5. The need—in view of acidosis being a probable etiological factor in epileptic states—for careful investigation, and the probability that, if such is the case, efficient alkaline treatment may cure the condition if recognized at the onset of the fits. The giving of bromides would seem to be dangerous in such a state, as it only tends to dull cellular activities; later on it may be of use in treating nerve cells which have acquired vicious habits.

6. The danger to the patient in not adopting a firm attitude. If such cases are at once sent to hospital before serious mental symptoms come on there would soon be marked diminution in the admission rate at asylums.

7. The predisposition to microbic diseases afforded by acidosis, above all to tuberculosis. As regards children, there are questions which can best be answered by the general practitioner; for instance:

What is the relationship between "biliousness" in children and subsequent tuberculosis? Are the sexes equally subject to acidosis? Does it throw any light on the greater mortality of male children?

With regard to tuberculosis:

Is it a question of the optimum reaction of the medium necessary for the growth of the tubercle bacillus? In other words, do certain individuals, as a result of errors of nutrition or faulty cell metabolism, offer a more favourable pulmonary or lymphatic culture medium for the growth of the tubercle bacillus than do others?

Finally, is this whole question of acidosis, within limits, at the bottom of what we understand by heredity in respect to disease processes? Is it an effort on the part of the organism to autolyze itself? All these questions are of extraordinary interest, and the whole subject may bring us vastly nearer a proper comprehension of certain processes which up to the present have been shrouded in mystery.

THE CARE OF CRIPPLED CHILDREN.

BY

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CRIPPLED children need both treatment and education; only thus can they be restored to active citizenship, healthy-minded and, so far as may be, healthy-bodied.

In a former paper, published in the *BRITISH MEDICAL JOURNAL*, October 11th, 1919, attention was called to the crying need for effective treatment for crippled children, and a system of orthopaedic hospital-schools and out-patient clinics designed to carry out the work was outlined. It was estimated that about 10,000 beds would be required for the whole of England and Wales, but it was pointed out that new construction was not involved to this extent, both because in some places hospitals carrying out this work already existed, and in other places there were hospitals in use by the War Office or Ministry of Pensions which would be suitable, and could eventually be made available for this civil orthopaedic work.

Those who have studied the problem feel very strongly that provision for the treatment and all-round education of crippled children is the reverse of an extravagance, even in the present financial straits. The following figures are taken from the report on "An inquiry concerning physically defective adults and children" carried out by the City of Birmingham Education Committee in 1911. Their capacity for work was a subject specially noted, and it was found that among 1,001 cripples over the age of 16 only 111 were "able to do remunerative work at home," and 531 were "unable to do any remunerative work." Now it is the experience of those who work at hospitals for cripples that 90 per cent. can be cured or improved sufficiently to enable them to take a share in industry if the disability is tackled early and efficiently and training given.

It is true that there must be expenditure, perhaps for six months, during the active treatment of a crippled child, and that in some cases his education expenses afterwards may be high, but from the financial point of view alone it is a clear economy, for he is thus enabled to become a pro-

ducer instead of a dependant for the many years that follow. Further, these crippled children are already being maintained somewhere and by somebody. Many are in workhouses, infirmaries, or industrial homes, and quite out of touch with expert treatment. A large number have to be admitted to general hospitals on account of the severity of their condition; this is especially true of cases of tuberculosis of the spine, hip, and knee—the very cases that need many months or several years of unremitting treatment in open-air wards in the country with plenty of good food. These are the children above all others for whom the hospital-school and continued supervision are needed. On all these children money is now being spent, but with very imperfect results. On the other hand, a certain number of orthopaedic hospitals, orthopaedic departments of general hospitals, and hospital-schools for crippled children are already doing most excellent work; they can only deal with a minority of the cases, yet their very existence means that so much of the capital cost has already been faced, and so much of the maintenance expense is already being found.

In some places new hospital-schools for crippled children are needed, but almost everywhere there is waste and inefficiency due to lack of the combination of education and treatment, of the fellow-working of all the forces that have hitherto worked apart, and of continuity of orthopaedic supervision. The recognition of this is neither new nor singular, as the following quotations will show.

