

island. As it is, their recommendations will drive out the few who already do manufacture there.

Unfortunately, similar attitudes prevail in many other developing countries. If, instead, they realized that it is possible for developing countries to attract foreign-owned factories to manufacture pharmaceuticals for export—as is already happening extensively in the Far East—it would open a new avenue through which the richer countries could fulfil their responsibility to contribute to the prosperity of the poorer.—I am, etc.,

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### Epitaph for the M.C.H.C.

SIR,—The mean corpuscular haemoglobin concentration (M.C.H.C.) has a time-honoured place in the measurement of hypochromic anaemias. The advent of automatic apparatus for routine haematological investigations has forced a shift of emphasis away from the M.C.H.C. Such apparatus is now widely used in this country and in the U.S.A., and haematologists are well aware that the M.C.H.C. may not be what it seemed to be. However, this remains a well kept secret, with medical students and non-haematological graduates showing a touching faith in what they have been told and what they continue to be told.

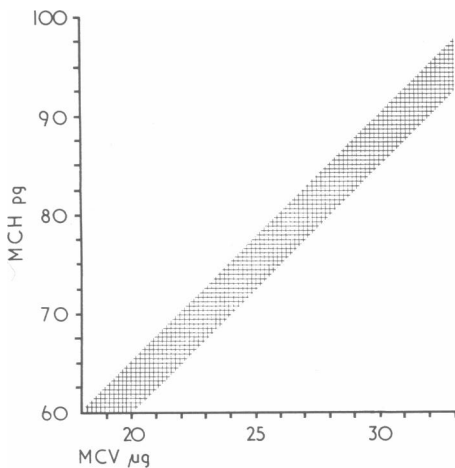


FIG. 1.—Shows relationship between M.C.H. and M.C.V. measured by the Coulter Model "S".

The M.C.H.C. was introduced to show how completely the erythrocyte space was filled with haemoglobin. Happily, the M.C.H.C. when calculated from directly measured parameters was low in blood from patients with hypochromic anaemias. Currently however, automatic apparatus such as the Coulter Model "S" (Coulter Electronics Inc.) is churning out normal M.C.H.C.s to the accompaniment of hypochromic films. Either the automatic M.C.H.C. is nothing of the sort, the manual M.C.H.C. was a fraud, or our eyes are deceiving us. Questions are now being asked and some answers are emerging which merit attention.

As a hypochromic anaemia becomes more severe the red cells show a striking variation in size and shape. When the packed cell volume (P.C.V.) is measured by manual

methods, the result expresses the limitation upon centrifugal packing set by the variations in shape and size. J. M. England and colleagues (in press<sup>1</sup>) have shown that the proportion of trapped plasma in the red cell column increases as the anaemia becomes more severe. The Coulter "S" calculates the P.C.V. from the red cell count and the mean corpuscular volume (M.C.V.), and therefore does not convey the fact that bodies of various shapes and sizes will not pack conveniently into a minimum volume.

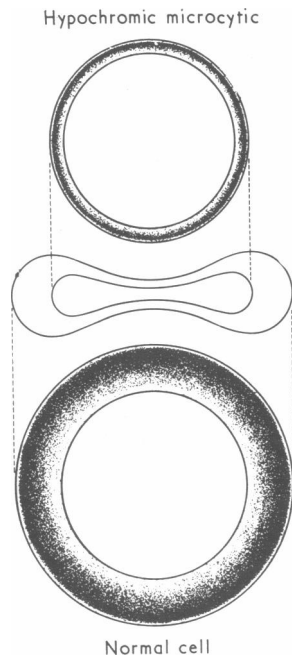


FIG. 2.—Red cell size determines whether the cell appears well or poorly filled with haemoglobin.

Furthermore, correlation of M.C.V. and mean corpuscular haemoglobin (M.C.H.) as provided by the Coulter "S" shows a linear relationship (Fig. 1). If a genuine fall in M.C.H.C. was the explanation for hypochromia seen on the peripheral blood film then the curve would deviate to the right as it approached the axial origins. Since the M.C.H. is predictable from the M.C.V. this measurement may also be considered obsolete. It appears therefore that hypochromic features seen on a film represent the optical properties of small relatively thin cells (Fig. 2) and have little to do with haemoglobin concentrations.

It may be mentioned that the whole selection of indices occasionally assist in the diagnosis of spherocytosis, but this is no good reason for persisting in the belief that either the M.C.H.C. or M.C.H. convey anything of particular clinical value any longer.—I am, etc.,

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<sup>1</sup> England, J. M., Walford, D. M., and Waters, D. A. W., *British Journal of Haematology*, in press.

### Shortage of Physiotherapists

SIR,—The Health Service is handicapped by a shortage of physiotherapists. A high proportion of women marry soon after training and qualification. The arrival of children keeps them from working for a time, but when the children reach school age and the mother wishes to return to part-time work

she finds she is discouraged by regulations. Particularly does this apply to the mother-physiotherapist who wishes to work almost full-time during the term and for very little time, or not at all, during school holidays. Where there is always a shortage of physiotherapists any available service is easily taken up even if only during term-time.

