FURTHER OBSERVATIONS ON BENZEDRINE

BY

E. W. ANDERSON, M.D., M.R.C.P., D.P.M.

The interest in benzedrine, particularly in its use in psychiatry, would seem to justify yet another contribution to the literature. The following is an account of a study of the effects of benzedrine, over a period of fourteen months or so, on a group of patients at the Cassel Hospital who were suffering chiefly from the minor forms of mental disorder.

Thirty-three patients in all were given benzedrine orally in doses ranging from 5 to 45 mg. In addition, eight normal subjects were given the drug. Among the patients twenty-one were male and twelve female. The diagnostic grouping was as follows: twenty-eight depressives, two

stituent has been observed either at the time or months later (Schube, Raskin, and Campbell, 1937), although before this Myerson, Loman, and Dameshek (1936) had reported dramatic changes, including a polycythaemia in some cases, as well as a striking leucocytosis. It would appear that still further work on this problem is required in view of these observations. So far as its use in psychiatry is concerned there is fairly general agreement as to its effects; the change of mood in the direction of elation, removal of inhibition, fatigue, and so forth call for no further mention, but before discussing the psychological effects in greater detail the present results will be considered.

The Present Investigation

The patients have been grouped in three categories: (1) those showing no change mentally or physically after taking benzedrine (Table A); (2) those who appeared to benefit by it, including those cases in which the beneficial

TABLE A

No.	Sex and Age	Diagnosis	Maximum Dose	Duration	Unfavourable Physical Symptoms	Psychological Symptoms
1	M., aged 49	Recurrent depression (third) with paranoid features and much retardation	30 mg.	One month	None	No change. During period of severe retardation, no change
2	F., aged 34	Schizophrenia (catatonic stupor)	20 mg.	One occasion	None	No change
3	M., aged 44	Depression with hypochondriasis	10 mg.	One day	No change	No change
4	M., aged 49	Depression (agitated, self-accusatory)	20 mg.	Two days	No change	No change
5	F., aged 56	Depression (retarded)	20 mg.	One day	No effect	No effect

"anxiety states," three schizophrenics, and one organic (manic-depressive with disseminated sclerosis).

At the beginning of this study the pressor effect of the drug was studied as well as its central effects, and careful observations of the blood pressure and the mental state were made throughout the day. The blood pressure was taken each morning at 9 o'clock, in the lying and standing positions, the third reading being taken in each case. The drug was then given, the variations in dosage being concealed from the patient by using tablets of a neutral substance (calcium lactate) as well, so that the same number of tablets was given each time. The normal variations of the blood pressure in the individual were also determined. These observations presented nothing new, and will not be discussed further. After a time, therefore, we ceased to study the blood pressure alterations and devoted our interest entirely to the psychological changes, and it is these which form the main topic of this paper.

After Davidoff and Reifenshtein's (1937) excellent paper and a recent leading article on benzedrine in the *British Medical Journal* (1937) it is unnecessary to review the literature at length. The two main effects of this sympathomimetic drug—the pressor and the central action—are now familiar. Its use in narcolepsy (Prinzmetal and Bloomberg, 1935; Ulrich, Trapp, and Vidgoff, 1936), post-encephalitic Parkinsonism (Solomon, Mitchell, and Prinzmetal, 1937), intestinal spasm and hence its employment in gastro-intestinal radiology (Myerson and Ritvo, 1936), as a vasoconstrictor in rhinology (Scarano and others, 1934), and its effect on the gastric juices (Myerson, Rinkel, and Dameshek, 1936), now require no further mention. A more recent non-psychiatric use is in orthostatic hypotension (Korns and Randall, 1937), in which favourable results have been observed; it seems, however, inferior to ephedrine in the treatment of this condition. Although containing a benzene ring no effect on the blood con-

psychological effect outweighed any unpleasant physical sensations which may have occurred (Table B); and (3) those in whom it was necessary or desirable to discontinue the drug because of untoward effects or because it proved of no value (Table C). In an earlier paper I described with Dr. Scott some unfavourable cardiovascular complications, the most notable of which was a transient heart-block. These experiences made us for a time exceedingly cautious in dosage; but we now believe this case to have been exceptional, and in view of increased experience with benzedrine, together with the fact that others—for example, Prinzmetal and Bloomberg (1935)—have now given the drug continuously for long periods, in some of their cases for over a year, without mishap, we have not hesitated to give larger doses. Nevertheless I consider there is still need for caution in its administration and more detailed investigation of its cardiologic effects in particular. I agree with Davidoff and Reifenshtein (1937) that it is best given under supervision in a hospital. So far, despite the comparatively large amount of work which has been done, the drug is still in the experimental stage.

