has been written about this product, and one of the most striking things at the National Milk Conference held at the Guildhall last October was the remarkable unanimity of the medical speakers with regard to its usefulness; but I do not think it is sufficiently realized that the product varies considerably in characteristics according to the method by which it is prepared. Two processes of manufacture are now in use. The first of these consists in the rapid drying of fresh milk on rollers heated by water or steam, and the subsequent powdering of the solids thus obtained with or without admixture of lactose; the second in the projection of milk in the form of a fine spray into a chamber with a current of hot dry air, so that the milk solids fall on the floor in the form of fine powder.

The powders produced by these two processes differ not only in physical characters but also in their reaction to rennet. Roller process powders, for instance, are not soluble in cold water, whereas spray powders are soluble; but the most important difference is the fact that whereas the addition of rennet to reconstituted milk prepared from the former variety produces a fine flocculent curd, its addition to a solution of spray process milk powder forms a dense mass identical with that formed in raw milk. This difference is important, for it was the character of the curd described by French writers as "just like human milk" which first led most of us to advocate the use of milk in this form for infant feeding. Another characteristic of dried milk which has always appealed strongly to me is the constancy of its composition. Nothing is more notorious than the variation in the composition of the milk of one cow, but Dr. James Crowther has drawn attention to the remarkable variation in the milk of small herds as well. In a paper read at the National Milk Conference he pointed out that the variation of fat from day to day is not great in either morning or evening milk when considered separately, but as between morning and evening milk the range of variation is relatively enormous.

In regard to vitamins, I might mention that Professor Dreyer of Oxford University has pointed out that it is only the "C" vitamin which is reduced in quantity by heat. It is destroyed altogether by double heating, reduced considerably by the longer periods of heating at low temperature commonly practised, but only slightly affected by rapid boiling or short heating at temperatures near the boiling point. It may be asserted, therefore, that milk loses little of its vitamin content by the process of drying, whereas with commercial pasteurization there is a tendency to reheat the milk in the home and thus destroy all the "C" vitamin. It is suggested that it is twice-heated milk which causes infantile scurvy.

I consider that milk in this form is especially adapted for mixed feeding, in which, perhaps, the best practice consists not in giving breast feeds and bottle feeds alternatively, but at each feed giving first the breasts and then a bottle in which the amount of milk corresponds as nearly as possible to that in which the former was deficient. Frequently the complementary feed, especially in young infants, is very small, and if ordinary milk be used we are faced with considerable difficulties in regard to obtaining it absolutely fresh, while if condensed milk is used wastage is almost unavoidable. Milk powder can be kept in a tin for weeks, and the French authorities strongly recommend it and largely employ it when a complementary ration is required to supplement the mother's milk.

It is obvious from the foregoing remarks that the subject I have ventured to bring before you is one on which strongly divergent views are held by various authorities on both sides of the Atlantic. We have what might be called three distinct schools of thought—namely, the fresh milk school, the condensed milk school, and the dried milk school. Famous names can be found in the members of each school, and it might not be unprofitable in this discussion to bring out the special qualities claimed for each variety, as the best practice may be found in a knowledge of and judicious employment of all three varieties.

Personally, my experience has been chiefly in hot countries, where milk is more putrescible, more sophisticated, and even more liable to contamination than in temperate climates. Under such conditions for infant feeding

one has turned gratefully from the "white sewage" of the bazaars to the comparatively sterile milk powders.

DISCUSSION.

Dr. ERIC PRITCHARD (London) said that the statement made by him regarding cow's milk referred only to infants in the first few days of life and to undiluted milk. It came as rather a shock to him that milk had toxic properties. Normally he thought that such substances were broken up and detoxicated in the process of digestion. With regard to the use of condensed milk, when one had pathological cases they had to be fed pathologically. All kinds of milk were useful if properly used.

Dr. CATHERINE CHISHOLM (Manchester) felt it advisable to stress the necessity of teaching medical practitioners and students the principles underlying the maintenance of a good breast secretion. They taught the necessity of breast-feeding, but they were too ready to accept the statement that the milk was insufficient and poor. She felt that all forms of milk could be used by some healthy children, and agreed that all types of preparation had their uses if given according to indication. The difficulty of using dried milk for children with dyspeptic difficulty was that it was not so easy to vary the constituents of fat, protein, and sugar according to the varying necessity of the case.

PROGNOSIS AFTER REMOVAL OF SEMILUNAR CARTILAGES.

BY

R. J. McNEILL LOVE, M.B., M.S.LOND.,

F.R.C.S.ENG.,

SURGICAL REGISTRAR, LONDON HOSPITAL.

