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THE PLACE OF DERMATOLOGY IN A GENERAL HOSPITAL*

BY

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Previous Watson Smith lecturers have all given learned discourses on some branch of dermatology, and as Sydney Thomson in 1958 covered so magnificently the facet of skin disease in which I am specially interested I felt justified in breaking new ground in trying to present to this College the position occupied by dermatology to-day, with particular relation to the other branches of medicine. I also feel justified in doing this because I am sure that it is a subject which would have interested the founder of this lecture. Watson Smith began his medical career in Dundee, but after some years migrated to Bournemouth, where he practised as a general physician with an interest in disease of the skin. I have tried to trace the growth of dermatology as a specialized subject in the hospitals of the United Kingdom, and I wrote to the chief administrative officers of all the teaching hospitals to find when a dermatologist, as such, was first appointed to their hospital.

TABLE I.—*Name and Date of Appointment of First Dermatologists to the Teaching Hospitals of Great Britain*

University College Hospital		Sir William Jenner	1859
Charing Cross Hospital		Tilbury Fox	1860
The Middlesex Hospital		Robert Liveing	1879
St. Mary's Hospital		Sir Malcolm Morris	1882
The Westminster Hospital		T. Colcott Fox	1883
St. Thomas's Hospital		Joseph F. Payne	?1884
Edinburgh Royal Infirmary		William Allen Jameson	1884
Liverpool Royal Infirmary		H. Leslie Roberts	1893
Royal Victoria Infirmary, Newcastle		James Linmont	1893
Royal Infirmary, Sheffield		W. Dale James	1893
King's College Hospital		Arthur Whitfield	1899
St. George's Hospital		Wyndham Cottle	1899
Aberdeen Royal Infirmary		John F. Christie	1901
The London Hospital		James H. Sequeira	1902
Radcliffe Infirmary, Oxford		Ernest Mallam	1905
General Hospital, Birmingham		A. Douglas Heath	1906
Guy's Hospital		Sir Cooper Perry	1907
Royal Infirmary, Dundee		W. E. Foggie	1907
St. Bartholomew's Hospital		H. G. Adamson	1908
Bristol Royal Infirmary		J. A. Nixon	1908
Western Infirmary, Glasgow		J. Wyllie Nicol	1909
Manchester Royal Infirmary		William Dyson	1920
Cardiff Royal Infirmary		James Beatty	1923
Royal Victoria Hospital, Belfast		Ivan H. McCaw	1925
General Infirmary, Leeds		John T. Ingram	1927
Addenbrooke's Hospital, Cambridge		C. H. Whittle	19-9

It will be seen from Table I that, by good fortune from the point of view of this lecture, the first dermatologist to be appointed to a teaching hospital in this country was appointed in 1859, just one hundred years ago, at University College Hospital. So far as can be ascertained, Sir William Jenner was in no way connected with Edward Jenner, in spite of the rarity of the surname. Sir William Jenner was also physician to the hospital and was later Physician-in-Ordinary to Queen Victoria and to the Prince of Wales. The list contains many names which have a place of honour in British dermatology. It is intriguing to note the wide difference in the time of the establishment of a dermatological appointment in the different teaching hospitals. Such important hospitals as the Manchester Royal Infirmary, Cardiff Royal Infirmary, the Leeds General Infirmary, and Addenbrooke's, did not have a dermatologist as such until after the first world war.

Willan must have been a remarkable man, but though he died in 1812 at the age of 55 it was another 47 years before a dermatologist was appointed to a teaching hospital. It is, I think, fair to assume that it is probable that all the members of the staff, both physicians and surgeons, treated whatever skin diseases came their way. The archivist of St. Bartholomew's Hospital has sent me a very full account of skin diseases in that hospital. As early as 1554 there are records of payments to Elizabeth Hall for treatment of scald heads, and in 1670 Katherine Ingram was in charge of the cure of scald heads at this same hospital. I gather that the fee for cure of each was twenty shillings. Similarly, at St. Thomas's Hospital there is a record of Edmund Hill being appointed surgeon for scald heads in 1567. I suppose that this is one of the earliest examples of "superspecialization."

To return to more modern times, two men—Erasmus Wilson and Jonathan Hutchinson—had a very great influence on British dermatology in the second half of the last century; neither of them was appointed to his hospital as a dermatologist. Erasmus Wilson is described in the *Annals of the Royal College of Surgeons of England* of 1952 as one of the three most munificent benefactors to that College. He founded a chair of dermatology, but this was later expanded—a delightful word—to embrace a professorship in pathology. This embrace was the kiss of death for the dermatological partner.