Of the total number of patients to whom the drug was given, in fifteen, or just under one-half, it was found necessary or desirable to discontinue the drug. In two others the drug appeared to be of no value and was discontinued essentially for this reason. Some undesirable symptoms also occurred in these patients, but they were not severe enough in themselves to have justified discontinuance of the drug had there been a concomitant psychological effect of any value. One patient, a man (C 10), was the "organic case" mentioned above; the other, a woman, was a case of anxiety state (C 11) with numerous phobias, who had been depressed for a day or two and for whom it was thought the drug might have a beneficial effect in tiding her over this crisis. In eleven

TABLE B

No.	Sex and Age	Diagnosis	Maximum Dose	Duration	Unfavourable Physical Symptoms	Psychological Symptoms	Remarks
1	F., aged 27	Depression with obsessional and hysterical features	30 mg. Usual dose 20 mg.	Twice or thrice weekly for one year	Felt shaky. Tingling sensation over head and body. Tachycardia. Tingling sensation later got worse and she felt her "heart nearly choked" her. Anorexia. Pains over legs. Strangled feeling and palpitation	Felt "lively"—not a normal feeling, "a quiet feeling." Feeling of lightness and buoyancy. Sense of remoteness. Time seemed to pass more quickly. Feeling of confidence and loss of self-consciousness (in popular sense). After smaller doses marked decrease in depersonalization; with larger doses feels drawing into self, more absorbed and inactive	On the whole a beneficial effect
2	M., aged 46	Depression with obsessional features. (Phases of severe agitation)	30 mg.	Twice	Shakiness in legs. Dry mouth. Feeling of "film on tongue" noticed two hours after ingestion of drug. Later tongue felt dried up	"More composed." Treading on air. "Light-headed." Alteration of time experience—e.g., felt he "was living in the present." Felt for first time his illness was really illness. After 30 mg. felt as if he had had alcohol but with difference that head was clear. Later felt drowsy, but on questioning this was shown to be more a feeling of "absolute control." Obsessional preoccupation over bladder and bowels diminished. Increased talkativeness. Likes and dislikes for people intensified	Definitely beneficial effect. Discharged a week or two later much improved. Drug given when clinical improvement had already begun
3	M., aged 33	Schizophrenia. (Earlier acute attack with hallucinosis and paranoid features—now disappeared)	20 mg.	Regular for one month	None	More "toned up physically." Drowsy. More energy	Dubious value. No effect on psychotic symptoms which could be attributed to drug
4	M., aged 50	Involuntary depression with prominent hypochondriasis	45 mg.	Sixty - two days	Severe pain in occipital region (probably of same nature as similar sensation associated with illness). Tachycardia and consciousness of heart's action, which he interpreted as a good sign as against former unawareness, which he felt indicated trouble with heart	Queer feelings in scalp modified favourably by drug. More cheerful. Feeling it was unnatural—"not himself." After 10 and 25 mg. very elated and talkative	Effect variable. After twenty-two days thought effect of drug wearing off. Broadly, a beneficial effect, and with its help might possibly begin work again, which without drug would probably be impossible
5	F., aged 41	Depressive psychopath with periodic severer depression, with suicidal ideas; heavy spirit drinker, taken to overcome inhibition	30 mg.	Frequent occasions over period of two months	Heavy feeling in epigastrium. Consciousness of heart's action	Felt more relaxed, less depressed. More inclined to talk to people. Less energy than with alcohol. Did not regard drug as so effective. Felt drug enabled her to go through day more easily. Towards end of treatment with drug felt more depressed than usual when effect passed off—? usual constitutional intensification of mood; this seemed more probable	On the whole the drug had beneficial effect
6	M., aged 49	Depression with hypochondriasis (first attack)	10 mg.	Three isolated occasions, then continuously some months later for twelve days	Intensified feeling of pressure in head when drug (first course) given. When second course given some months later this symptom was not made worse	Talked more; more assurance. "Spirits risen 100 per cent." Felt a little drunk. Depression intensified five hours after one dose	On the whole had a beneficial effect
7	M., aged 28	Recurrent depression with prominent anxiety, with phobias, etc.	10 mg.	Three occasions	Palpitation and sweating. Tremulousness	Felt drowsy and "heavy-headed." Alteration of time perception in direction of normal—i.e., recently past events seemed more vivid	Doubtful whether beneficial effect
8	M., aged 51	Recurrent depression with obsessional features	30 mg.	Five weeks (thirty-five days)	None	"Absolutely right as rain, one might say too right; all my troubles fell away." After five days on 15 mg. thought drug losing effect. Dose increased to 30 mg., and this has been steadily effective since	Action variable in psychic sphere but almost entirely favourable effect. Duration of period between dose and psychic effect—varied
9	M., aged 49	Depressive (first attack) with obsessional colouring—e.g., inability to make decisions	10 mg.	On isolated occasions during one month	None	More cheerful. Not so tense. More talkative, confident, and hopeful. Felt he could deal with his problems better	Administration of drug coincided with definite and progressive clinical improvement
10	M., aged 49	Recurrent depression (second), self-reproach, feeling of inadequacy	20 mg.	Two occasions	Slight headaches and giddiness	Drowsiness and heaviness. Seemed "clearer in the eyes." More confident and self-reliant	Given during period of clinical improvement, and soon after discharged much improved
11	M., aged 49	Recurrent depression (second). Emotional instability, inability to concentrate, early organic. (Suffered from asthma)	30 mg.	Isolated occasions at first. Regularly for fortnight, also after discharge	Felt "wobbly." Asthmatic symptoms improved and breathing easier. Some blurring of vision. Limbs ached. Slight headache	Felt a little "dopy." Rather more cheerful. After 30 mg. feeling of exhilaration. More talkative. Feared addiction. Alteration of time perception (time seemed to go faster). Concentration improved	Beneficial effect after discharge (20 mg. per day). Effect of same dosage varied