1. Report of the City of Birmingham Education Committee March 29th, 1912:

"More systematic co-operation and definite co-ordination between the local education authority and the hospital and medical charities, especially those which deal with orthopaedic cases, (are needed). In England, speaking generally, the divorce between these two organizations and their respective attitudes towards the children under their supervision is complete. The success which has attended the joint work of education and cure of cripples in America and on the Continent is in no small degree due to their close co-operation and identity of outlook."

2. Report of Census of Cleveland, Ohio, 1916:

"The need does not arise from failure to recognize separately the medical and educational requirements, but the failure to co-ordinate these and other forces affecting the life of each crippled child."

On the completion of their treatment most of the children would be able to go to ordinary schools. In towns some "special schools" would be advisable, but certainly far fewer than are called for now, when many children are allowed to remain crippled needlessly. As the cases are sent in progressively earlier the reduction of the number of children too crippled to attend ordinary schools will become greater in the same degree.

For a few children, either very severely crippled or living too far from a school, a "residential school" would be needed in each district, and this should be in the same grounds as the hospital-school. On their discharge from the hospital these children would then remain under the supervision of the orthopaedic surgeon and continue to attend the school and workshops. The advantages would be many, including administrative, educational, and workshop economy, and facility of orthopaedic supervision.

The publication of the paper already mentioned brought some of those whose work lay specially in the treatment of crippled children into touch with others who had done much for their education and training. These mutual interests have combined, and the "Central Committee for the Care of Cripples" has been formed. Its purpose is to represent and help voluntary associations devoted to the welfare of cripples, and to push forward the work in every possible way. This committee has become associated with the "Central Council for Infant and Child Welfare," and has an office at 20, Berkeley Street, W.

Whenever schemes are put forward or new associations formed there is alarm amongst existing organizations, for they naturally feel anxious lest their proved work is to be set on one side. In this case probably the feeling has been—"Is some new and theoretical system of State Service to start afresh with the slate wiped clean, and then perhaps never to work with the same sympathy and enthusiasm?" That is the last thing desired. Rather is the aim to unite and help the present efforts, to combine the workers and put better tools into their hands, and to make the attainment of results easier and quicker.

There is no need for new administrative machinery. The organization of this work must be moulded so that it will fit into its place in the health work of the nation—that system composed of central government (by the State), local authority (locally elected), and the ultimate network of health and social services, official and unofficial. Of this network the hospitals form nodal points; voluntary in origin, they are becoming more and more linked up with State mechanism by the system of capitation grants for the treatment of various types of disability.

The Hospital-Schools for Crippled Children will, it is hoped, be worked in close touch with the medical officers of health in their districts, and in affiliation to the general hospitals. For the costs of maintenance each hospital-school will be largely dependent on capitation grants from the local authorities, who will pay only if they are satisfied with the work that is being done, and if the institution has been approved by the Ministry of Health and Board of Education, for with this approval 50 per cent. of the maintenance fees paid out can be recovered. In some districts several counties will be served by one hospital-school; these arrangements will be made to accord with the geographical conditions in various parts of England and Wales. On the other hand, in London and other big cities a fitting plan would be that each orthopaedic hospital, or general hospital with an orthopaedic department, should have its section of the town, and its beds for crippled children in the country. This would make towards simplicity of working, and continuity of treatment and supervision of the patients present and past throughout hospitals, special schools, and their homes.

Guidance and help from the Ministry of Health and Board of Education would be welcome, for an organization for the care of cripples, planned to give them all that they need, must at the same time be moulded to fit into its place exactly, and be linked up accurately with the existing health and education machinery, for only thus will efficiency be quickly realized and permanently maintained. It will be a small part of the whole structure, yet essential, for it is to deal with children to whom effective care alone can give lives active, happy, and self-supporting.

A HOSPITAL-SCHOOL FOR CRIPPLED CHILDREN.

An attempt has been made to represent diagrammatically a hospital-school of 200 beds, with its various parts indicated and grouped on a definite plan, and an associated "residential school." The plan is intended to serve as a means of illustrating some of the many points to be thought of in planning such a hospital and as a stimulus towards further consideration of the subject. No doors or windows are indicated.

Types of Cases.

The conditions for which these hospitals are needed can quickly be grasped from such a table as that given in the article on the Cure of Cripples, in the BRITISH MEDICAL JOURNAL of October 11th, 1919. It is now repeated—corrected in one particular—in the next column. It will be seen that the cases are grouped into three main categories:

1. Deformities.
2. Paralyzes.
3. Surgical tuberculosis and other affections of bones and joints.

Desiderata.

