and after reconstitution. On account of their relative simplicity and cheapness we hope that the methods described here will be of use in laboratories where expensive large-scale installations are not possible; so far as we can judge, the final dried products are similar to those obtained by the lyophil process.

Recent clinical reports on the use of concentrated plasma and serum are very promising (Medical Research Council War Memorandum No. 1, 1940), and the cellophane tube method should be of great help in the preparation of such concentrated plasma and serum, which can be prepared without risk of contamination and stored in any plasma bank. Many of the advantages claimed for dried plasma also apply to concentrated plasma. Moreover, concentrated plasma is prepared with considerably less risk of bacterial contamination and much more easily than is the dried form, and can be diluted to the required strength without the short delay necessary for the solution of plasma powder.

The methods we have described for the preparation of concentrated and dried plasma are capable of many modifications, according to the scale on which the processes are to be carried out, and in view of the importance of the matter at the present time we have thought it wise to put forward our preliminary results at this stage. A detailed clinical report on the use of dried and concentrated plasma will be published later.

Summary

Two methods for the concentration and drying of plasma have been described: (1) using spray distillation *in vacuo*; (2) using the principle of evaporation through cellophane tubes under sterile conditions, followed by low-temperature drying of the concentrate.

These methods enable large amounts of plasma to be concentrated and dried without undue cost.

Serum may also be concentrated or dried by these methods, and may prove more satisfactory than plasma.

This work has been carried out during the tenure of research grants from the Medical Research Council, to whom we wish to express our thanks, as well as to Dr. Brundret, department of bacteriology, University of Manchester, for enabling us to test out the final stage of the drying process in his laboratory. We acknowledge with thanks the supply of viscous casings from Messrs. John Crompton and Co., Wythenshawe, Manchester.

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F. G. Chandler, S. R. Gloyne, and D. V. Hubble (*Tubercle*, 1940, 21, 292) record the case of a female infant, aged 12 weeks, who had difficulty in breathing since birth, and was admitted to hospital for increasingly frequent attacks of cyanosis. Death took place two days later. The necropsy showed that the right lung had several shallow grooves suggestive of imperfect accessory lobulation, and that the greater part of the lung was involved in a cystic condition with a disorderly arrangement of the bronchi. Histologically the cystic condition was due to an abnormal arrangement of air spaces and bronchi.

DYSMENORRHOEA AND STERILITY PERSONALITY STUDIES

BY

E. WITTKOWER, M.D., L.R.C.P. & S.Ed.

Physician and Halley Stewart Research Fellow, Tavistock Clinic, London

AND

A. T. M. WILSON, B.Sc., M.D.

Physician and Rockefeller Research Fellow, Tavistock Clinic, London

Informed gynaecological opinions abound to the effect that personality factors are related to dysmenorrhoea and sterility in some way as yet undetermined, while some gynaecologists have gone further and suggest that psychological factors may actually be of primary importance in the production of both complaints. Conversely, many medical psychologists have noted that dysmenorrhoea and sterility are common constituents of various syndromes which are predominantly psychological, and that where psychological treatment is successful these gynaecological symptoms often disappear simultaneously with the others.

The patients to be described were submitted to a biographical study, occupying on an average two hours, covering the family background and, in rather more detail, the childhood characteristics, the reaction to various phases of adolescence, and the adult personality. Biographical studies of this type were made of 57 unselected patients with primary dysmenorrhoea, aged 16 to 40, 31 of them single; and of 30 patients with sterility of some years' duration, aged 21 to 45, similarly unselected. A suitable control group was found in 30 primigravidae, aged 19 to 40, who had never suffered from dysmenorrhoea; they were studied in an identical manner. Sedentary workers formed approximately half of each of the three groups. Complete verbatim reports were kept of each interview, and the data thus obtained from each group were later submitted to more detailed analysis and comparison (Table I).

TABLE I.—Childhood Adjustment in Cases of Primary Dysmenorrhoea and of Sterility

	Control (30 Cases)	Sterility (30 Cases)	Dysmenorrhoea (57 Cases)	
			Proportion (in 30 Cases)	Actual
Apparently well adjusted	19	9	5	9
Fairly well adjusted (e.g., concealed shyness)	8	7	7	13
Definitely ill adjusted:				
(a) Boisterous tomboy	2	3	11	21
(b) Resentful, aggressive				
(c) Miserable, non-aggressive				
(d) Miserable, ailing	1	11	7	14
(e) Exceptionally timid and shy				

Childhood Adjustment

It will be seen from the table that the control group of 30 normal primigravidae is mainly composed (27 out of 30) of women who give a history of having been as children well-adjusted or fairly well-adjusted types, familiar in the general population. The term "ill adjusted" was confined to children whose abnormality of emotional status was beyond discussion.

