splenic infarction during flight, in a black man, Dr. Green and his colleagues produced the statement: "A positive sickle-cell test with a normal haemoglobin level suggested he was a sickle-cell trait carrier, though electrophoresis was not performed." The possibility of SC disease in this case appears to have been ignored because of the "normal haemoglobin level." Evidence of 377 consecutive Hb SC disease patients on whom haemoglobin estimations have been done in the steady state (see Table) shows levels of at least 12.0 g/100 ml in 49, 12.8 g/100 ml in 37, 13.5 g/100 ml in 36, 14.3 g/100 ml in 14, and 15.0 g/100 ml or more in 18 (the normal Ghanaian male-female mean³ being 12.7-14.8 g/100 ml).

TABLE.—Haemoglobin Levels in Sickle Cell Disease Patients in the Steady State.†

Haemoglobin (S/100 ml)	SS	SC	SFh	STh
16.5		**	*	
15.75				
15.00		16		
14.25		14	**	
13.50	*	36	*	**
12.75	***	37	*	***
12.00	***	49	*	****
11.25	***	25	*	***
10.50	***	57	*	****
9.75	***	41	*	***
9.00	***	37	***	***
8.25	***	23	***	***
7.50	***	28	*	***
6.75	***	76	*	**
6.00	***	69		
5.25	***	26		
4.50	***			
3.75	***			
Mean	7.998	11.202	11.137	10.317
SD	1.645	2.210	2.767	2.113
Total	463	377	16	30

†BMD Biomedical Computer Program 07D output. Each star represents a patient. Where the total number of patients for the same range of haemoglobin level exceeds 10 the exact number is shown after the row of stars. Note that 154 (41%) of 377 Hb SC patients had haemoglobin levels of 12.0 g/100 ml or more. Inter-genotype differences in Hb levels are highly significant ($P < 0.001$).

By far the most striking thing about the haemoglobin electrophoresis of sickle cell β -thalassaemia in West Africa is an "AS" pattern with no more fetal haemoglobin than is found in sickle-cell anaemia (Fig.). The

inexperienced confronted with such an electrophoretic strip without the control, and without values for A_2 and S, will almost certainly call it sickle-cell trait. The authors have failed to satisfy themselves and your readers that the Ghanaian nurse, information on whom they obtained second hand, was in fact sickle-cell trait and not sickle-cell β -thalassaemia. While they admitted that "no sickling crises were reported among African competitors with the sickle-cell trait competing in the Mexican Olympic Games at 7,000 ft (2,135 m)" they nevertheless accepted without question the recent controversial report⁴ of four cases that "violent exercise and residence at a moderately high altitude (4,000 ft; 1,220 m)" was capable of precipitating a fatal sickling crisis in sickle-cell trait carriers. Actually, in their paper entitled "sudden death in sickle-cell trait"⁴ the authors relied on the "SA" electrophoretic pattern without quantification of A_2 , A, or S in three of their cases, and in the fourth who did not even have haemoglobin electrophoresis they were content to call it sickle-cell trait because "a sickle-cell preparation at autopsy was positive."

There is no controversy regarding sickle-cell disease and altitude. The controversy is about the uncritical way the authors have used the term sickle-cell trait throughout their article in relation to aviation. The sickle-cell gene is found in much of the non-negro world, for example in the Mediterranean countries and in South India. Indeed, in the Lake Kopais region of Greece 1 in 5 of the population has the sickle-cell trait⁵—a proportion which is exactly the same as that in Ghana. Any international pronouncement on the sickle-cell trait will, of course, also affect Greeks and people of Greek descent.

I am grateful to Professor Bela Ringelmann, Department of Chemical Pathology, University of Ghana Medical School, for his advice and help; to Professor Herman Lehmann, M.R.C. Abnormal Haemoglobin Unit, University Department of Biochemistry, Cambridge, for confirming the haemoglobin electrophoresis of the S β -thalassaemia strip shown in the Figure; and to Mr. R. G. Carpenter and Miss J. Nixon of the Department of Human Ecology, Cambridge, for their help in computer analysis of data.

—I am, etc.,

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- 5 Choremis, C., Zervos, N., Constantinides, V., and Zannos, L., *Lancet*, 1951, 1, 1147.
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IgE Levels in Asthmatics

SIR,—The observation of "two distinct forms" of IgE by Mr. D. Jacobs (11 September, p. 642) may simply represent an artefact resulting from the processing of serum to concentrate the IgE.

