association between inoculation and poliomyelitis as involvement of the inoculated limb, alone or in combination with other sites, within one month after the inoculation. The time limit is arbitrary, but an extension to three months would not include any further cases in Belfast. This definition serves the purpose of this report, which is that of comparison.

McCloskey reported 340 cases of poliomyelitis investigated, and found this association in 24. The antigens concerned were combined diphtheria-pertussis (14 cases), pertussis alone (6 cases), and A.P.T. (4 cases). Geffen's report includes 182 cases of poliomyelitis in children under 5 years, and shows the association with inoculations in 30 cases; the antigens being combined antigen (21 cases), pertussis alone (1 case), and A.P.T. (8 cases). The impression given by these figures is that the combined antigen is most often responsible. This may very easily be not so, as no accurate estimate of the extent of the use of these various antigens in the areas concerned is given. Geffen makes a rough estimate that the risk is about 1 in 1,800 or 1 in 1,900 inoculations. He bases these figures on the assumption that 80% of the children reaching 1 year of age during the epidemic received three injections each. These figures, he states, are almost certainly too high—that is, the risk is greater than his estimate.

From the accurate records of P.T.A.P. inoculations given during the Belfast epidemic, which affected the age groups being inoculated, it can be stated that no case of association as defined above occurred after 6,250 inoculations. The administrative action taken in Northern Ireland, late in July, to discourage immunization during the epidemic prevents any better estimate being made here.

This limited experience cannot, of course, prove that the association does not occur with P.T.A.P. In fact,

Dr. Guy Bousfield informs me that he has had one probable case following the intramuscular use of an experimental batch of P.T.A.P. However, our experience is that P.T.A.P. is a relatively innocuous antigen so far as induction of poliomyelitis in the inoculated limb is concerned. Bousfield (1950) has suggested that the use of such an antigen as P.T.A.P. subcutaneously is the answer to the current diphtheria immunization problem. This is supported by the experience recorded in Belfast.

Summary

An epidemic of poliomyelitis is reported in which non-inoculated children under 2 years of age show an unusual involvement of the arms.

An association between site of inoculation and site of paralysis was not found after 6,250 inoculations of P.T.A.P. in children of the age group affected by the poliomyelitis epidemic.

I am indebted to Dr. E. A. Cheeseman, of the Department of Preventive and Social Medicine, Queen's University, for guidance in the statistical aspects and for much constructive criticism; to Professor A. Bradford Hill and Dr. Guy Bousfield for many useful comments; to Dr. S. Barron, M.O.H., Belfast, for permission to publish, and for the encouragement given by him and Dr. W. G. Swann, deputy M.O.H., Belfast, to continue immunization during the epidemic of poliomyelitis.

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ANTI-TRACHOMA CAMPAIGN IN GOZO

BY

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In June, 1948, I was entrusted by the Government with the task of carrying out an intensive anti-trachoma campaign on the island of Gozo (near Malta), which has a population of about 28,000 spread out in the only city and in twelve villages.

Trachoma had long been reputed to be more prevalent in Gozo than in Malta, and it was the scope of this investigation to examine the whole population, to find out how many were affected, and to treat, by the most efficient methods, those found suffering from the disease.

It was decided to tackle school-children first, next their contacts, and finally the population at large. I undertook to examine all children attending the Government primary schools and their contacts, while the district medical officers were to carry out a house-to-house inspection of the whole population. Any cases about which the district medical officers were not too sure were referred to me for an opinion.

Diagnosis

Examination of patients was carried out in a good light with the aid of a loupe; the finding of trachoma follicles was essential for making a diagnosis. The search for inclusion bodies and examination with a slit-lamp were carried out only in some of the more difficult and doubtful cases. Differential diagnosis in this series

was chiefly between trachoma on one side and follicular conjunctivitis and the folliculosis sometimes met with in children on the other. Trachoma follicles were found, as expected, mostly on the tarsal conjunctiva of the upper lid. They were more numerous at the upper border of the tarsus, especially at its inner and outer extremities: they were irregular in size, shape, and distribution, and their number varied widely. Only a few were found in early cases, and they tended to be small; the conjunctiva in trachoma tended to be red, hyperaemic, and uneven, especially in active cases of long standing. Mucoid and mucopurulent discharge was found in some cases, while pannus was a variable finding.

Diagnosis was sometimes difficult, and in order not to swell the number of cases unduly, and yet obtain as accurate a record as possible, such cases were labelled non-committally "conjunctivitis." About half of such cases later proved to be trachoma, while the other half cleared up completely in a very short time. To Professor Sorsby we owe the observation that under treatment with sulphonamides the follicles of trachoma tended to follow a certain pattern of evolution: they first became larger and more opalescent, they next coalesced with neighbouring ones, and finally they became flatter before disappearing. My cases showed this behaviour, which enabled me to make a diagnosis in dubious cases, as follicles other than trachomatous did not evolve according to this pattern.