It is easy to imagine stormy meetings of the hospital staff in the past whenever the subject of appointing a dermatologist was raised, since such an appointment would inevitably affect to a greater or less extent a part of the private practice of the rest of the staff. I believe that this is the biggest single factor responsible for the great difference in the time of the establishment of a dermatological post in the various hospitals.

The first dermatologists had a general training in either medicine or surgery, and a similar trend had been happening on the Continent. Later, in the last century, the branch went through the very necessary phase of minute histological investigation and classification to emerge, at any rate in this country, as an integral branch of general medicine.

Place of Dermatology To-day

So much for this brief review of the establishment of dermatology as a specialty. Where do we stand

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to-day in the pattern of the hospital? What is the place of this branch, long known as the "Cinderella of medicine"? I feel that we can and must play an important part in the diagnosis and care of the sick, and during the rest of the space at my disposal I hope to try to illustrate this fact.

Since I went to the United Oxford Hospitals in June, 1957, I have kept a note of all the patients I have had referred to me by other members of the consultant staff and also a record of all the cases presenting primarily with a skin lesion which I have referred to other departments. I have analysed the period from June 1, 1957, to September 30, 1958. The figures do not include the 131 cases I referred to the radiotherapist nor the 48 cases referred to the plastic surgeons, since these were referred mainly because of special therapeutic techniques. I also have only included cases which I have seen myself.

TABLE II

Total number of patients referred by consultants of United Oxford Hospitals to dermatologist from June 1, 1957, to September 30, 1958 ..	315
Referring source:	
E.N.T. department	15 (4·6%)
Eye ,, ...	17 (5·4%)
Gynaecological ,, ...	39 (12·4%)
Orthopaedic ,, ...	34 (10·8%)
Paediatric ,, ...	24 (7·6%)
Physicians	120 (38·0%)
Psychiatrists	4 (1·3%)
Surgeons	62 (19·7%)

During this period I have seen 315 cases referred from other departments, roughly one every working-day. An analysis of the referring department is shown in Table II and, as one would expect, the largest proportion (38%) were referred by the physicians, but cases came from all departments of the hospital.

These 315 cases fall into three groups: the first group consisted of those in which the eruption was directly associated with the main underlying disease, and comprised 52% of the cases; the second group consisted of 43 cases in which the eruption was caused by treatment of the primary disease; and the third was a group of 108 cases in which the eruption was not in any way associated with the primary disease.

Group 1

I feel that in 49 of the 164 cases in the first group the dermatological diagnosis was of positive help either in confirming or even in establishing the diagnosis. It is obviously impossible to give these cases in detail, but I will briefly mention a few.

Illustrative Cases in Group I

Case 1.—A man aged 56 was referred by one of the physicians for advice on his rash. He had been admitted to hospital with auricular fibrillation and cardiac failure, and in addition to the generalized rash which had been present for many years he had moderate splenomegaly. He was found to be suffering from telangiectasis macularis eruptiva perstans with the splenomegaly sometimes found in this condition. The possibility of mast-cell infiltration of the cardiac muscle giving rise to the infiltration can only, I think, be investigated *post mortem*. At present he is very much alive and well.

Case 2.—A man aged 34 was referred from the ophthalmologist by way of the plastic surgeon for advice on the treatment and prognosis of the pigmentation of the right lower eyelid and lower half of the eye. He was found to have a naevus of Ota.

Case 3.—This case of a farmer aged 26 is interesting; he was referred to me by the eye department. The story was that he had been struck on the left upper eyelid by a cow's tail and a few days afterwards this eyelid became swollen, red, and painful. Within five days a firm nodule appeared on the left upper eyelid. I talked to the students about cowpox and orf—he also kept sheep—but it was only later, when my registrar was taking him over to the laboratory for virus studies, that she got the history from him that his baby had been vaccinated three weeks previously and the cow and the sheep were—as it were—red herrings.

Case 4.—Quite soon afterwards I was asked to see a woman aged 30 in the eye hospital who also had primary vaccinia of the left upper eyelid contracted from her recently vaccinated baby.

Case 5.—A man aged 66 was referred to me by one of the house-surgeons for treatment of the warts on his hands. They were in fact arsenical keratoses. This man had had cirrhosis of the liver for a long time with associated oesophageal varices and he has several times nearly lost his life with haematemeses. Mr. Macbeth, the E.N.T. surgeon, was controlling these varices by means of injections. In going into his story it was found that he had had a good deal of inorganic arsenic for treatment of his psoriasis many years ago. I feel that the cirrhosis is probably connected with the arsenic, and, in addition, he has papillomata of the bladder, possibly from the same cause. During this period I have seen two other cases of arsenical keratoses.