In the two groups who later complained of sterility and dysmenorrhoea there is a high proportion of ill-adjusted children as compared with the control group. Equally striking was the difference between the control group and the others in the degree of maladjustment of any particular type—for example, in the control group the

she would feel faint and get palpitation. "If somebody's eyes were looking at me I used to get terribly nervy." She was terrified of the dark, and fancied people were following her. Now, she says, "I am terribly nervous; I jump at everything—if the door slams. If anybody touches me from behind it startles me. I'm nervous of the dark and of being on my own. If I hear a noise I think it's someone in the room. I get quite frequent attacks of palpitation. Quite suddenly it comes on and lasts for twenty to thirty minutes. Sometimes I feel faint with it. For three or four years I've had terrible faint sweats. I get all hot and clammy and trembly. I get these fits once a week or fortnight, just walking along the street; excitement and worry bring them on. For two or three hours afterwards I have to sit down and take things easy."

Adult Sexuality

Omitting other aspects of the adult personality of these patients, there must now be described differences in sexual development of the primigravidae and of the patients with dysmenorrhoea and sterility.

1. *Preparation for Period.*—In relation to instruction before onset of the period no striking difference could be found in the three groups beyond slight excess of unprepared girls in the sterile and dysmenorrhoea groups.

2. *Reaction to Onset of Menstruation.*—The reaction of the patients to the onset of menstruation could be classified for the most part under the headings of Neutral, Anxious, Proud, and Resentful. Here are examples of each type:

Neutral (Control).—"When it happened I just took it for granted. I didn't think it anything terrible."

Anxious (Sterile).—"I was completely bewildered; I couldn't make out what it was or why, or anything about it."

Proud (Dysmenorrhoea Later).—"I was pleased because I must be well and healthy to have it."

Resentful (Periods at 12; Dysmenorrhoea at 15).—"It was a violent shock; I thought I had developed a severe illness. The periods became a sore point with me; I felt I was the only person to have them and was unfortunate. I thought it was just going to be an illness, but instead it became an unending misery to me."

Classifying the individual patients on the basis of the examples given, it will be seen that the ratio of girls who were neutral to those who resented menstruation varied in the three groups. The proportions were: control group—neutral 3, resentful 1; sterile group—neutral 1, resentful 1; dysmenorrhoea group—neutral 1, resentful 2. The obvious suggestion that the resentment of the dysmenorrhoea patients is the inevitable sequel of their pain does not really explain their attitude, since the resentment often preceded the pain. Further, girls with severe pain did not always express or feel resentment, and, perhaps more significant, there was striking evidence that the resentment was not directed so much towards the pain as towards the "messiness" and towards the actual period, which was regarded as an expression of feminine inferiority and an unfair handicap in relation to athletic and social activities.

3. *Premarital Attitude to Sexuality.*—In the control group the premarital attitude to "boy friends" showed two main types of equal frequency—girls who had several minor friendships before engagement and marriage, and girls who had not made any other than the most superficial contacts of this kind. In the sterile group the only significant difference was a relative preponderance of the second group mentioned above, a finding which corresponds with the excess of individuals in this group characterized by shyness and diffidence in social contacts. Among the dysmenorrhoea patients, in contrast to both the control and the sterile groups, there was an excess

of girls who usually described themselves as "flirty." It could be seen from their elaboration of this description that this was very seldom the expression of an early adult interest in the opposite sex. Much more often it was the result of a wish for a continuation of the "spoiling" attitude of parents or, alternatively, resulted from the openly expressed motive of a spiteful desire to humiliate boys by the use of sexual attraction.

4. *Sexual Maturation as shown by Attitude and Behaviour in Coitus.*—It is an axiom of psychological work that the nature and maturity of adult sexual interests supply evidence about individual development which is less open to error than many other criteria. The findings so far reported point to the occurrence among the sterile group of patients of delayed and inhibited maturation in all aspects of adult life, while the dysmenorrhoea group are particularly characterized by individuals showing strongly resentful attitudes towards what is felt to be the inferiority of being feminine. As might be expected, these group differences are thrown into strong relief by an analysis and comparison of the adult sexual adjustment of the patients as shown by their behaviour in coitus. These reactions have been classified under five headings: normal orgasm, occasional orgasm, clitoris orgasm, complete absence of orgasm (with and without repugnance), and, lastly, fear of intercourse, dyspareunia, and vaginismus. In Table III the last three groups are included under the heading "Ill adjusted."