Starting with PS myeloma IgE serum, purification usually results in an IgE

preparation giving a single band on Ouchterlony plates.¹ However, in one preparation in which the purified IgE was concentrated to 10 mg/ml two distinct precipitin bands were observed when this preparation reacted with commercial antihuman IgE (Miles Laboratories) (see Fig.). We suspect that the second band probably represents aggregated or otherwise modified IgE expressing new antigenic determinants which become visible only with very concentrated preparations.

PHOTOGRAPH OF OUCHTERLONY A & B

Ito *et al.*² have reported new antigenic determinants resulting from the processing (heating) of IgE preparations which may be an additional example of the possible artefactual nature of the observation reported by Mr. Jacobs.—We are, etc.,

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- 1 Bazaral, M., and Hamburger, R. N., *Journal of Allergy and Clinical Immunology*, In press.
- 2 Ito, K., Wicher, K., and Arbesman, C. E., *Journal of Immunology*, 1971, 106, 1130.

Gamma Benzene Hexachloride as a Scabicide

SIR,—I recently returned from four months' relief work among East Bengali refugees in India, about half of whom were suffering from scabies. All patients infested by scabies, whether as a presenting complaint or an incidental finding, were taken by a nurse to a quiet corner of the hospital compound, stood upon a piece of plastic sheeting, stripped naked, and painted swiftly, exclud-

Figure.—Haemoglobin electrophoresis tris-barbiturate pH 8.9 of blood from sickle-cell β -thalassaemia person (left) and normal control (right). Note from top to bottom increased A_2 band, 6.1%; large S band 70%; and smaller A band 21% in S β -thalassaemia, while in the normal control a smaller A_2 , 2.1% and an A band are found (from Konotey-Ahulu and Ringelmann⁷). Haemoglobin F in this sickle cell β -thalassaemia patient was only 2.3%. Mean Hb F levels in 184 HbSS 34 HbSThal, and 27 HbS-persistent F patients in Accra were 7.7%, 7.4%, and 20.3% respectively.

ing only the face, with one application of gamma benzene hexachloride lotion 1%. This became a swift and easy routine as the numbers were great, probably 50 patients in one outpatient session. Each patient was given a card showing his name and diagnosis and date of treatment and requested to return after seven days. Laboratory facilities for confirming the diagnosis of scabies were not available, but with such large numbers recognition of the condition did not present a problem. About 10% of the cases were secondarily infected, but only the most purulent of these were given a systemic antibiotic.

Only around 15% of the patients kept their follow-up appointment. Not a single case of persistence of scabetic lesions was found among them. Surprisingly, secondary infection in the milder cases had also remitted. In no case was there any complaint of irritation caused by treatment, but this is less significant in people already accustomed to many irritations of a sort not well tolerated in western communities. In no case was an eruption seen which could be considered a sensitivity reaction to treatment. The total number of patients treated was not recorded, but by projection of the attendance at one outpatient session it can be estimated at 750 in the course of four weeks.

At the time of first attendance all members of a family present usually had scabetic lesions. These were treated, and the responsible member was exhorted to bring other members of his family for similar treatment. It is doubtful whether this advice was taken in most cases, and late recurrence, usually after a period of three weeks or more, was not uncommon.

It seems that when gamma benzene hexachloride 1% is applied efficiently the incidence of resistance of acari to it is insignificant. A further advantageous factor was that the people were accustomed to taking daily baths. A controlled trial of gamma benzene hexachloride 1% in the treatment of acarus infestation is being conducted by War on Want's field medical units still operating in West Bengal.

I wish to thank Messrs. Stafford-Miller Limited for donating large quantities of gamma benzene hexachloride in the form of Quellada (Kwell) lotion.—I am, etc.,

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Truncal Vagotomy and Pyloroplasty

SIR,—Permit me a short comment on the paper by Professor J. G. Goligher and his colleagues (1 January, p. 7) as I have personal experience of 380 cases of truncal vagotomy and pyloroplasty. My experience is very different from that of the authors, and to highlight it I can state immediately that I have never seen a case of food vomiting or bilious vomiting, and the incidence of unsatisfactory digestive status (Visik classification¹) is 4%. I can only think that these startling differences in statistics must result in large part from inadequate pyloroplasty function leading to delayed gastric emptying, and some studies of this factor might well have been informative in these cases.

The figure in my series for suspected recurrent ulcer is 2.5%. In Professor Goligher's series there seem to be two factors to ex-

plain the high incidence of suspected recurrent ulcer—an unfortunately high incidence of incomplete vagotomy and, again, a number of cases of inadequate pyloroplasty function, as evidenced by the fact that in more than half the cases subjected to re-exploration no recurrent ulcer was found but a further antiulcer operation was performed.