Physiotherapists are allowed to work up to four sessions (12 hours) each week at £2.62 per session. If they are able to work more than this their pay is calculated on a pro rata basis and works out at £2.25 per session, though, of course, they are then eligible for holidays and sickness benefit, but to be paid in this way they must work a regular number of hours throughout the year. A young, keen, energetic physiotherapist with children all school age wishing to work six or more sessions a week during term-time but not at all during holidays is not covered, and though finance offices bend the regulations to help as much as possible it gets very difficult to pay more than the statutory number of sessions during term-time, even though the local needs cry out for physiotherapists.

One does not have to be an administrative genius to see some simple changes in the regulations which could benefit greatly the public. First, the number of sessions allowed per week could be increased to six; even seven or eight does not seem to be unreasonable, for physiotherapists are desperately scarce. Secondly, the average number of sessions throughout the year could be used as a basis for calculation so that if she does not work at all during holiday time she could do at least six sessions per week during term-time, and only have an average of about four. If the first suggestion was also accepted then she could do as many as nine sessions during the term-time per week. For those legislators who are concerned that a sessional rate might allow a physiotherapist to be paid too much money, perhaps they could set an annual total over which a session would not attract any pay. £850 would seem a reasonable figure.

I trust publicity for these facts will do something towards changing the regulations and bringing back into the hospital service physiotherapy time which is now being wasted.—I am, etc.,

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### Neuropathy after Cloiquinol

SIR,—Dr. S. I. Terry's patient with transient dysaesthesiae following the ingestion of cloiquinol (25 September, p. 745) is of interest.

From 1963 onwards I investigated the effect of modifying the gut flora of patients with so-called "intrinsic" allergy. Cloiquinol, which is hardly absorbed, seemed potentially useful. The drug's safety was not in doubt: Gholz and Arons<sup>1</sup> had reported extensive investigations on 4,000 patients who had received the drug continuously for 4 years without untoward side-effects.

In the course of my investigation five patients developed numbness and tingling of their extremities, but no pain. One of these patients developed her symptoms after leaving my care. She was admitted to another hospital where a tentative diagnosis of transient encephalitis was made, but she was

allowed to continue self-medication with clioquinol since this controlled her rhinitis. She returned to my clinic with foot-drop in addition to her paraesthesiae, having taken clioquinol continuously for ten months. After withdrawal of the drug her symptoms and signs regressed over a period of a year.

The first patient to develop this syndrome was admitted to the ward and fully investigated. There were no abnormal findings on investigation, and unlike Dr. Terry's patient there was no leucocytosis, nor have any of my patients developed pyrexia. The only unusual feature was the finding of serum vitamin B<sub>12</sub> values just below the lower limit of normal in both the patient in the ward and the girl mentioned above.

A sixth patient developed an episode of probable optic neuritis while taking clioquinol. He stopped the drug at once, and his symptoms disappeared in a day. When he returned to the clinic his eyes were normal.

In this series, no patients developed symptoms until they had taken clioquinol continuously for at least six weeks, and provided the drug was stopped at once the symptoms resolved in a few days. The matter was reported to the Committee on Safety of Drugs at the time, and as a result it was agreed that in future containers of clioquinol tablets sold to the public should carry the warning that it was inadvisable to continue treatment for more than a period of four weeks.

The final outcome of the original investigation which led to these findings has been published<sup>2</sup> but only three of the above patients were among the 35 subjects who took part in the prospective trial which was reported. This figure suggests that the risk of clioquinol neuropathy to Londoners is a little below 10% if they take the drug for long enough. It seems unlikely that the Japanese are more susceptible.—I am, etc.,

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<sup>1</sup> Gholz, L. M., and Arons, W. L., *American Journal of Tropical Medicine and Hygiene*, 1964, 13, 396.

<sup>2</sup> McEwen, L. M., and Constantinopoulos, P., *Annals of Allergy*, 1970, 28, 256.

### Better Specimens from the Female Genital Tract

SIR,—You have drawn attention in leading articles to the rising incidence of gonorrhoea at a time when venereology is facing a recruitment crisis (5 June, p. 547), and to the problems of diagnosis in general practice (19 June, p. 670), as well as the special significance posed by the increasing incidence of nonspecific urethritis (10 July, p. 62).

Women constitute the main reservoirs of infection in gonorrhoea and probably also in nonspecific urethritis and genital herpes. The symptomless carrier state is very common and will be detected only by routine screening programmes. But even when clinical disease is present, the collection of satisfactory specimens for diagnosis in women is notoriously difficult for patients and doctor alike.

A new type of swab which we recently devised<sup>1</sup> should prove as helpful in general practice as we have found it to be in a busy

hospital outpatient department. The swab consists of an ordinary orange stick to one end of which is attached a thin strip of polyester sponge. The sponge used is non-toxic even to the delicate gonococcus, is very absorptive (retaining more than three times as much secretion as a conventional cotton wool swab), and has a moderately abrasive surface. One application of the swab to cervix, urethra, vaginal wall, or rectum provides ample material for microscopy and culture, either for immediate examination or dispatch to the laboratory in Stuart's transport medium.

