life must be an important factor when a large-scale future provision of day nurseries is considered. Short of ideal conditions (and the economic possibility of attaining these is remote), a large amount of respiratory infection, with the usual aftermath of ill-health and complications, may be expected, and must be balanced against the possible advantages of communal life for young children. The possibility exists that the risk of respiratory infections might be reduced considerably by part-time attendance at day nurseries, and the incidence of respiratory infections in children attending nurseries for two or three half-days a week is a question worthy of investigation.

Reference must be made to other work on this subject published since this survey was begun. The report by the Day Nurseries Committee of the Medical Women's Federation (1946) on the health of children in day nurseries revealed a higher rate of respiratory infections in children attending day nurseries than in those living at home, and showed evidence that "for children under 2 years old nursery life had an adverse effect on physical health."

In a study of infections in wartime day nurseries in Oxford (Allen-Williams, 1945) routine health records of children in day nurseries and attending welfare centres were analysed, and it was deduced that there was a greater liability to infections among nursery children, and that these infections occurred at an earlier age, than among children living at home. The records of infections and other details were, however, admittedly incomplete.

A study of the progress of children under 2 years of age in day nurseries in Leyton (Menzies, 1946) concluded that "a substantial proportion of children under 2 years old do not make satisfactory progress on admission to a nursery, as judged by the weight gain . . .", in spite of the very liberal diet in the nurseries, and drew attention to the importance of including in a survey of the health of children in day nurseries those who leave after a relatively short time of attendance because of "fretting" or contracting an infection.

Summary

An investigation in the health of children attending wartime day nurseries was carried out in Birmingham in 1944-5. During a period of one year repeated examinations were made by a single examiner of 557 children attending day nurseries and of a control group of 641 children living at home.

The results are based on a total of 3,250 examinations of children from 0-5 years old.

1. Respiratory tract infections were from two to eight times more frequent among nursery children than among the home group. This excess was manifest at all ages and at every season.

2. The incidence of measles was significantly higher in the day-nursery group, and was four times greater among those presumed susceptible in the day nurseries than in the home group. This excess was marked at all ages, but affected particularly those under 18 months old. The epidemic occurrence of measles was more pronounced in the nursery group than in the home group. These findings are important in view of the increased mortality from measles under 18 months of age and during an epidemic.

3. Pes valgus was more than twice as common among day-nursery children as in those living at home. The significance of this as a sign of fatigue is discussed.

4. Children over 2 years of age attending day nurseries were heavier than the children living at home, and they gained weight more rapidly between 1½ and 3 years of age. This may be correlated with the extra allowances of rationed foods (meat, bacon, cheese, eggs, etc.) available under the rationing system to children in day nurseries.

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Public Health Department, for kindly providing facilities for the survey. Lastly, many thanks are due to the staffs of the nurseries and welfare centres, for whom this survey involved much extra work, for their enthusiastic help and co-operation throughout.

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DE MORGAN'S SPOTS

BY

A. R. MURISON J. W. SUTHERLAND
Captain, R.A.M.C. Lieutenant, R.A.M.C.

AND

A. M. WILLIAMSON
Flying Officer, R.A.F.

The minute round ruby-coloured macules known as De Morgan's spots are of common occurrence in adults. They are most often seen in the skin of the abdominal wall. They vary in size up to a diameter of about 5 mm. and in number up to 20 or occasionally more. Microscopically they have the character of simple hæmangiomas.

The spots are named after Campbell De Morgan, surgeon to the Middlesex Hospital from 1842 to 1875. Tradition holds that De Morgan believed the spots to indicate or presage malignant disease, particularly of the stomach. If this was his view he did not (so far as we have been able to discover) commit it to paper. In his book *On the Origin of Cancer* (1872) he does indeed mention the spots, but only as the merest aside. In the course of developing the argument that cancer is not due to an infective agent he says (p. 16): "I have noticed, and it has been verified by the observation of others, that concurrently with, or following on, the development of cancer, small outgrowths of warty or vascular or dermoid structure are frequent. Now one would imagine that, if there were a cancer-poison in the blood, these or one of them would become the seat of the disease. But . . ." And he makes no further reference to the spots which are now known by his name.

The literature on the ruby spots is extremely meagre, and the only paper of note is Sampson Handley's in 1909. He points out that the spots are found in atrophic skin, and begin as small nodules of connective tissue under the epidermis. As the spots enlarge, wide blood channels make their appearance and by their bulk elevate the epidermis, causing further atrophy. He draws attention to the common belief that the spots occur more often in patients affected with cancer, but emphasizes that this belief lacks corroboration. From this brief review of previous work it will be clear that, although the ruby spots by virtue of their brilliant appearance often arouse comment and keen though transitory interest, there is an entire absence of precise information on their significance. Accordingly, it seemed to us useful to collect data over a series of cases large enough to demonstrate their frequency and incidence.