Treatment

Of recent years we have made real progress in the treatment of trachoma. The old drastic methods of cauterization and expression have largely been abandoned, and the place of physical methods of treatment, such as x rays and diathermo-coagulation of follicles, is rapidly being established. There is as yet no standard therapy of trachoma accepted by all, but most ophthalmologists seem to prefer the use of the sulphonamides, penicillin, "aureomycin," and other antibiotics. In a campaign such as the one under review the choice of treatment has to be determined chiefly by financial considerations as well as by the means available to enforce such treatment.

I decided to use the sulphonamides both locally and perorally. The drug employed was sodium sulphacetamide. The plan was to give patients tablets in full doses for ten days (as recommended by Professor Sorsby), and to instil drops of the 30% solution at least three times a day, while the 6% ointment was to be applied at night. I was afraid that not all would co-operate in accepting treatment, and so various talks to different sections of the community were arranged in order to explain the reasons for the drive and what was expected of people.

With the permission of the authorities concerned, I asked school teachers to give tablets to affected children during school hours and to instil drops in their eyes. The teachers rose to the occasion by accepting this public duty in spite of the many inconveniences it entailed. Tablets were given at 8 a.m., noon, and 4 p.m., while drops were instilled at the same times. The ten-day period during which children had tablets was divided into two five-day periods with an interval of two days between them (Saturday and Sunday). Such a system had obvious defects: holidays and absenteeism hampered regularity of treatment, while there was a long

gap between the last treatment of the evening and the first one the following morning. I tried to avoid some of these defects by giving drops and ointment to the children's parents, who were asked to supplement the treatment at school. One could never be certain how much was being done at home, but at least one was sure that a measure of treatment was being carried out in the school. Resistant cases received a second and a few a third course of tablets.

All contacts of affected school-children as well as the majority of the rest of the population have been examined and those found affected were given medicines free of charge and told how to use them. Periodically they were all seen by me to check and control progress.

Results

Details of the results obtained are shown in Tables I and II.

TABLE I

School	No. of Pupils	Trachoma	Conj.	2 Courses Tablets	3 Courses Tablets	No. of Cases Left after 2 Years	
						Trachoma	Conj.
Victoria:							
Boys ..	324	42	26	13	Nil	Nil	Nil
Girls ..	387	32	21	11	"	"	"
Ghainsielem:							
Boys ..	136	22	Nil	7	"	1	"
Girls ..	179	21	11	6	"	Nil	"
Zebbug:							
Mixed ..	183	18	19	6	"	"	"
Sannat:							
Mixed ..	269	113	14	9	"	2	"
Nadur:							
Boys ..	260	26	20	11	"	Nil	"
Girls ..	374	47	36	8	2	"	"
Xaghra:							
Boys ..	255	38	11	6	Nil	1	"
Girls ..	339	50	42	5	2	Nil	"
Gharb:							
Mixed ..	222	15	19	4	Nil	"	"
S. Laurenz:							
Mixed ..	71	6	7	1	"	"	"
Kercem:							
Mixed ..	193	21	12	8	"	"	"
Ghasri:							
Mixed ..	65	3	9	Nil	"	"	"
Xewkja:							
Boys ..	223	74	Nil	6	"	"	"
Girls ..	378	141	6	20	"	2	"
Qala:							
Boys ..	84	25	Nil	16	1	Nil	"
Girls ..	116	27	17	4	Nil	"	"
Total ..	4,058	721	270	141	5	6	"

TABLE II

School	Trachoma Cases		Average Age	No. of Contacts of School-children
	No.	%		
Victoria ..	74	10.4	8.07 years	103
Ghainsielem ..	43	13.6	8.64 "	42
Zebbug ..	18	9.8	7.5 "	21
Sannat ..	113	42.0	8.95 "	161
Nadur ..	73	11.5	8.34 "	144
Xaghra ..	88	14.8	8.81 "	102
Gharb ..	15	6.8	11.05 "	7
S. Laurenz ..	6	8.4	10.66 "	1
Kercem ..	21	10.9	9.47 "	8
Ghasri ..	3	4.6	8.33 "	3
Xewkja ..	215	35.8	9.48 "	272
Qala ..	52	26.0	9.35 "	62

In all, 4,058 school-children were seen, and of these 721 were found suffering from trachoma, and 270 from "conjunctivitis." Examination of members of families of affected children revealed that 926 contacts were actually suffering from trachoma. In a house-to-house examination of all persons on the island, 12,698 have so far been seen, and of these 612 had trachoma. The above figures show that the incidence of the disease is much greater among school-children than among the rest of the population. The percentage of affected

school-children varied widely. It was lowest at Ghasri (4.6% of all school-children), while it was the highest at Sannat (42%). Complete figures for the rest of the population are not yet available.