The specimens have proved very satisfactory for the diagnosis of gonorrhoea, candidiasis, trichomoniasis, and herpes virus infections. In addition, excellent smears for cervical cytology can be obtained very rapidly and in every case, as a result of the gentle curetting action of the swab. We no longer have to submit women to scraping with wire loops that are painful and difficult to maintain in good order. The Ayre's spatula is not now required for cytology, nor is multiple swabbing necessary for smears and cultures. The patient's ordeal is thus reduced to a minimum, and so is the time taken for specimen collection.

It is hoped that the Department of Health will soon make these swabs available to general practitioners as a sterile pre-pack. This will at last make it possible to screen for subclinical infections large selected populations, such as patients at antenatal and family planning clinics.—We are, etc.,

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<sup>1</sup> Oates, J. K., Selwyn, S., and Breach, M. R., *British Journal of Venereal Diseases*, 1971, 47, 289.

### Verdict on CS

SIR,—I would indeed be grateful for space to comment on some of the points raised in your article "Verdict on CS." (25 September, p. 722).

First, critics of the use of CS were invited to ponder on the deaths in Attica jail, as reported by *The Times*,<sup>1</sup> with the implication that CS could somehow have avoided the tragedy. Your writer had apparently missed an earlier report;<sup>2</sup> just before the attack "... a state helicopter flew low down over the prison and dropped tear gas grenades. . . . Dense clouds of gas billowed out . . . of the prison building as . . . state police . . . rushed in." It is difficult to see how CS could have accomplished anything more in a situation where the copious use of tear gas failed to prevent 42 deaths.<sup>1</sup> I assure you Sir, we ponder.

Second, your description of CS as being "more poisonous than chlorine and capable of being metabolized to cyanide" was incorrectly attributed to me, and was taken from a synopsis prepared by editorial staff.<sup>3</sup> These informative synopses are useful guides to the content of articles, but tend to be exaggerated; quoting from them can be misleading. What I had actually written (apropos the whitewashing of the image of CS) was

"... CS is somewhat more poisonous than chlorine." In parenthesis, new data presented in the Himsforth report<sup>4</sup> reassures that CS aerosols generated from munitions are less toxic than aerosols of the pure compound.

Third, I am in full agreement with your comment that "... this emotive link with cyanide has no justification." One must not, however, ignore the strong factual link which, quite properly, the committee took very seriously in their report. Substantial evidence, albeit of an indirect nature, has been presented, showing that toxic amounts of CS given by injection kill by cyanide liberation.<sup>5</sup> The authors recognized the difference between the situations of injected mice and exposed individuals; "Comparisons with or extrapolations to the effects of aerosols on people are extremely difficult to make . . ."<sup>5</sup> The position was clarified recently by a publication<sup>6</sup> describing an interval of two to three days between the exposure of dogs to lethal aerosols of CS and subsequent mortality. The point that short-term deaths may involve production of cyanide, and that long-term deaths arising from CS aerosols involve another mechanism has now been established.<sup>4,7</sup>

If your anonymous writer has misrepresented me, that same Christian feeling which earlier prompted my work on CS now prompts me to forgive him gladly. But, Sir, when he uses the authority of your distinguished *Journal* to mislead your readers, it causes me pain to reflect that my forgiveness is of no avail.—I am, etc.,

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<sup>1</sup> *The Times*, 15 September 1971, p. 1.

<sup>2</sup> *The Times*, 14 September 1971, p. 1.

<sup>3</sup> Jones, G. R. N., *New Scientist and Science Journal*, 1971, 50, No. 756, p. 690.

<sup>4</sup> Home Office. *Report of the Inquiry into the Medical and Toxicological Aspects of CS (Orthochlorobenzylidene Malononitrile) Part II*. Cmd. 4775, London, H.M.S.O., 1971.

<sup>5</sup> Jones, G. R. N., and Israel, M. S., *Nature*, 1970, 228, 1314.

<sup>6</sup> Cucinell, S. A., Swentzel, K. C., Biskup, R., Snodgrass, H., Lovre, S., Stark, W., Feinsilver, L., and Vocci, F., *Federation Proceedings*, 1971, 30, 86.

<sup>7</sup> Jones, G. R. N., *Nature*, (in press).

### Epidemiology of Malaria

SIR,—The note on epidemiology of malaria (21 August, p. 487) calls for fuller comments. It is not unexpected that most of the cases of imported malaria occur in long-term residents in tropical countries. However, a substantial proportion of cases (23 out of 68 known) was seen in short-term visitors, and this can only mean that few of them take the protective antimalarial drugs during their stay in malarious areas, or that many interrupt their protective drug regimen on their return instead of continuing it for four weeks.

The fatality rate of 5% for all malaria infections is high enough, but if calculated for *P. falciparum* only it would amount to 5/49 equivalent to 10%—a truly frightening figure. It seems to continue in 1971 with four deaths in 91 cases of malaria notified in England and Wales during the first half of the current year. This should cause concern and greater effort is needed to increase the awareness of the medical profession of the risk of mis-diagnosed or mis-treated malaria.<sup>1</sup>