Frequency and Incidence of Spots

Method of Investigation.—The greater part of this paper is based on observations made on 1,300 patients at three Glasgow hospitals—the Western Infirmary, Stobhill Hospital, and the Radium Institute. The routine adopted was to visit in turn each of the general medical and surgical wards and to make observations on every patient available for examination. The area of skin examined for spots extended from the nipple line to the pubis, and laterally as far as the mid-axillary lines. This area was chosen for

convenience and because it is much the commonest site of the spots. For each patient a record card was prepared giving the age, sex, and provisional diagnosis, as well as information about the spots. The spots were classified into groups according to their diameter (as measured by a simple celluloid template), and the number of spots in each size group was noted.

The observations here presented were made in 1944, during our term of office as house-surgeons in the Western Infirmary, Glasgow. Since then one of us has been able to observe at routine medical inspections a large number of healthy men and women of the R.A.F. and W.A.A.F., and the opportunity has been taken of recording (though in less detail) the presence or absence of ruby spots. These observations are contrasted with those made in hospital. It has to be stated explicitly that none of the patients or Service personnel was chosen for record because of the presence or absence of ruby spots.

Influence of Age on Incidence.—Since, as Sampson Handley pointed out, the spots rarely occur before middle life, it is clear that an apparently high incidence of spots in patients with cancer (who are nearly all elderly) might well be fallacious. Accordingly, before proceeding to other considerations it is necessary to determine the relationship of age to the incidence of spots. In Fig. 1 we have included all Glasgow patients, male and female, cancerous and non-cancerous, and analysed the figures according to the number of patients with spots in each age group. It will be seen that the proportion of patients with spots rises progressively with age, at all events up to the age of 70. Thus in adolescence some 5% of patients have spots, but thereafter the proportion increases throughout adult life till in old age about 75% have spots. It is

FIG. 1.—Age incidence of De Morgan's spots (three hospitals; both sexes).

thus quite clear that the number of patients with spots in any series will vary greatly with the ages of the patients considered, and it will therefore be essential to make comparisons at each age group separately when comparing one series with another.

Frequency in Hospital Patients as Compared with Air Force Personnel.—A comparison of the frequency of spots in hospital patients and in Air Force personnel is shown in Fig. 2. It will be seen at a glance that, age for age, the proportion of individuals with spots among the Air Force personnel was much less than among the patients. Analysis confirms that the discrepancy is too great to be readily attributed to chance, and some other explanation must be sought. What the explanation may be is open to speculation, for the two series differ in many respects—in race, in health, in sex composition, and doubtless in other ways. It should be noted that the Air Force personnel

FIG. 2.—Incidence of De Morgan's spots in hospital patients and Air Force personnel.

were in the main English, whereas the patients were drawn from the West of Scotland: the possibility of a racial difference in the incidence of spots is attractive and merits

further study. On the other hand, we are inclined to think that differences in sex composition and in health are probably not important. The evidence on which we base this opinion is given below.

Sex incidence.—For the purpose of discovering if there was any sex difference in the incidence of ruby spots, we combined all patients from the Western Infirmary and Stobhill Hospital, and classified them (irrespective of disease) according to sex and the presence or absence of spots. It will be seen from Fig. 3 that the frequency of patients with spots (age for age) is almost the same in males and females, and analysis confirms that any small differences are readily attributable to the chances of sampling.

FIG. 3.—Sex incidence of De Morgan's spots (two hospitals; all diseases).

Influence of Disease on Incidence of Spots

In order to find out if there was any such influence we divided our patients into three broad categories: *Group 1*: patients without systemic disease (e.g., fracture cases) and those with acute disease (e.g., pneumonia). *Group 2*: patients with chronic disease (e.g., tuberculosis). *Group 3*: patients with malignant disease. A comparison of the incidence of ruby spots in "acute disease" and in "chronic disease" was made by combining the patients from the Western Infirmary and Stobhill Hospital (irrespective of sex) and classifying them according to the presence or absence of spots. It will be seen from Fig. 4 that the frequency is almost the same; analysis confirms that the small discrepancies are readily attributable to the chances of sampling.

FIG. 4.—Incidence of De Morgan's spots in acute and chronic disease (two hospitals; both sexes).

A comparison of the incidence of ruby spots in malignant disease as against the incidence in all other diseases combined was made by pooling all patients (irrespective of sex) from the three hospitals and classifying them according to the presence or absence of spots. Fig. 5 shows that in malignant disease the frequency of patients with spots was a little higher than that in non-malignant disease at all ages. It should, however, be noted that the differences are small, except at age 31–40 years (where the group of malignant cases comprises only 15 patients). Indeed, analysis reveals that a total discrepancy of the magnitude found might be expected to arise through the chances of sampling about once in eight such experiments, and the differences found cannot therefore be regarded as important. The very fact that a series consisting of 160 malignant and 784 non-malignant cases is insufficient to establish a significant difference in the incidence of ruby spots indicates clearly that the presence or absence of spots has no diagnostic importance.