Early cases and those in which treatment was applied more scrupulously recovered more quickly, but some were very resistant. Any discharge present at the start of treatment usually disappeared within a few days, and for this reason no particular measures were taken to segregate school-children. District nurses carried out frequent visits to households of infected persons to give fresh medicine, to show how drops were best instilled, to advise on the important hygienic aspects of the disease, and to encourage perseverance in treatment.

Cases were declared cured and treatment was stopped when all follicles disappeared and when the conjunctiva became smooth and shining. The duration of the disease varied according to the stage at which treatment was started and to the regularity and assiduity of treatment. An idea of the length of treatment may be had from the following figures. After 13 months of the above course, only 117 cases of trachoma and seven cases of conjunctivitis were still under treatment in the primary schools of Gozo. After a further period of nine months, only six cases of trachoma were left in those schools. Of the 926 contacts, only 354 were left after six months' treatment.

Comment

It is probable that trachoma is spread by contact, through fomites, or through vectors. Lice and flies have long been suspected of being at least partly responsible for the spread of the infection, but no definite proof of this has been forthcoming in this investigation. Lice would abound in less hygienic dwellings, and this fact might at first thought be linked with the generally accepted view that trachoma is a disease of the lower classes. My experience, however, has not borne this out. I found trachoma among all classes with practically equal frequency, but patients of the upper classes tended to have fewer complications, and trachoma was often discovered on routine examination for other conditions. The better hygiene of the upper classes probably prevents or hinders the occurrence of secondary infections, which are responsible for some of the symptoms and some of the complications of trachoma. The case for the fly as trachoma carrier does not seem to be placed on better foundations: this insect is practically ubiquitous in Gozo, and it was found in great numbers in some of the areas where trachoma was less prevalent.

I have already mentioned that the incidence varied greatly from one part of the island to the other. I found this rather baffling, as it is difficult to believe that the state of hygiene would materially differ from place to place. It will be seen from the tables that Sannat and Xewkja, in the south and central parts of the island, had the greatest incidence, while S. Laurenz, Gharb, and Ghasri, in the western sector of the island, showed the lowest number of cases. Again, at the eastern tip, Qala showed a much greater incidence among school-children than did the neighbouring village of Nadur.

The average of affected children was of some interest; the age of those attending the primary schools was between 6 and 14; that of trachomatous children between 8 and 11. This finding agrees with that of an investigation carried out in Malta several years ago, and

its constancy may mean that children of the ages stated have greater contact between themselves, and that spread occurs chiefly in the schools. If this were confirmed, control of school-children would eliminate this disease in a short time.

The part played by immunity in trachoma is obscure but is well worth further study. In this investigation it was quite common to find only a few persons affected in a household, while three cases had trachoma in one eye only. Again, the fact that some cases responded to treatment better than others raises the question of different strains of the trachoma virus.

The sulphonamides have no doubt proved to be a milestone in our age-long fight to conquer trachoma, but they are not the ideal answer to the ophthalmologists' dream. Our goal should be to find a method capable of controlling the disease in a matter of days. Despite several claims, we are probably still far from this, although newer drugs, such as aureomycin, are proving very satisfactory.

Summary

The working of an intensive anti-trachoma drive on the island of Gozo is described. All primary-school children, their contacts, and a large section of the general population have so far been examined, and those found affected given free treatment. This consisted of sulphonamides by mouth for one or more periods of 10 days each, the instillation of sodium sulphacetamide drops (30%), and the application of sodium sulphacetamide ointment (6%). The campaign has yielded very good results, especially in respect of school-children. In two years only 6 out of 721 cases remained under treatment. Sulphonamides have proved very valuable in our fight against trachoma, but we are still in search of a method capable of controlling the disease in a matter of days.

My grateful thanks are due to Professor A. C. Briffa, Chief Government Medical Officer, Malta, for permission to publish this paper, and for constant encouragement and advice in the conduct of this campaign.

Medical Memoranda

Acute Tuberculous Peritonitis Treated with Streptomycin

Up till recently streptomycin has rarely been used in cases of tuberculous peritonitis in this country, mainly owing to difficulties in obtaining the drug. So far there has been no British literature on the subject; but cases have been reported in the U.S.A., from the Medical Department, Veterans Administration Hospital. A number of cases were treated for from 25 to 164 days, and the results were most successful; the temperature came down to normal, and the patients gained weight and felt very well.

Reports on streptomycin treatment have been received from Egypt, the results also being very satisfactory. These papers say that improvement was pronounced in the first two weeks. Similar good results have been obtained in the Argentine, France, and Russia.

We should like to add two cases of acute tuberculous peritonitis treated with streptomycin and *para*-amino-salicylic acid ("P.A.S.").