THE object of this paper is to review the results of a series of cases of meniscotomy and to endeavour to investigate any factors which influence the prognosis after operation. This paper is based upon a series of 50 cases, the majority of which were treated in the army, and owing to favourable local conditions one was enabled to keep the patients under observation for a sufficiently prolonged period while they performed ordinary duties and partook of vigorous exercises—for example, football, swimming, etc.

It was a curious fact that during the Mesopotamian campaign internal derangement of the knee was an epidemic condition, especially prevalent in the autumn. The probable explanation of this was that during the summer months all hostilities automatically ceased and strenuous exercises and games were in abeyance. The result of this inactivity combined with excessive heat was that muscles, ligaments, and other periarticular structures rapidly lost their tone. With the onset of the autumn an active life was abruptly resumed, and as a consequence internal derangement occurred before the structures supporting the joint regained their tone.

That loss of tone is a predisposing cause of internal derangement of the knee is also suggested by the fact that derangement sometimes follows a simple effusion when a sudden strain is thrown on the knee before the effusion has completely subsided. This occurred in one case of this series when internal derangement followed simple traumatic synovitis; the patient slipped into a river and displaced his internal cartilage while struggling out again.

The war in Mesopotamia virtually ended in the spring of 1917, after which the Expeditionary Force became an army of occupation. This obviated the need of continual movement of men, hence after operation men could be posted for duty at base units, and so "followed through" as long as necessary.

Treatment was carried out on the lines now almost universally adopted. After the first attack the limb was splinted, in the hope that adhesions might form and reflex a separated cartilage to the capsule. It is imperative that reduction of the cartilage is first obtained, and if the cartilage is merely displaced or torn without separation of fragments fixation may then occur.¹ Patients who had suffered more than one attack were strongly advised to submit to operation.

OPERATION.

I do not propose to discuss details, but merely to refer to a few salient points. A rubber bandage was always used as a tourniquet, and the leg firmly held by an assistant at about 120 degrees, the heel resting upon the table across the opposite leg. The advantage of this is that further flexion and rotation can easily be obtained. The surgeon stands on the opposite side and is thus enabled to look directly into the joint. This series of cases only includes those in which a definite diagnosis of displaced cartilage had been made, therefore Annandale's transverse interarticular incision was used, modified by a slight curvature upwards by the side of the patellar ligament in front. Posteriorly it extended to half-way round the joint, the internal lateral ligament not being endangered, as this structure lies postero-internal. I am aware that the vertical curved incision of Sir Robert Jones gives a better exposure for a general survey of the joint, but when the diagnosis of displaced cartilage is practically certain the transverse incision gives a more direct approach.

The cartilage, having been exposed, is hooked out and as much as possible removed, the synovial membrane then being inspected for fringes, tags, etc. Sutures of plain catgut are used for synovial membrane and capsule, and silkworm gut for the skin, the sutures being interrupted so that any excess of post-operative effusion can escape between the stitches. A bandage is applied firmly before the tourniquet is removed, and the patient returned to bed without a splint. The following day it is usually found necessary to loosen the bandage as swelling of the joint renders it uncomfortable.

Probably no muscle in the body wastes more rapidly than the quadriceps extensor, and therefore massage of the muscle is commenced on the second day. At the end of four days the bandage is further loosened to allow limited movement, which is speedily encouraged, and the patient is allowed up with a stick at the end of twelve to fourteen days, the inner border of the boot being raised about a third of an inch to take the strain off the inner aspect of the capsule.

In this series of fifty cases on only one occasion was the external cartilage the seat of the trouble. Von Bergmann states that the internal cartilage is separated "more than twice as commonly as the external";² this probably underestimates the relative frequency.

I append a list of the relative frequency of pathological changes found in this series; in many cases more than one change was present, but to avoid complications I have only indicated the most obvious lesion.

Circumferential split	...	...	27
Definite abnormal mobility	...	...	15
Frayed or flattened	...	...	6
Doubtful increased mobility	...	...	2

Although in the last group no definite mobility was discovered, removal of the cartilage relieved all symptoms—a condition which has been remarked upon by Rendle Short.³

With regard to the length of time which should elapse between separation of the cartilage and operation, it is wise to wait a few days until the acute traumatic inflammatory reaction has subsided. There seems no need to wait until all the fluid has been absorbed; this may be a matter of weeks. In seven cases an ounce or more fluid escaped on opening the joint and no untoward complications occurred.

PROGNOSIS.

In considering the prognosis special attention was paid to the following features:

(a) *Recurrence.*

(b) *Pain.*—This is, of course, a difficult symptom to assess at true value. Many patients complain of slight or diminishing pain for an interval varying from a few weeks to two years, but unless it caused actual disability such pain has been ignored in considering the prognosis.