1. *Open Air Wards in the Country.*—Probably only those who have worked in a hospital where the children are in open air night and day can realize its marvellous effect on their vitality and powers of recovery.

2. *A site on dry subsoil, fairly high, with southern aspect, and a low rainfall.* A low local rainfall can sometimes be found in a district which as a whole has a comparatively high rainfall.

3. *A position in the neighbourhood of a main town, with good radiating railways and roads, and if possible near enough to the town to share in the advantages of its electricity and gas and the transport, water, and drainage systems.*

4. *Affiliation with a good General Hospital.*—Hospital organization is tending towards the co-ordination of the special hospitals in each neighbourhood with a "mother" general hospital. This should give many advantages—

Table of Cases under Treatment.

	Shropshire.	Stoke.	Total.
Approximate population of area served...	425,000	246,307	671,307
Approximate proportion of cases under treatment to population	1 to 538	1 to 722	1 to 594
A. Deformities, congenital or acquired:			
Rickets	177	51	228
Deformities of the foot	71	51	122
Scoliosis	8	14	22
Congenital dislocation of hip... ..	16	8	24
Fractures, non-union and mal-union	15	10	25
Other deformities... ..	43		43
Total	330	134	464
B. Paralyzes:			
Infantile paralysis	211	72	283
Infantile hemiplegia	43	11	65
Spastic paraplegia		11	
Total	254	94	348
C. Surgical tuberculosis:			
Spine	55	75	230
Hip	57		
Knee	26		
Other joints, etc.	17		
Total	155	75	230
D. Other conditions:			
Osteomyelitis	33	11	44
Various	16	28	44
Total	49	39	88
Grand total	788	342	1,130

for instance, the special hospitals would share in the benefits of a first class pathological laboratory, and it should bring the spirit of team work into hospital relationships.

5. *Sufficient beds to meet the demand from the area which the hospital serves.* It is particularly important to avoid the results of bed pressure: (1) Undue curtailment of treatment, and (2) a heavy waiting list.

6. *A Unit of Manageable Size.*—The hospital shown is planned for 200 patients. This is recommended as the best size. Sufficiently large to justify the necessary expense of an expert staff, it is yet not too large to be dealt with effectively by a clinical team consisting of orthopaedic surgeon, assistant orthopaedic surgeon, two house-surgeons, physiotherapist, and masseuses.

7. *Administration Offices.*—Where these hospitals are to be managed by a committee, offices will be required for a secretary-accountant and his clerk or clerks; for the matron and her clerk; and for a housekeeper or steward.

8. *Construction and Design.*—The hospital as shown might well be of semi-permanent construction and of "bungalow" type. Wood should not be used externally, owing to the great cost of maintenance involved. Beside the general principle of placing all wards and living rooms on the southern side of the hospital the following points illustrated in the plan may be mentioned:

(a) *Ward units*—each main ward complete with its two accessory blocks.

(b) The concentration of departments specially concerning the surgeon (west end of centre block); the conjunction of clinical rooms of surgeon and physiotherapist (49, 50).

(c) The aggregation of the departments requiring heating or hot water supplies into a small number of groups. In each of the three main groups the heating plant can be situated under or close to a department requiring special heat—namely, (1) theatres in the surgical group, (2) the hydrotherapy room, and (3) the kitchen.

(d) The economy of service, heating, and hot water supplies obtained by the grouping together of all the dining-rooms and the resident quarters of the matron and the three medical officers.

(e) The advantage of locating entrance, kitchen, etc., on the northern side of the hospital, so that the southern may be clear.

(f) An arrangement of drive, short, but serving the principal points of supply.

(g) The provision of covered walks between the various buildings of as short a total length as possible, yet so arranged that nurses or children can get from any one part of the institution to any other without getting wet.

(h) A convenient position should be found for the nurses' quarters. This building should stand in its own garden. Each nurse should have a separate small bedroom. A reading room and a recreation and lecture room should be provided.

9. *Departments and Wards well equipped for Orthopaedic Work.*—Points that may be mentioned have regard to:

A. Examination Room.

This should be long, so that patients may be seen walking, warm, and with good light. There should be a waiting-room for patients. Even if the main clinical laboratory work is done at the general hospital, simple equipment for the examination of smears, etc., should be provided.