TABLE C

No.	Sex and Age	Diagnosis	Maximum Dose	Duration	Unfavourable Physical Symptoms	Psychological Symptoms	Remarks
1	M., aged 51	Chronic depression with depersonalization	20 mg.	Three times	Slight headaches and dizziness. Anorexia	Head slightly clearer. Felt more tired and was unable to concentrate so well	
2	M., aged 35	Depressive with hysterical features	10 mg.	Four occasions	Dizziness. Legs felt heavy	Dazed. More depressed	
3	F., aged 29	"Anxiety state" (palpitation, acid dyspepsia, some phobias, etc.)	10 mg.	One occasion	Dizziness. Later palpitation, headache, and nausea. Increased lability of blood pressure and some extrasystoles	No change in mood	
4	F., aged 35	Mild manic-depressive	20 mg.	On isolated occasions during one month	Severe headache. Pain from chest upwards and including all face. Intermittent spells of giddiness (? entirely due to drug, as she had reported this before). They ceased immediately after drug to reappear at intervals	Less tense. Body felt more comfortable. "Mind worked very actively," and poor sleep	Dubious value, so discontinued
5	M., aged 29	Depression with self-reproach. Feeling of inferiority, etc.	10 mg.	One occasion	Headache. Tremulousness	Felt "frantic." More self-reproachful two and a half hours later; felt calmer; then one and a half hours later still "shaky" and complained of headache. Some diarrhoea	No beneficial effect
6	M., aged 35	Depressive psychopath, obsessional and paranoid features	10 mg.	Several isolated occasions	Head-throbbing. Giddiness	"Made head a bit more clear. I think I feel more, gives me a little more brightness." More self-confidence. After two or three doses asked that it should not be given him again as it made him feel unnatural and excited	Left hospital as he refused to continue treatment with drug
7	M., aged 29	Recurrent depression with obsessional features	30 mg. daily	Twenty-two days	Complained of heavy sensation in epigastrium. Marked fall in weight (physical examination revealed no reason). Anorexia more marked	Indecision less after drug. Felt he could concentrate better; more energy. Brain more active. Pleasant thoughts. Days passed more quickly than before. Towards the end of period effect seemed to wear off and symptoms became relatively more prominent, for which patient blamed the drug. Fatigue	Discontinued chiefly owing to loss of weight, which it was felt might be due to the drug
8	M., aged 49	Involuntary depression with paranoid features	30 mg.	One occasion	Transient heart-block	Calmer. Lived more in the present. Did not think so much about his trouble	Reported in earlier article
9	F., aged 47	Depression with hysterical features	20 mg.	One occasion	Tachycardia. Vision blurred and felt shaky. Numb feeling down the arms	Felt brighter	
10	M., aged 46	Manic-depressive with disseminated sclerosis	40 mg.	Continued for one month	Feeling of constriction in neck. Unsteadiness of gait. Dizziness and nausea	No change in mood. Felt if anything a bit more lethargic and unreal	
11	F., aged 46	Anxiety state, phobias, etc.	15 mg.	Four times	Skin dry and hot. Hot and tight in head	"Brain worked all night and raced from topic to topic." No change in mood	Given during a brief period of depression lasting two days or so
12	F., aged 52	Involuntary depression with hysterical features	20 mg.	One occasion	Severe sympathetic reaction. Faint. Nearly collapsed. Extrasystoles	No change	Case reported in earlier article
13	M., aged 29	Manic-depressive with depersonalization	20 mg.	Two days		Dazed, unsteady, and headache	Increased activity
14	F., aged 56	Manic-depressive. Hypochondriasis. Pain in head and face	20 mg.	Two days		Giddy and "drunk"	No effect
15	F., aged 38	Manic-depressive. Hypochondriasis	20 mg.	Four days	Palpitation and nausea	Talked with greater ease	
16	M., aged 24	Schizophrenia. Depressed, tense, hypochondriacal	20 mg.	One day	Pain in chest	No change except exaggeration of hypochondriasis	
17	F., aged 24	Depression (retarded)	20 mg.	Two days	"Dazed"	Some days later said inner excitement had been present	