Case 6.—This patient was referred by a physician. He was 72 and had had a bromide-arsenic mixture for several years up to the age of 20 for epileptiform fits. He knew that his hands were abnormally dry in 1917, because he remembered that at that time somebody with whom he shook hands made a remark about the abnormal dryness and roughness of his skin. Incidentally, these cases can often be diagnosed by shaking hands. He had had various epitheliomata treated in his skin from time to time, and had an operation for removal of a carcinoma of the oesophagus in 1947. The long survival period from this operation probably indicates that this was also associated with the ingestion of arsenic. The arsenic content of the skin was investigated by Mr. D. Gibbons, of Harwell. This showed no increase in the arsenic content of the skin, and it is interesting to speculate how arsenic can cause these profound epidermal changes, which often only appear many years after ingestion has stopped. One feels that the arsenic must, in some way, alter the normal process of keratinization, perhaps by entering into an enzyme system.

A third case associated with arsenic was that of a woman of 50 who had received that drug years ago when being treated with bromide for epilepsy.

Case 7.—This patient was referred from the dental department, and I have included her because it does not yet appear to be generally recognized that the commonest cause of angular stomatitis, in this country at any rate, is either ill-fitting dentures or, more commonly, specific sensitization to the material of which the denture is made. All the patients I have seen with this condition have had enormous quantities of vitamin B before they were referred to us (Vickers, 1949).

Case 8.—This patient was referred to me by Dr. Coles, but as she had been referred to him by a surgeon I feel justified in including her in this series. The clinical diagnosis made by a surgeon was a melanoma of the forearm with secondary nodules in the surrounding tissues, but she was in fact suffering from the rare condition, fortunately harmless, described by Church and Sneddon (1954) under the name of familial haemartoma. This name was, I believe, coined by running together the two words hamartoma and haemangioma; however, as one of my learned colleagues who read the classics before he became a pathologist pointed out to me, the defect is in the blood vessels and not in the blood, so that a much better name would be familial angiohamartoma. Dr. Coles has subsequently found other members of the family with the same condition.

Case 9.—In December, 1957, Professor Witts asked me to see a patient of his who was suffering from pernicious anaemia. The anaemia was well controlled, but the

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condition which was at that time worrying him greatly was extensive psoriasis. This man had previously suffered from hyperthyroidism, which had been treated by thyroidectomy, and the psoriasis had occurred for the first time in his life some time after the operation. When I was in Sheffield, I had under my care a patient with extensive psoriasis following thyroidectomy in which the parathyroids had been damaged; this patient had a low serum calcium which improved—together with the psoriasis—on calciferol. The present patient also had signs of parathyroid deficiency, he gave a positive Chvostek's sign, and his serum calcium was found to be 5.8 mg./100 ml. He was treated with 50,000 units of calciferol daily, and when seen in July, 1958, his psoriasis had practically disappeared and the serum calcium was improving, being 7.7 mg./100 ml. These cases are of interest as indicating possible triggers for the manifestation of psoriasis in a patient prone to develop this condition.

Case 10.—This case, referred by Dr. Victoria Smallpeice, illustrates, I think, the transplacental passage of the L.E. factor. I first saw the baby in August, 1957, when she was aged 3 months. She is the third child of an American who has suffered from subacute disseminated lupus erythematosus for eight years and who, since coming to this country some years ago, has been under the care of Dr. Stephen Gold. She has had L.E. cells in the peripheral blood from time to time and the condition has been controlled by chloroquine When the child was 4 weeks old a scaling area was noticed in the left temporal region and later the right temporal region was affected. When I saw the baby she had a well-defined erythematous slightly scaling eruption on the central part of the face, spreading into the hair margin in the temporal regions, and small erythematous plaques on the abdominal wall which showed slight atrophy. I thought at first that this was some low-grade infective condition, but in the course of three weeks the diagnosis of discoid lupus erythematosus became much more obvious. Examination of the mother's and the baby's blood at this time showed no L.E. cells, but the mother had a leucopenia of 2,600 per c.mm. Perhaps a little influenced by the mother's natural concern, I gave the child 50 mg. of chloroquine daily, and within five days, either because of or in spite of treatment, the rash rapidly improved and it had almost completely disappeared when the chloroquine was stopped after two weeks' treatment. This baby had been exposed to a good deal of sunshine in the first few weeks of life, and I think that since it has been shown by Bridge and Foley (1954) and by Berlyne *et al.* (1957) that the L.E. factor is present for the first few weeks of life in babies born of a mother suffering from systemic lupus erythematosus, it is reasonable to assume that this baby had the L.E. factor when she was exposed to sunshine and discoid lupus erythematosus developed. The infant is now quite well.