Of course it must be understood that all this pertains to a procedure that is really somewhat archaic now, and that even better results, particularly in regard to the avoidance of diarrhoea, are now obtained by the use of selective vagotomy. No doubt the future will tend towards a more highly selective vagotomy without pyloroplasty, and certainly not towards the backward-looking procedure of gastric resection.—I am, etc.,

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¹ Visik, A. H., *Annals of the Royal College of Surgeons of England*, 1948, 3, 266.

Proximal Vagotomy

SIR,—I think that the high incidence of recurrent ulceration in Mr. C. Wastell and his colleagues' (1 January, p. 28) small series of selective proximal vagotomies is explained by their 28% incidence of incomplete vagotomy (14% early positive) as shown by insulin tests performed soon after operation. Any type of vagotomy for duodenal ulcer, whether truncal, selective, or highly selective, is sure to fail if the section of the vagal nerve fibres to the parietal cell mass is so inadequate.

In the first 100 consecutive patients treated here for duodenal ulcer by highly selective vagotomy without a drainage procedure the incidence of incomplete vagotomy was 3% (all late positive), and in the past three years recurrent ulceration has not been found in a single one of them, despite regular assessment in "blind" fashion by a physician, a radiologist, and a surgeon. Amdrup's¹ experience with over 100 patients treated by parietal-cell vagotomy without drainage in Copenhagen is similar: not a single recurrent duodenal ulcer in three years, though there has been one gastric ulcer.

Thus one would infer that if the vagotomy of the parietal cell mass is efficient recurrent ulceration in the first 2-3 years after highly selective vagotomy without drainage is very unlikely to occur, whereas if the vagotomy is incomplete at the time of operation recurrence is likely. Mr. Wastell's report should not be regarded as an indictment of highly selective vagotomy without a drainage procedure.—I am, etc.,

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¹ Amdrup, E., and Jensen, H. E., *Gastroenterology*, 1970, 59, 522.

Treatment of Malignant Hyperpyrexia

SIR,—I was indeed pleased to read the report by Dr. Gaisford G. Harrison (21 August 1971, p. 454) and your associated editorial (p. 441) recommending the treatment of malignant hyperthermia with intravenous procaine. His experiment was well thought out, and the results are certainly provocative.

When I reported¹ the use of intravenous lidocaine in a young man and noted then the apparent rapid and favourable response of the syndrome to this treatment I was similarly impressed.

The regimen recommended by Harrison does raise certain questions. Would the same beneficial results have been achieved with smaller doses of procaine? Is procaine, which is rapidly hydrolyzed and evanescent in action, really preferable to lidocaine, which acts longer because of slower hydrolysis? Harrison clearly states that the dosage of procaine used invariably produced bradycardia and hypotension, which necessitated the use of isoprenaline. Since catecholamines produce ketosis and increase free fatty acids, it would on a theoretical basis seem best to avoid the use of catecholamine-like drugs if at all possible. Ketosis would aggravate the existing acidosis while the uncoupling phenomena, if this mechanism is operative, would follow the increase in free fatty acids. Monitoring the rate of procaine infusion on the basis of the cardiovascular response may provide effective reversal of the hyperthermic process without inviting the hazards inherent in overdosage with procaine and the theoretical, if not real, adverse effects of isoprenaline in this syndrome.

Lastly, though a dysfunction of intracellular calcium metabolism is currently attractive as an explanation for some of the changes seen in this syndrome, it may be identified as only one phase in a series of altered metabolic processes. The role of magnesium in relation to endogenous hypermetabolic stimulating substances as well as in the metabolic process for energy transfer are still to be defined in relation to the malignant hyperthermic syndrome. Continued investigations into this syndrome are obviously still necessary, but just as Dr. Harrison has done a great deal to stimulate interest and advance our understanding of this syndrome he has also further opened the therapeutic door to this terrible syndrome.—I am, etc.,

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¹ Katz, D., *Anaesthesia and Analgesia*, 1970, 49, 225.

Health Service or Sickness Service?

SIR,—You published Dr. Eliot Slater's article "Health Service or Sickness Service?" (18 December, p. 734) to provoke debate. I experienced much satisfaction in finding so beautifully and lucidly expressed what I had felt for a long time—until I came to the last paragraph referring to suicides among the elderly.

As I read the quoted paper by Barraclough,¹ on the evidence available all but four of the 30 suicides over 65 were regarded by a panel of three psychiatrists as having been mentally ill immediately before death: in 19 there had been a primary depressive illness, and at least two of the five suicides with malignant disease had not apparently been aware of its presence.

It would be a pity if Dr. Slater's admirable paper were to lead to a greater neglect of elderly depressives and of old people attempting suicide. Their treatment will not always prevent death but will in the great majority of cases alleviate suffering, and in