of the patients (one-third) a beneficial effect could be claimed, in some cases with reservations. In two of them the benefit was somewhat dubious; one (B 7) was a man of 28 with mild depression and depersonalization with some phobias and anxiety features, palpitation, sweating, and tremulousness, which were increased, as might have been expected. This is in accord with Guttman and Sargant's (1937) observations of the effect of the drug in anxiety conditions. The other (B 3) was a schizo-

phrenic in whom there was a slight clinical improvement which seemed doubtfully due to the drug. Nevertheless he thought it "toned him up."

Physical Symptoms

Of the eleven patients who appeared to benefit from the drug only three had no physical symptoms—that is, the drug appeared to exert its effect in the psychic sphere alone. Of these three, one had 30 mg. daily for a month,

TABLE D.—*Normal Controls*

No.	Sex and Age	Maximum Dose	Duration	Unfavourable Physical Symptoms	Psychological Symptoms
1	M., aged 35	20 mg.	Once	Palpitation. Pains in left chest and in left axilla. Shakiness in walking. Sweating increased. Absence of fatigue	Thinking quicker and easier. Arguments easier to marshal. Less reserve. Feeling of well-being. Time seemed to pass more quickly. Sceptical attitude towards value of therapy in some cases less marked. Feeling of being completely master of every situation. Self-depreciation reduced, but no tendency to overvaluation. Feeling of not being quite natural. Feeling of tension three-quarters of an hour after taking drug
2	F., aged 46	20 mg.	Once	Felt changes in sensation in finger tips and muscles of jaw. Giddiness. Tendency to walk to left. Difficult to keep a straight line. Blurring of vision. Got tired of holding teacup; it was an effort to eat	Slightly apprehensive. More alert. A little happier than usual
3	F., aged 35	20 mg.	Once	Some "swimminess" on lying down. Tingling sensation in legs. Breathlessness and dizziness. Anorexia: tiredness later: some dimness of vision, momentary: some abdominal discomfort. Dry mouth. Decreased micturition	Elation. Increased output of talk. Increase of energy mental and physical
4	M., aged 46	20 mg.	One day	Fullness in head. Nausea. Tiredness. Feeling of nausea day after test. Increased frequency of micturition	"Full of beans." More confident, alert, talkative, and energetic. Time passing more quickly. Less reserve
5	M., aged 34	20 mg.	Three days	Pain in chest	Increased activity
6	M., aged 35	20 mg.	One day	Pain in chest	Increased activity, cheerfulness, and increased talkativeness
7	F., aged 23	20 mg.	Twice	None	None
8	F., aged 19	30 mg.	One month	Some anorexia	None

the second 10 mg. on isolated occasions during a similar period, and the third, the schizophrenic already mentioned, 10 mg. daily for a month. In the other eight it was considered that the favourable central effect outweighed any physical phenomena which may have appeared, though these in several cases were quite unpleasant. In five cases no mental or physical change was noted. Two of these (A 1 and 5) were depressives with much retardation. Here the result was in accordance with what Guttman and Sargent have found in this type of case. Another was a case of catatonic stupor (A 2). All the controls except one had physical sensations, some of them unpleasant.