Of the 39 patients referred from gynaecologists, 7 were women who had developed an irritable erythematous eruption in the last few weeks of pregnancy. One of these patients had definite erythema multiforme, but in the others the erythema was of the non-specific toxic type. Russell and Thorne (1957) mention this in their paper on herpes gestationis, and it is, of course, sometimes impossible to separate the rash which is directly associated with the pregnancy from a non-specific erythema due to various drugs administered during this time. In all the patients I saw, the eruption subsided within two weeks of delivery and none of them had any blisters. This type of non-specific erythema is probably relatively common.

Many of these cases I have seen are fascinating, but space prevents the telling of them—the reticuloses with skin changes, the patient with erythema nodosum who had sarcoid nodules on the conjunctiva, the man with von Recklinghausen's disease presenting with the possibility of neoplastic change in one of the large neurofibromata, and so on. I should hate you to imagine that I was never wrong.

Case 11.—A woman aged 42 was referred to me by the E.N.T. department. She had been hoarse all her life and had a curious yellowish-brown slightly nodular infiltration of the skin of the neck, the lower half of the face, and the occipital region. In the occipital region there was marked thinning of the hair. I had never seen anything like this before; I made a tentative diagnosis of an unusual variety of pseudoxanthoma elasticum, and a piece of the affected skin was taken for biopsy. A few days later I was walking across the Radcliffe quadrangle when Dr. Robb-Smith hailed me and, in his delightfully diffident way, asked whether this case, whose sections he had been studying, could possibly be Urbach's lipoid proteinosis. This, of course, was the diagnosis.

Group 2

The next group of 43 comprise those in which the rash was associated with the treatment of the primary disease, and in 26 of these cases the rash was thought to be due to drugs either administered by the doctor or taken by the patient to relieve his symptoms, and 17 were cases of dermatitis due to some local application used in treating the primary disease (Table III).

TABLE III.—*Cases Directly Associated With Treatment*

Due to drugs	26	Due to local application	17
Aspirin	2	Benzocaine	1
Barbiturate	2	"Embrocation"	1
Carbromal	4	Flavine	5
Hormone	1	Iodine	1
Penicillin	3	Neomycin	1
Phenolphthalein	2	Penicillin	1
Sulphonamide	2	"Skin glue"	1
Unknown	10	Sticking plaster	1
		Unknown	5

Of the drug eruptions, the causes are those now commonly seen in dermatological practice; the largest group, labelled "unknown," comprises patients who had received several rash-producing drugs, and, because of their primary condition or distance from Oxford, it was impossible to trace which of the many causes was in fact responsible for the rash. I have the impression that carbromal eruptions are becoming increasingly common. One of these was of interest in that the patient was referred to me by a gynaecologist. I sent a copy of my letter to him to the patient's practitioner, stating that in my view the rash was due to carbromal. I received a rather indignant letter from the practitioner telling me that the only tablets the patient was taking were a hormonal preparation for menopausal symptoms, and later we found that she had been taking "menopax" tablets, which of course contain carbromal. My colleague, Kenneth Crow, has prepared a list of 15 proprietary preparations containing carbromal, and this number must be steadily increasing.

The rash labelled "hormone" was severe acne occurring in a woman having large doses of methyltestosterone for disseminated carcinomatosis following cancer of the breast. One of the phenolphthalein eruptions was in a young infant. This substance has apparently replaced mercury in some of the so-called teething powders. Of the known local applications flavine still tops the list.

Group 3

In the 108 cases seen in which the dermatosis was not in any way associated with the primary disease, the incidence of the various skin diseases is very similar, as one would expect, to that seen in the out-patient department. 28 of the cases had dermatitis or eczema, 17 had psoriasis, 9 acne, 6 warts, and there was a

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sprinkling of such conditions as alopecia areata, pityriasis rosea, lichen planus, etc.

So much, then, for cases referred from other departments.