(c) *Movement.*—With a relatively healthy joint, followed by absence of splinting and early movements, there seems to be no reason why movement should be restricted after operation.

(d) *Stability.*—A "feeling of weakness" is a common immediate after-result of meniscotomy. This is in a great measure psychical, as the patient is often accustomed to the

deranged knee feeling weaker than its fellow. Encouragement soon leads to re-education and restoration of confidence; and in the majority of cases the patient soon learns to trust his knee again and appreciate its stability.

Results fall naturally into three groups:

1. *Good.*—Where there is negligible pain, no sensation of weakness, and movements are unimpaired. This group includes two professional footballers and one music-hall dancer, all of whom subsequently followed their normal occupations.

2. *Fair.*—This includes cases in which there is slight limitation of movement or pain occurring periodically or when the limb is placed in certain positions.

3. *Poor.*—This includes cases in which recurrence takes place or range of movement is less than a right angle. Also are included cases in which pain is frequent or a sensation of weakness remains in the joint.

In considering these cases it is interesting to note that prognosis appears to depend chiefly upon two factors—firstly, the number of attacks, and secondly, the age of the patient. Hence I have analysed the series from these standpoints.

A. Prognosis in Relation to Number of Attacks.

(Group I consists of cases with not more than three attacks; Group II of cases with more than three attacks.)

	Group I (29 cases).	Group II (21 cases).
<i>Pain:</i>		
None or insignificant	23	13
Periodic	3	5
With certain movements	3	3
<i>Movement:</i>		
Unimpaired	24	15
Slightly impaired	4	3
Less than 90 degrees	1	3
<i>Stability:</i>		
Normal	27	15
Sensation of weakness	2	6
<i>Results:</i>		
Good	23	13
Fair	6	5
Poor	1	3

There were no recurrences in Group I; two in Group II.

It will be noticed that, as would naturally be expected, the results of operation before repeated attacks have caused stretching of the supporting structures or early osteo-arthritis are much superior to those obtained in later cases.

Symptoms recurred in two of the later cases. In one this was shown to be due to foreign bodies in a joint which was the seat of osteo-arthritis. In the other subsequent operation was refused and no cause could be stated; possibly the failure was due to excessive traction on the cartilage during removal causing separation of the posterior remaining portion—a danger which has been emphasized by Sir Robert Jones.⁴

The occasional pain relatively more frequent in the later cases was usually associated with changes in the weather, suggesting its association with secondary osteo-arthritis.

B. Prognosis in Relation to Age.

(Group III consists of cases under 30 years of age; Group IV of cases aged 30 and over.)

	Group III (31 cases).	Group IV (19 cases).
<i>Pain:</i>		
None or insignificant	26	10
Periodic	1	7
With certain movements	4	2
<i>Movement:</i>		
Unimpaired	25	13
Slightly impaired	4	3
Less than 90 degrees	1	3
<i>Stability:</i>		
Normal	28	14
Sensation of weakness	3	5
<i>Results:</i>		
Good	26	9
Fair	4	7
Poor	1	3

There was one recurrence in each group.

As was to be expected, prognosis in the elder patients was less good than in the younger, for the power of recuperation diminishes with age and osteo-arthritic changes are more prone to occur. Also as a rule the elder patients have been subjected to more numerous attacks.

By combining the two groups the results of operation were: Good, 35 cases (70 per cent.); fair, 11 cases (22 per cent.); poor, 4 cases (8 per cent.). Hence the prognosis is not by any means assured, but I believe these figures indicate a fair average of the results that may be expected if cases are "followed through" after operation. This is particularly necessary with internal derangements of the knee-joint, as cases apparently cured may relapse after a period of freedom. In one patient in this series who was apparently cured the condition suddenly recurred after an interval of nine months of strenuous life.

Prognosis should be especially guarded where attacks have been frequent and in the elderly. On the other hand, when once attacks have become established insecurity of the joint and osteo-arthritic changes are a natural sequence and may be diminished or controlled by removal of the offending cartilage.

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THE ANTISEPTIC ACTION OF THE STYRYL-PYRIDINES AND STYRYL-QUINOLINES.*

BY

C. H. BROWNING, J. B. COHEN, S. ELLINGWORTH,
AND R. GULBRANSEN.

(From the Organic Chemistry Department of the University, Leeds, and the Pathological Department of the University and Western Infirmary, Glasgow.)