The principal symptoms were headaches, giddiness, and cardiovascular symptoms—for example, tachycardia, pains in chest, extrasystoles, and the case of heart-block already reported elsewhere. Two patients complained of a heavy feeling in the epigastrium, possibly due to an increase in gastric acidity. Four complained of blurred vision, including two of the normals; five complained of anorexia, including three normals—one of the patients (C 7) showing this symptom had complained of anorexia before, but it became definitely worse while the drug was given. This patient was also the only one of the series to show a notable loss of weight (over a stone), which might have been secondary to the anorexia but may also have been an effect of the drug. Davidoff and Reifstein found a loss of weight in most of their subjects. Physical examination in this case failed to reveal any cause for it. These results are all the more noteworthy when the relatively small dosage used in most cases is taken into account. One normal subject (D 4) had decreased frequency of micturition; the other (D 5), also normal, increased frequency. One patient (B 2) complained of a sensation he described as "a film on his tongue." One patient reported diarrhoea (C 5).

Psychical Effects

So far as the effect of the drug on different psychiatric conditions goes, the best results were obtained with the depressives. It seems impossible to predict what patients will benefit by the drug. It seems as if the drug were

perhaps of greatest value in the terminal stages of a depression—that is, when clinical improvement has already appeared. This was true of several of our cases, and is again in agreement with what Sargent and Guttman had found. These authors are diffident of giving the drug to patients with prominent hypochondriasis, but in some of the patients of this series the hypochondriacal symptoms were beneficially modified, however temporarily, and it seemed in one case the only form of therapy known likely to prove of much value. It enabled this patient (B 4) to face a medical board and perhaps even to launch him again on his duties. In another case (B 5), a depressive psychopath who had been accustomed to take large quantities of alcohol to overcome her inhibition and enable her to do her work, it was hoped to replace alcohol by benzedrine. This was unsuccessful. In this context it may be mentioned that Wilbur, MacLean, and Allen (1937) found it gave marked relief to the craving in chronic alcoholics, acting as a supplementary stimulant over a period of months. A subjective alteration of time experience was noted in a number of cases (Table B). One or two of the patients complained that the drug made them feel "unnatural," and one of these (C 6) implored me to give him no more of the drug although he admitted the beneficial psychic effect. He finally left the hospital in order to escape the treatment. One or two others, although admitting benefit, were unwilling or reluctant to have any more—an odd and probably unique situation in therapeutics. Others again—as might be expected, depressives—while admitting benefit, pointed out that it was after all a drug and they did not wish to be dependent on this, an attitude precisely similar to that adopted by many such patients towards the necessary sedatives to procure sleep.

With regard to sleep, the results were very variable. Several on the larger doses, 30 to 40 mg. a day, slept well, even when the drug was given at midday. Moreover the sleeplessness, when it occurred, was usually not a painful or unpleasant experience. In general the effect observed on sleep was similar to that found by other workers, and needs no further comment. Four patients felt drowsy or "dopy" after the drug and two felt fatigued. In one

or two cases there was an increase in the depression when the effect of the drug was wearing off, and it is important to bear in mind that Davidoff and Reifenstein mention a case of manic-depressive illness in which the patient impulsively attempted suicide. One of our patients (the alcoholic depressive) became very much more depressed, and the question of suicide was uppermost in our minds for some days, and in another (C 5) the depression was considerably intensified. This might, of course, just as well have been a usual constitutional intensification in the first case, but it appeared to be a definite effect of the drug in the second.