FIG. 5.—Incidence of De Morgan's spots in malignant and non-malignant disease (Western Infirmary, Stobhill Hospital, and Radium Institute; sexes combined).

The somewhat unlikely possibility that cancerous patients might have spots which were unusually numerous or unusually large was investigated by comparing the malignant and non-malignant series, and no significant differences were found.

Increase in Number and Size of Ruby Spots with Age

Hitherto we have restricted attention to the question whether ruby spots were present or absent. It remains to describe how they increase in number and size as age advances, and to attempt an estimate of their rate of growth. For this purpose it has seemed best to pool all the information available from the three Glasgow hospitals. Among the data recorded for each patient was a count of the number of spots of diameter less than 1 mm., between 1 and 3 mm., and over 3 mm. The number of spots of each size (per 100 patients) was therefore easy to determine for each age group. These estimates are illustrated in Fig. 6.

FIG. 6.—Influence of age on number and size of De Morgan's spots.

It will be seen that the total number of spots per 100 patients (represented by the top line in Fig. 6) increases at first slowly from zero at age 0-10 years to about 50 at age 21-30, and then increases rapidly to close on 500 at age 61-70; thereafter there is no increase. Again, it will be observed that the size of the spots, as well as the total number, increases with advancing age. Thus under the age of 30 years the majority of the spots are small (less than 1 mm. in diameter). Thereafter as age advances there is an ever-increasing proportion of spots of medium size (between 1 and 3 mm. in diameter). The proportion of large spots (over 3 mm. in diameter) also increases with age, but they never become very numerous; thus at age 21-30 years they account for about one-tenth of the whole, whereas in old age they account for about one-fifth of the whole.

The data already given (Fig. 6) can be made the basis of a rough estimate of the average rate of growth of the ruby spots. The estimate was made as follows:

Fig. 6 shows reasonably smooth sequences except at age 61-70 years, and the values given were therefore used direct, except that at this age the total count was arbitrarily reduced (at the expense of spots of medium size) from 481 to 430. The average number of years taken by the spots to attain a given diameter was then read off from the graph by a method best explained by illustration. Thus at age 36 (the mid-value of the decade 31-40) there was a total of 183 spots per 100 patients, of which 93 measured 1 mm. or more in diameter and the

remainder were smaller. It was assumed that the larger spots had been present longer than the smaller spots. But a total count of 93 spots was present (reading from the graph) at age 29 years. It was inferred that the spots which measured 1 mm. or more at age 36 had been present for at least seven years. Using this method, the following estimates of the average time taken by ruby spots to attain a given diameter at various ages were obtained:

Age in years	No. of years required to attain a diameter of:	
	1 mm.	3 mm.
6	—	—
16	6	—
26	9	17
36	7	22
46	12	28
56	13	30
66	13	38
76	22	47

A high degree of precision cannot be claimed for these estimates, but the general statement can be made that the rate of growth of ruby spots decreases as age advances. Thus to attain a diameter of 1 mm. the spots require about seven years in early adult life, and about twice or thrice this period as age advances. Similarly, to attain a diameter of 3 mm. the spots require about 20 years in middle age, and about double this period in old age.

Summary

The literature of De Morgan's spots is reviewed and their possible connexion with cancer discussed.

Data on the incidence of ruby spots were obtained from observations on 1,300 patients at three Glasgow hospitals.

No difference was found in sex-incidence.

The proportion of hospital patients with ruby spots rises from 5% in adolescence to about 75% at 70 years of age. The spots also increased in number and size with advancing age, but their rate of growth decreased.

The proportion of Air Force personnel with spots was found to be much less than that of the hospital patients.

De Morgan's spots were slightly commoner in malignant than in non-malignant disease, but not sufficiently so to be of diagnostic importance.

The observations recorded here were made for the most part during our terms as house-surgeons under Prof. Illingworth in the Western Infirmary, Glasgow. We are indebted to the physicians and surgeons in charge and to the medical superintendents of the Western Infirmary, Stobhill Hospital, and the Radium Institute for permission to examine their patients. Our particular thanks are due to Mr. R. A. Jamieson for his help in preparing this paper and in the statistical analysis; and to Dr. R. A. Robb, of the Mathematics Department of Glasgow University, for suggesting the method of estimating the rates of growth. We have to acknowledge our indebtedness to the Air Ministry for permission to publish the data referring to Air Force personnel.

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