THE formation of styryl-quinoline derivatives by the condensation, in presence of piperidine, of p-dimethylamino-benzaldehyde and quaternary salts of quinaldine and lepidine was noticed by König,⁴ and, later, Barbier¹ and König and Treichel⁵ described a number of substances of this type. Recently Mills and Pope⁶ described the preparation of a similar kind of compound from α -picoline methiodide, and also recorded the fact that this material, like the cyanines, possesses photosensitizing properties. The similarity in structure between these substances and those of the isocyanine type, together with observations made by us showing that the antiseptic potency of the isocyanines was increased by simplification of the quinoline portion of the molecule, suggested the possibility that the styryl compounds might also exhibit antiseptic activity. The relation between the two types will be apparent from the appended formulae:

Preparation of the Styryl Compounds.

One molecule of p-dimethylamino-benzaldehyde and 1 molecule of the quinaldine methiodide were dissolved in alcohol, and the solution boiled for three to four hours after the addition of a small quantity of piperidine. The dyestuff, which crystallized on cooling, was in some cases recrystallized from alcohol. This further purification, however, did not increase the antiseptic potency.

These bodies have the advantage over the cyanines of being much more easily and rapidly prepared, and are obtained in much better yields. The following compounds were tested:

- 2 p-dimethylamino-styryl-pyridine methiodide;
- 2 p-dimethylamino-styryl-quinoline methiodide and ethiodide;
- 2 p-dimethylamino-styryl-6 aminoquinoline methiodide (base and hydrochloride);
- 2 p-dimethylamino-styryl-6 methylquinoline methiodide and methochloride;
- 2 p-dimethylamino-styryl-6 methylquinoline allobromide;
- 2 p-dimethylamino-styryl-6 methoxyquinoline methiodide and the corresponding ethoxy compound;
- 2 p-dimethylamino-styryl-7 aminoquinoline methiodide hydrochloride.

Antiseptic properties were determined, as previously described.^{2,3}

To 1 c.cm. of culture medium were added varying amounts of the substances to be tested along with 0.1 c.cm. of a 1 in 1,000 dilution in saline of a twenty-four-hour culture of the organisms (*Staphylococcus aureus* or *B. coli*) in peptone water. As test media (a) 0.7 per cent. peptone water with a P_H value of about 7.2, and (b) undiluted ox serum (previously heated at 56° C.) were employed. The mixtures were then placed at 37° C., and were examined after forty-eight hours for the presence or absence of growth, which was determined in each instance by the appearance of turbidity in the fluid, and also by subculturing a loopful on agar.

In the case of *Staphylococcus aureus*, the sterilizing concentration of the above-named substances lay between 1 in 200,000 and 1 in 1,000,000 both in peptone water and in serum, except with 2 p-dimethylamino-styryl-pyridine methiodide, which was distinctly weaker (1 in 40,000 was required to produce sterility in both media). Toward *B. coli* the antiseptic action was never greater and usually somewhat weaker than toward *staphylococcus*. For *B. coli* the most powerful compounds were 2 p-dimethylamino-styryl-6 methylquinoline methochloride and methiodide (sterilizing concentration in both media, 1 in 100,000 to 1 in 200,000). The occurrence of long zones of inhibition between concentrations which permit of active growth and those which sterilize completely is a feature of this group of compounds. In no case did the presence of serum cause a marked decrease in antiseptic power for either organism.

The toxicity of several compounds of the series was tested for mice; the tolerated dose was 1 c.cm. of 1 in 5,000 to 1 in 15,000 dilution for animals weighing 20 grams. Where lethal doses had been given there were no characteristic lesions in any organ.

The methochloride and methiodide of 2 p-dimethylamino-styryl-6 methylquinoline and the ethochloride and ethiodide of 2 p-dimethylamino-styryl-quinoline were tested on mice infected with *Tryp. brucei*; but with the maximal doses tolerated there was no effect on the course of the infection.

The chemical variations in the series involve merely alterations in side-chain substituents, apart from the pyridine compound. The substitution of a simple pyridine nucleus for a quinoline nucleus caused slight reduction of antiseptic power. Alterations in the side-chain occupying the 6-position are not very marked in their effect; the 7-amino derivative does not differ significantly in its action from those substituted in the 6-position.

Thus it is shown that substances belonging to the group of styryl-quinoline compounds are very powerful antiseptics.

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A REPORT received by the United States Public Health Service at Washington shows a remarkable reduction in the infant mortality rate in Springfield and Campbell Townships, Green County, Missouri, since the establishment of a whole-time county health department. In 1918 the infant death rate in these two townships was 105 per 1,000. The county health department was organized that year. In the following year the infant death rate in the two townships dropped to 96 per 1,000. In 1920 it was 85, in 1921 it was 76, and in 1922 it was 61. This reduction of 42 per cent. in four years is regarded as a striking example of what may be accomplished in infant welfare by carrying out, with economy and efficiency, a well balanced general programme of health work affecting all age-sex groups in a community with a well administered health department under the direction of a whole-time health officer.

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