TABLE III.—*Sexual Adjustment in Coitus*

	Control (30 Cases)	Sterile (30 Cases)	Dysmenorrhoea (Total 26 Married)	
			Proportion	Actual
Well adjusted (normal orgasm) ..	22	4	7	6
Fairly well adjusted (occasional orgasm or clitoris orgasm) ..	5	11	7	6
Ill adjusted (no sexual feeling; no orgasm; dyspareunia; vaginismus) ..	3	15	16	14

It will be seen from the table that patients who are sexually mature, as shown by apparently normal orgasm, are distributed between "control" and "sterile" and "married dysmenorrhoea" groups in the proportion of 22:4:7. Conversely, gross abnormalities of sexual development, as shown by absence of orgasm, with or without repugnance to intercourse, are in the proportion of 3:15:16. Patients showing repugnance to or fear of intercourse, dyspareunia, or vaginismus in these three groups are in the proportion of 3:20:21.

Overlap between Dysmenorrhoea and Sterility.—Of 30 sterility patients 10 suffered from severe dysmenorrhoea; while of 26 married dysmenorrhoea patients 9 were sterile. Thus of the total of 87 patients in the two groups 19 suffered from both disorders, 13 of them of the basically shy and shut-in classes described as personality types in both disorders.

TABLE IV.—*Summary of Personality Types in Dysmenorrhoea and Sterility*

Dysmenorrhoea :		Sterility :	
Resentment of feminine role ..	15	Shy and immature	11
Allied types	11	Allied types	12
Shy and timid	15	Obese or maternal and middle-aged ..	5
Plaintive	14	Unclassified	2
Unclassified	2		

Personality Types in Dysmenorrhoea

In previous sections various aspects of the personality of these patients have been considered. Here follows an attempt to give tentative composite descriptions of various types seen in this disorder.

Resentment of the Feminine Role.—Members of this group form a common type whose psychological make-up

is obviously reflected in appearance, manner, and adult history. Hard and aggressive in expression, with unfeminine voices, masculine carriage, and a physical development in which female secondary sexual characteristics are less well marked than usual, these individuals frequently express their emotional outlook in their dress and behaviour. They give a history of having been, as children, over-attached to their fathers, uncertain or contradictory in relation to their mothers, and openly jealous of brothers. Their character at this time is most easily described as that of aggressive tomboys. Fond of rough games, disdaining dolls, and often outstanding at school, both in class and on the playing-field, they have frequently been captains of school teams and often monitors or prefects. From the onset of menstruation they have usually been openly resentful of it, less on the grounds of pain than of "messiness"—an attitude clearly seen in patients in whom the pain only started some years after the onset of menstruation. Although from the beginning they have usually tried to ignore the period by a special effort they have still felt with unusual keenness that it was an unfair handicap in the sports and allied activities which play such a prominent part in their lives. They are often attractive to and attracted by men on a basis of equal companionship; but their contempt of femininity becomes very obvious when any form of courtship is attempted: they are only anxious to be perpetual sisters to their men friends. In any more feminine field they display a hard emotional inaccessibility, which can often be seen to cover a rebellion against their own nature.

A further stage in the development of psychological attitudes of this kind can be seen in the determined spinsters who form a small subgroup of the patients just described. Other girls who are also basically of this type are handicapped in the presentation of a masculine attitude by the possession of obvious feminine good looks, which are, however, only used as a means of humiliating the admirers they so easily attract.

Shy and Timid, and Plaintive Groups.—The second typical group of patients with dysmenorrhoea have small juvenile faces, with a corresponding physique, sometimes to the point of fragility. Uniform in their physical immaturity, they yet show certain differences in the psychological field. One-half of them are timid, shy, and shut-in personalities, who had been as children typically over-attached to and spoiled by their parents. At this time their main psychological difference from other children lay in their constant self-consciousness about their appearance, and well- or ill-founded feelings of inferiority. They were jealous of the success of other children and often of boys in particular. Apparently resigned to the burden of menstruation and feminine duties, they could yet be seen to regard the onset of periods as a handicap which upset them by its affront to their high standards of fitness and personal cleanliness. They were even more disturbed by the significance of this event as marking the end of childhood. The second half of this group of patients, however, formed a variant of the first, identical except that their childhood had been occupied by serious or vague illnesses to such an extent that they had become something like plaintive invalids in their attitude to life. From early childhood onwards these individuals had been preoccupied with attempts to satisfy a deep craving for sympathy and affection. In the interests of this need they had overestimated their illnesses as children and naturally made use of their periods for a similar purpose. Small and pale-faced like the patients in the first part of this group, this second type are chronically anxious, and in their voices can be heard to complain continually.