B. Theatres.

Two are indicated with the anaesthetic room between. Each should be complete with its whole outfit and one reserved exclusively for clean cases. There should be ample space and light. The plan does not show separate rooms for washing-up. The writer works in a theatre devised in accordance with a plan worked out by Mr. A. P. Dodds-Parker which is recommended as very simple and extremely safe. It involves merely a rather elongated theatre with one end reserved for washing-up and the sterilizing of instruments, the other for operating. The ends are partially separated by a central transverse baffle coming down from the ceiling to within 7 ft. of the floor. Fresh air is admitted to the operating area through ample inlets protected by a single layer of muslin; at the same time the steamy air is prevented from spreading into this half of the theatre (and there condensing) by the baffle and by an exhaust fan at the southern end.

A room for aspirations and minor operations in the south block is shown.

C. Plaster Rooms.

Plaster-of-Paris plays a great part in the work of these hospitals. The actual treatment of cases in plaster, the preparation of casts on which to make spinal jackets or other appliances, and record casts, together necessitate good provision of plaster rooms. Two are shown in the surgical block, and a third in the south block for the treatment of the cases there. They should be well heated and ventilated, and equipped with an Abbott's frame, a good vertical suspension frame, and a strong table with arrangements for pelvic rests, etc.

D. The Splint and Appliance Workshops.

These workshops are mentioned later.

E. The Wards.

The four main wards shown on our plan can be partitioned further if thought desirable. They face directly south, and on this side are open right up to the ceiling level, which should be about 9 ft., the place of the south wall being taken by pillars.

The beds would usually be ranged in a double row. When driving rain beats into the ward the front row of beds could be pushed back. Further protection can be given by stout canvas roller blinds which can be pulled down between each pair of pillars.

All main wards should be lit and ventilated by windows on the north side, in addition to being open to the south.

The floor of the wards should slope slightly outwards.

In these open-air wards the children need plenty of food, plenty of blankets, and, in cold weather, a supply of artificial heat. Whether hot-bottles which have to be reheated or refilled several times a day or electrically-warmed mattresses will prove more economical is not yet clear. Possibly the latter system will gain on the score of economy due to the saving of hot water, labour, and breakages; it is certainly a more efficient source of controlled and steady heat. Information on this point should soon be available from the Hayling Island annexe of Sir William Treloar's Alton Hospital.

The southern block of the hospital could be specially devoted to cases of surgical tuberculosis. Diseases of the spine and hip account for the majority of such cases in hospital and mean treatment in bed for very long periods.

Each main ward has attached to it:

1. Ward Annexe, containing—

A. Sister's room, 15 ft. by 9 ft., from which there is a good view of the ward.

B. Nurses' duty room, 15 ft. by 19 ft.; this is available for dressings and the massage of certain bed cases.

C. Bathing room, 15 ft. by 12 ft., with tables on which cases on frames or in plaster can be washed.

D. Ward kitchen, 15 ft. by 5 ft., with gas stove.

E. Bathroom, 15 ft. by 7 ft., with washing basins and baths.

F. Drying room, 15 ft. by 7 ft., for damp clothes or bedclothes.

G. Kit and linen store, 20 ft. by 10 ft. south, 15 ft. by 10 ft. centre.

Rooms B, C, D, and E should be fitted with hot and cold water. For B and C warmth combined with thorough ventilation is most important, for it is dangerous to take the more delicate children into a stuffy room for washing or dressing, although they remain free from bronchitis if treated continuously in the open ward. It is exceedingly difficult to keep these two rooms warm and airy without windows which can be opened on either side and open fires. Further, the nurses on duty must be remembered as well as the patients.

The projection of this annexe in front of the ward gives some shelter from cross winds, and adds to the stability of the structure.

2. *Sanitary Block*, connected to the centre of each main ward by a short cross-ventilated passage, and containing a slop sink, etc.

Wards for Isolation and Acclimatization.—The plan indicates three small wards (15 ft. by 10 ft.), with partially glazed partitions, and a nurse's room from which the wards can be overlooked. The south side of these wards consists of double doors which can be opened inwards. The wards can be used for infectious cases or for the acclimatization of specially delicate children to living in the open air. Observation of newly admitted cases in special wards is not found necessary in open-air hospitals.