Comment

It must be admitted that, so far at least as these results are concerned, it is difficult to claim any great therapeutic value from benzedrine. Nevertheless, if its use relieves the depressed patient even transiently and gives him a few hours' respite, the drug has a place in psychiatry. To claim more than this from it at the moment, however, is impossible, and there are many limitations to its usefulness, not the least of which is the variability of its action. A small minority of cases seem to benefit definitely from benzedrine, and its greatest usefulness perhaps is in those cases of depression in which a clinical improvement has already set in. Here it may be helpful in giving the patient a temporarily increased insight, which has been of use psychotherapeutically. Apart from this, the drug is of doubtful value as an aid to psychotherapy. It was difficult to resist the impression in one or two cases that the speed of convalescence from a depression was increased, but this is difficult, if not impossible, to establish objectively. Indeed it is almost impossible in many cases to separate the changes of the normal process of recovery from the effect of the drug, which makes any pronouncement of its value in such cases very dubious. For those patients who have clinically improved but who for economic or other reasons are unable to stay in hospital and must return to work, benzedrine is sometimes of help in enabling them to face their day's work. The drug should, however, be controlled by frequent examination of the patient afterwards. For those depressed patients who may at any time get worse, and perhaps contemplate suicide, suitable doses of benzedrine may enable one to keep them in a hospital or even in everyday life without extra supervision. Here, again, they should not be given a bottle of tablets and allowed to go their way.

With regard to dosage, 10 to 40 mg. in ordinary cases should be enough, and a divided dosage—say, 15 mg. at 9 a.m. and a further 15 mg. at 11.30 a.m.—is to be recommended; and certainly, unless the patient is under full in-patient supervision, this dosage should never be exceeded. The drug is admittedly still in its experimental stage, but enough work has now been done to make it doubtful how far, if at all, it is likely to be of greater value in psychiatry than it is at present. The contraindications are now being established, but from my experience it would appear to be unwise to give benzedrine to any subject with cardiovascular disease in any form, or to those with prominent anxiety symptoms. The initial dose should not exceed 10 mg. and the optimum dose should be determined carefully. I agree with Davidoff and Reifenstein that it should be used cautiously in certain depressives because of the possibility of intensifying the depression, with consequent suicidal risk. This risk has not been sufficiently stressed.

Summary

Thirty-three patients suffering from different forms of mental disorder and eight normal subjects were given benzedrine orally in doses of from 5 to 45 mg. In sixteen the drug had to be discontinued because of untoward effects, mental or physical, and in two more because no beneficial effect was produced. In eleven (one-third) the drug appeared to be helpful. In five no effect, mental or physical, was produced. Dosage, contraindications, and the general value of benzedrine in psychiatry are discussed.

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The following medical promotions in and appointments to the Venerable Order of the Hospital of St. John of Jerusalem are announced in the *London Gazette* of June 24. As Knights: Major A. W. Anderson, M.B., Major W. O. Evans, M.B.E., L.R.C.S.; as Commanders: D. W. A. Bull, M.D., C. Armstrong, M.B.; as Officers: L. L. Westrope, M.D., H. Riddell, M.B., E. H. Knowles, L.R.C.P. and S.Ed., J. E. Banks, F.R.C.S., A. P. Martin, M.B., J. Vaillancourt, M.D., Lieutenant-Colonel F. A. Young, M.D., Major-General P. S. Mills, C.I.E., W. T. Thomson, M.R.C.S., C. A. Verco, M.B., W. G. Shellshear, M.B., Colonel J. L. Hamilton, M.C., T.D., M.D., K. S. Maurice-Smith, M.R.C.S., Lieutenant-Colonel C. L. Dunn, C.I.E., J. K. Milligan, M.R.C.S., A. T. McKay, M.D., E. Lewys-Lloyd, M.R.C.S., Hon. P. P. Debono, M.D., F.R.C.S., Professor J. Ellul, M.D., E. L. D. Parry, M.B.; as Associate Officers: Colonel D. H. Rai, M.C.; as Serving Brothers: F. M. Longson, M.B., E. Ringrose, M.D., J. R. Hall, M.B., G. Fisk, M.D. (since deceased), G. H. Edgecombe, M.B., L. A. Williams, M.D., W. O. F. Sinclair, M.B., J. E. Scales, M.R.C.S., J. C. P. Bayley, L.M.S.S.A., J. B. McKay, M.B., F. C. Cozens, M.B., W. W. A. Kelly, M.B., A. J. Craig, M.D., T. D. Delprat, M.B., A. F. Janes, M.B., H. C. E. Donovan, M.B., J. McK. Woods, M.B., C. S. Renwick, M.B., F. L. Firkin, M.B., P. D. Braddon, F.R.C.S.; as Serving Sister: Frances C. B. McKay, M.B.