Personality Types in Sterility

It has already been noted that the second group of dysmenorrhoea patients described overlaps with the main type found in sterility and now to be outlined. The vast majority of the sterile patients were diffident in manner, juvenile or younger than their years in appearance, and without marked secondary sexual characteristics. They were often more ambitiously dressed than others of their class, or so differently, especially in relation to the use of make-up, that their total appearance could best be described as "doll-like."

Individuals of this type had frequently been the youngest or only children, obviously over-attached to the family rather than to either parent. Intensely shy, especially with grown-ups, they disliked school because of the roughness of other children and preferred to stay at home, even in adolescence, when their shyness prevented many outside contacts. At this time they seldom expressed any feeling about menstruation, since they found the topic too embarrassing. Many of them as adults are interested to an unusual degree in their personal appearance and obviously desire to attract; but neither before nor after marriage have they ever experienced any genuine adult sexual feeling. In fact, they are almost completely frigid and, corresponding to this, incapable of any deep affection.

Allied types with most of these characteristics may show superficial differences in vaguely boyish features or be so nervous as to justify the label "anxiety state." A small subgroup of patients complaining of sterility are obese women, with strongly marked maternal attitudes although they have never reached adult maturity in their instinctual development. Their obesity was not related to their sterility in any mechanical way. Lastly, in a few parous patients subsequent sterility had been preceded, as they themselves pointed out, by a diminution or disappearance of sexual feeling.

Discussion and Conclusions

Dysmenorrhoea.—Obstruction, maldevelopment, endocrine dysfunction, and localized autonomic disturbance have all been held responsible for dysmenorrhoea (Ehrenfest, 1937; Davis, 1938). The view that neurotic manifestations associated with dysmenorrhoea are mainly secondary in nature is held by Shaw (1938) and Miller (1933). It is a common observation that dysmenorrhoea is predominantly a disease of the better-educated and cultured classes, is aggravated by mental or physical strain, and is relieved during holidays (White, Berkeley, and Cook, 1938); and that the onset of dysmenorrhoea is frequently preceded by some emotional disturbance, often, but not necessarily, sexual (Meyer, 1925; Naber, 1931). Some authors suggest that dysmenorrhoea is frequently allied to temperaments described as "nervous, apprehensive, and introspective" (Fairbairn, 1928; Johnstone, 1939; Kerr *et al.*, 1939; Novak and Harnik, 1929). Psycho-analytical aspects of gynaecology have been discussed by Abraham (1925), Horney (1933), Menninger (1939), and Rickman (1926). The present study strongly suggests that dysmenorrhoea predominantly occurs in individuals with certain psychological characteristics which antedated the onset of their complaint. In the most general terms patients with dysmenorrhoea, as children, had often been either unusually aggressive and boisterous tomboys resenting their feminine role, or ailing complaining children, unwilling or unable to give up their childish dependence on their parents and possessing strong needs or cravings for sympathy and protection.

These superficial studies do not completely answer questions as to the possible groups of psycho-physiological

mechanisms by which the symptom of dysmenorrhoea may be produced. Psychological attitudes and allied emotional states may lead to increased interest and awareness of physiological uterine functions or to an autonomic endocrine disturbance affecting uterine function, or to both. In the second case, as elsewhere, the pain might easily arise from relative ischaemia through disturbance of the relation between the reciprocally innervated muscular contraction of body and cervix and the vasomotor state of the organ.