Babies' Wards.—On the south side of the west end of the central block are two wards—one for babies, the other for the admission of both mother and baby when necessary; both can be completely opened to the south.

Recovery Ward.—In a children's hospital especially it is a very great advantage to have a ward set aside for the reception

1. Nurses' quarters.
2. Matron's bungalow.
3. Kitchen offices.
4. Cooks' room.
5. Housekeeper's office.
6. Stores.
7. Larder.
8. Servants' room.
9. Kitchen.
10. Matron's dining-room.
11. Nurses' dining-room.
12. Girls' dining-room.
13. Boys' dining-room.
14. Porter's room.
15. Telephone room.
16. Matron's office.
17. Matron's clerk.
18. Secretary's office.
19. Secretary's clerk.
20. Waiting room (parents).
21. Stores.
22. Ditto.
23. Dispensary.
24. Sewing room.
25. Photography.
26. Radiology.

27. Developing.
28. Plaster casts and records.
29. Sterilizing.
30. Theatre for septic cases.
31. Anaesthetic room.
32. Theatre for clean cases.
33. Plaster.
34. Splint store.
35. Surgeon's changing room.
36. Nurses' changing room.
37. Isolation annexe and sanitary.
38. Isolation ward.
39. Mother and baby.
40. Babies.
41. Recovery ward.
42. Ward annexe.
43. Centre ward, girls.
44. Centre ward, boys.
45. Ward annexe.
46. Reading room.
47. Play room.
48. Waiting room.
49. Clinical room, surgeon and clerk.

50. Clinical room, physio-therapist.
51. Masseuses' duty room.
52. Hydrotherapy.
53. Electricity and massage.
54. Gymnasium.
55. Medical officer's quarters.
56. Residential school quarters.
57. School.
58. Covered playground.
59. Workshops.
60. Sanitary block (workshops, etc.).
61. South ward, girls.
62. Ward sanitary block.
63. Plaster.
64. Minor operations.
- 65 and 66. Schoolrooms.
67. South ward, boys.
68. Ward annexe.
69. Drive.
70. Asphalt or concrete area.
71. Asphalt or concrete slope. Garage, laundry, chapel not indicated.

N.B.—Pathological laboratories and an out-patient department, though not shown, will be required if the hospital is not working in touch with a general hospital.

of cases for the first twelve or twenty-four hours after operations. It must be most harrowing for children to watch others go through the process of "coming round" from an anaesthetic, and a most undesirable preliminary to a subsequent operation on themselves.

Adolescents and Adults.—No special wards are indicated for these. The girls and boys are in distinct sides of the hospital, so that adults could be accommodated in one end of the ordinary wards.

Paying Patients.—Similarly no wards are indicated. Small bungalows in suitable positions could be provided.

Education.

Regulations as to education in hospital-schools are laid down by the Board of Education. In this plan no design of the schoolrooms is indicated, but positions are suggested. The main school lies to the east of the site and is surrounded by the workshops, residential school quarters, covered playground, reading and play rooms. The main school block would be attended by walkers and chair cases from the central block of the hospital, as well as by the children in the residential school quarters. The schoolrooms in the centre of the south block are so placed that the children confined to bed in this ward can be pushed to school easily, bed and all.

The residential school quarters are for children who, though they no longer require hospital treatment, would get no education if sent home, owing to the relation of the degree of their disability to the distance of the school from their home. Here, again, no internal structure is indicated, but as some of the children in these quarters will probably be convalescent from tuberculous conditions, one or two open-air dormitories might well be provided. No cubicles or dormitories should be on the north side. The size of this particular building should not be regarded as a reliable guide as to the residential school needs of an area requiring a hospital of 200 beds. A group of small cottages would be an alternative method of housing the older children. The children in hospital and in residential school need reading rooms, play rooms, covered and open playgrounds.

The Workshops should supply training in various handicrafts. Besides those of general application, such as carpentry, cobbling, leather and basket work, in each district the local trades should be specially considered.

Splint Shop.—It is an immense gain to an orthopaedic hospital that all the splints and appliances needed in the hospital should be prepared in its own workshops. The instrument makers can then work in constant touch with the orthopaedic surgeon, and so carry out his ideas exactly. Further, in urgent cases special splints can be made immediately.