Cases Seen in First Instance by the Dermatologist in Which Eruption was a Manifestation of Internal Disease

TABLE IV.—*Cases Referred to Other Departments* (33)

E.N.T. department ..	2	Paediatric department ..	2
Eye ,, ...	1	Physicians	17
Gynaecological ,, ...	2	Surgeons	9

Another great group consisted of 33 cases sent to the skin department by practitioners with what was found to be a dermatological manifestation of internal disease. I suppose that it is this type of case which adds spice to our out-patient sessions. Just over half were referred by me to one of the physicians, the choice of the physician being determined by his particular special interest. Table IV shows where these 33 patients were sent. The solitary patient referred to the eye department was a young woman with atopic dermatitis in whom bilateral cataracts were developing.

Case 12.—One of the first patients I referred to the surgeons was very intriguing. He was sent to me because of a so-called wart in the umbilicus which had been present for several months. There was certainly a rather fleshy warty nodule in the umbilicus, but, in addition, there was also a fusiform tense midline swelling in the abdominal cavity arising from the pelvis and extending to the umbilicus, and on pressing this swelling turbid fluid could be squeezed out of the nodule. The diagnosis of persistent urachus was made, and this was confirmed at operation by Mr. Mynors, who removed a mass in which a carcinoma had developed in the base of the urachus, and it is probably because of this that the potential space became filled with fluid.

Case 13.—A man was referred to the wart clinic in May, 1958, with the diagnosis of bilateral plantar warts of the big toes. He was found to have perforating ulcers with symptoms of subacute combined degeneration of the cord; he also had obvious profound anaemia. I referred him to Professor Witts, and in addition to pernicious anaemia he was found to have malignant disease of the stomach, though he had no symptoms referable to his stomach. This was removed by Mr. Elliot-Smith, and the patient is very much alive and doing a full day's work. Unlike the classical story of this type of case, the perforating ulcers which were the cause of his seeking medical advice have also healed.

The next type of case is always very satisfactory.

Case 14.—A man came to the out-patient department with the diagnosis of ? papilloma of the submental region. He had the typical sinus on the skin associated with a dental abscess, and, though the teeth appeared to be healthy, *x*-ray examination showed an abscess at the base of the central incisor from which there was a fine track running from the site of the sinus on the skin.

Case 15.—A woman aged 76 was referred to me because of paronychiae. She gave a history of having had Raynaud's disease for many years. There were numerous telangiectases on the face which were of fairly recent origin. Close questioning revealed that she had suffered a good deal from gastro-intestinal disturbance, and systemic scleroderma was confirmed by the physicians. Incidentally, though the association of telangiectasia with systemic sclerosis is well recognized by dermatologists, this association is not stressed in some of the standard medical textbooks.

Other exotic cases were seen and referred to other departments, but I would like to mention two cases in which I made the wrong clinical diagnosis but was saved by dermatological diagnostic measures.

Case 16.—A man aged 48 was referred to the skin department with erythematous patches on the cheeks which had been present for about two weeks. He had no other symptoms. There was a well-defined, erythematous, slightly indurated plaque on each cheek, and I made a tentative diagnosis of early sarcoidosis. A biopsy of the affected skin was done and *x*-ray film of his chest taken. The biopsy was non-specific, but the radiograph showed a large shadow of the left upper chest. He had no symptoms of chest trouble and was doing heavy work as a furniture remover. He was referred to Professor Allison, who resected the whole mass. This was found to be a carcinoma of the left upper bronchus adherent to many structures, including the recurrent laryngeal nerve, which had to be sacrificed. Over a year later the man was working, and, though hoarse, appeared to be very well.

Case 17.—A man aged 50, working as a long-distance bus driver, felt quite well, but had noticed three small indurated plaques on the chest wall for which his doctor had sent him to the skin department. I made the clinical diagnosis of reticulosis. However, his blood count was normal, but biopsy showed that the skin lesions were deposits of a glandular carcinoma. He had no localizing symptoms or signs and was referred to Professor Witts. *X*-ray examination of the stomach showed a marked leather-bottle picture. This man was seen in July, 1957; he died about six months later.

Conclusions

This, then, is the day-to-day type of clinical work which a dermatologist is doing in association with other members of the staff of a large general hospital.

What conclusions can we draw from this survey? The first is that a dermatologist must have a sound training in clinical medicine and that he must be essentially a general physician with a special interest in disease of the skin. I feel in this respect that it would be a retrograde step to introduce a diploma in dermatology. There is no more place for such a diploma than there is for a diploma in, say, cardiology or neurology.