Sterility.—In the sterility patients production of active spermatozoa by the husbands was known to have occurred. Similarly, in these patients organic disease affecting the general health, and relevant pelvic conditions such as blocked tubes, have been excluded by careful examination by our gynaecological colleagues. Our investigation showed that, as in the case of dysmenorrhoea, patients who later complained of sterility were even as children different from the control group of primigravidae of the same age. The well-known clinical overlap between primary dysmenorrhoea and sterility is reflected in the presence of a common personality type in both groups described. The main group of sterile patients, however, are not of this particular type, either as children or as adults, but display as a main characteristic a self-centredness and lack of warmth in their social and personal relations, clearly seen in a sexual frigidity of which their abnormal reaction to coitus forms an impressive index. As to the mechanism by which the personality of the patients is related to their sterility, experience shows that sterility is unlikely to be the direct result of infrequent intercourse. Many gynaecological authors, both ancient and modern, have suggested that the mental attitude of the woman (Aristotle), inhibition of orgasm by unrecognized anxiety, or lack of orgasm through emotional immaturity may interfere with conception by preventing the progress of spermatozoa (Duncan, 1884; Rubin, 1933; Fairbairn, 1928; Anspach, 1934; Gellhorn, 1931). This might result from dryness of the vagina, from failure or reversal of possible vaginal peristaltic movements, or through spasm of the muscles of the pelvic floor and the cervix, with failure to retain the seminal fluid. It has further been suggested by gynaecologists that emotional development and frame of mind may affect the endocrine processes controlling ovulation and implantation (Kehrer, 1922). To the solution of these problems hormonal research may furnish new clues.

Summary

Fifty-seven unselected patients with primary dysmenorrhoea, 30 unselected patients complaining of sterility, and 30 primigravidae who had never suffered from dysmenorrhoea were submitted to a biographical study covering childhood characteristics, reaction to adolescence, and adult personality.

Comparing the three groups as children, psychologically well-adjusted types were found in great excess in the control group, and only two of this type were noted in the sterility and dysmenorrhoea patients.

As children the dysmenorrhoea group showed psychological maladjustment four times as often as the control group. Of these maladjusted types the sterile group contained a high excess of ailing, timid, unsociable children, devoid of self-assertion, while the dysmenorrhoea group contained an excess of children who were boisterous and manifestly aggressive—obstinate, bad-tempered, or headstrong.

As adults the dysmenorrhoea patients showed a high excess of two main personality groups—the first characterized by deep resentment of their feminine role; the second obviously immature physically, and either shy and shut in or chronically anxious and complaining. As adults a vast majority of the sterile patients display an unusual self-centredness in their social and personal relations, clearly seen in a sexual frigidity, with abnormal reactions to coitus.

Prof. Browne and his staff at University College Hospital and the Medical Committee and staff at the Soho Hospital for Women were good enough to arrange access to these patients and to the clinical notes. We are greatly indebted to them. The work was done during the tenure of Fellowships endowed by the Sir Halley Stewart Trust and the Rockefeller Foundation.

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TRAUMATIC CHYLOTHORAX

BY

C. J. CELLAN-JONES, M.D., F.R.C.S.Ed.

AND

WILLIAM MURPHY, M.B., B.Ch., B.A.O.

Rupture of the thoracic duct is a calamity which many a surgeon does not encounter once in his lifetime. Since Longelot first described the condition in 1663, Shackelford and Fisher (1938) have succeeded in tracing only 41 authentic instances, and many years have elapsed since chylothorax was last mentioned in the *British Medical Journal*.

Although our experience is limited to a single unsuccessful case we are led by the rarity of the injury to describe this patient's history as fully as possible.

Case History

On August 16, 1940, a collier aged 32 years ate a large breakfast of bacon and eggs at 6 a.m. He was working underground at 9.30 when he was thrown backwards by a stone which struck him in front of the chest. As he fell his dorsal spine was brought into violent contact with the square-cut edge of a block of coal. He experienced an immediate feeling of constriction in the chest and acute pain in the left knee-joint, but a moment or two afterwards was able to crawl away.

When Dr. R. M. Marshall examined him two hours later there was no dyspnoea and the degree of shock was trivial. The patient was most concerned about "a gripping tightness" in the right chest, and this was thought to result from a linear abrasion which traversed the back horizontally at the level of the tenth dorsal vertebra. Radiographs which were made at Port Talbot Hospital on the following day disclosed a fissured fracture of the left tibia and possible damage to the body of the ninth thoracic vertebra with no displacement. The ribs had all escaped injury, and there was no evidence of a pleural effusion.

On August 18 the temperature rose to 100° F., and for the first time there was some dyspnoea. A tentative diagnosis of pneumonia led to the administration of sulphapyridine tablets. On August 19 the patient collapsed; his pulse rate was 130 per minute, his temperature was subnormal, and his respirations were rapid and distressed. We decided to aspirate a moderate-sized right-sided pleural effusion, and to our surprise a quantity of fluid which resembled pale tomato soup