It is recommended that part of the workshops should be of the open-sided hut type, and that all should be specially well ventilated, for they will be used in the training of children in the hospital and residential school. It will sometimes be possible to give permanent work as instrument makers or instructors to children who have passed through the residential school and shown special aptitude.

Maintenance.

Complete fulfilment of the conditions laid down by the Ministry of Health and the Board of Education, which include arrangements for dental and refractive work, is necessary so that the "approval" of these departments may be obtained for work under (a) the Maternity and Child Welfare Act, (b) the Education Act (1918), and (c) the tuberculosis clauses of the Insurance Act.

Great benefits will be derived from close association with the medical officers of health and tuberculosis officers of the group of local authorities served by each hospital-school.

Definite working arrangements should be made with the local authorities by which the costs of maintenance, worked out to an average for each child and approved by the Board of Education, are paid on a capitation basis by the local authority concerned in accordance with the Acts mentioned above.

Expenditure.

The following is an analysis of the weekly expenditure per child at Baschurch for the quarter ending December 31st, 1919:

	£	s.	d.
Food	...	0	19 1
Drugs and chemicals	...	0	1 9
Instruments and appliances	...	...	...
X-ray apparatus	...	0	4 4
Boots and leather	...	...	...
Salaries	...	0	11 2
Repairs and renewals	...	...	...
Buildings and machinery	...	0	5 0
Hardware and crockery	...	...	...
Furniture and bedding	...	...	...
Oil and fuel	...	0	2 1½
Laundry	...	0	1 0
Printing	...	...	...
Stationery	...	...	...
Postage, telegrams	...	...	...
Rent, rates	...	0	2 10
Carriage	...	...	...
Railway fares	...	...	...
Miscellaneous	...	...	...
Total	...	2	7 3½

The total weekly cost is seen to be greater than the estimate of £2 given in the paper published in October. This is due to the rise of prices, which unfortunately has not yet stopped.

Beyond all these material advantages, there is needed in the staff enthusiasm for the work, orthopaedic experience, with a balanced judgement of the values of various methods of treatment, the highest degree of skill, and well arranged clinical team work. Further, the efficacy and permanence of the work of such a hospital depends on early recognition and treatment and on thorough after-care. The use of all the health services of the district, official and voluntary, especially the work for infant and child welfare, should lead to the early discovery of crippling conditions, and avail to bring them into touch with orthopaedic treatment without delay. Similarly, each patient on discharge from hospital should be attached to one or other of the orthopaedic clinics scattered through the district. Careful after-treatment and supervision will then make for the attainment of the best result possible for every child.

THE X-RAY TREATMENT OF ACNE VULGARIS.

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INTRODUCTORY.

IN spite of the general advance in dermato-therapy during the last decade, it is discouraging that few of the commoner skin diseases can be permanently cured. It is now established that acne vulgaris—perhaps the most widespread minor skin ailment in this country—no matter how extensive, or in what stage it presents itself, can be permanently cured by judicious x-ray treatment. I am well aware that, in making this statement, I lay myself open to the retort that radiotherapy for so trivial a complaint is a dangerous and quite unjustifiable remedy. The comedo and pustular stages of the condition are, however, very objectionable, and women especially cannot afford to regard the prospect of permanent disfigurement by pitted or keloidal scars with equanimity. It is surprising to find that most of the larger textbooks incline to the opinion that x-ray treatment should be reserved for the most intractable cases. In these, however, irremediable cicatrization will already have occurred, and the final appearance when cure has been brought about may resemble the after-effects of small-pox or lupus. It would seem to be an axiom of therapeutics that nearly all its most effective weapons are dangerous in unskilled or injudicious hands; but no reasonable member of the profession would therefore limit the administration of salvarsan in syphilis, of emetine in dysentery, or of chloroform in the major operations of surgery. To relegate an invaluable and approved remedy to the position of a last resource because there have been disasters among the earlier cases, is to assume an attitude for which there is now no justification, and which it is the main purpose of this article to repudiate.

Pathology.

Acne vulgaris is mainly attributable to the activities of a particular microbacillus first grown by Sabouraud. Every comedo contains it in more or less pure culture, as can be proved histologically by suitable staining reagents. The acne pustule is the result of contamination of the