The second conclusion is that the dermatological department must be closely integrated, both physically and spiritually, with the rest of the hospital. The dermatologist must be readily available on the spot for consultation with the rest of the staff if the sick of the area are to be given the benefit of a comprehensive medical service. In this connexion, I was appalled to learn of two recent appointments in dermatology. In one, a dermatologist working mainly in London was appointed to do two sessions in a hospital about 60 miles away; and in the other, the unfortunate young man does one or two sessions in each of a widely scattered group of hospitals. Please do not imagine that I have anything against the people appointed to these posts, but it is physically impossible to give proper dermatological service under such conditions. The whole of the staffing of the country should be critically reviewed. One feels that the number of consultants in dermatology has largely been determined by the numbers in certain areas before the appointed day. This number was based very largely on the amount of private practice which could support a dermatologist, and this does not necessarily bear any close relationship to the needs of the community.

I wish to draw attention to the views expressed by Jonathan Hutchinson in 1887: "Dermatology is no longer to be regarded . . . as a mere matter of giving arsenic and prescribing ointments and lotions, nor, as some, only a stage more enlightened, think, an arena for endless debate as to the arbitrary application of

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pedantic names of older or newer coinage. We have got beyond the old classifications, and we are ceasing to be merely empirical therapeutists. We claim for dermatology a foremost place as a branch of scientific medicine, and without hesitation I assert of it that beyond all others it offers attractions to the student of the laws of disease in general, and to the seeker after the causes which disturb health and local nutrition."

That was true 70 years ago and it is true to-day. I feel that the reason why the ideas of the rightful place of dermatology expressed then so forcibly were not fulfilled was entirely a question of economics. In order to make a living in the days preceding the National Health Service the dermatologist had to see an enormous number of hospital patients in addition to those who provided his bread-and-butter. Before the appointed day there were, with very few exceptions, no full-time consultant dermatologists within 100 miles of London, the private patient living in this area preferring to be seen in "Harley Street." The dermatologists of that time were bogged down by the mass of patients, and I am always amazed that so much was accomplished under those circumstances.

We must make sure that this mistake is not repeated in the National Health Service and that an adequate number of consultant posts are created.

The magnificent conference held in Cambridge on the progress of the basic sciences in relation to dermatology was a striking demonstration of the virgin field waiting to be cultivated. We have the men to do it; we must ensure that their zeal is not stifled by financial stringency.

Dermatology will take its rightful place in medicine only if we, as dermatologists, give practical proof of the value of looking at the skin. I have tried to show how this is working in one general hospital. I know that this is being done in many hospitals in the country, and it must be done in all.

By retaining our training in general medicine and by having time to think, we can fulfil the hopes voiced by Dr. Ingram in his presidential address to the Dermatological Section of the Royal Society of Medicine: "Do not let us resist progress; let us embrace and foster research in all directions, but in these days of increasing specialization which tends to forget the patient and does not always regard medicine as a whole, we must be careful to preserve our heritage and graft progress on to that background."

The general physician with an interest in dermatology who founded this lecture would, I am sure, be pleased by the present trend of dermatology in this country, and so, I know, would the man who taught skin diseases to us both—Rupert Hallam.

In conclusion I would like to quote a recently qualified intelligent student who came to me for advice for becoming a dermatologist. In reply to my question of why he was particularly interested in this branch, he said that dermatology is now the least specialized of all branches of medicine.

The Cinderella child is now claiming the glass slipper, perhaps with the National Health Service as fairy godmother.

I thank all my colleagues on the staff of the United Oxford Hospitals who have been so kind to me since I joined them and who have asked me to see and allowed me to quote their cases; and the administrators of the teaching hospitals who answered my queries so promptly.

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THE BRAIN AND MENTAL RETARDATION*

BY

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Interest in the neural abnormalities associated with and often responsible for mental retardation is gradually increasing, and recent years have also seen a welcome convergence upon this subject by workers in widely separated fields.

The more common encephalopathies of mental retardation have been described from time to time—for example, Crome (1957) and Norman (1958)—while very detailed reviews of the subject by German authors are being published in the still incomplete compendium edited by Scholz (1956). Since neural malformations comprise the bulk of these encephalopathies, the full survey of this particular problem by Ostertag (1956), a contributor to the above compendium, is especially noteworthy, though many of the conditions considered by him are too severe for prolonged or, indeed, any post-natal survival. An outcome of the anatomical studies so far has been a descriptive classification of the anomalies. This is based on normal embryogenesis, many aberrations of development being "timed" in relation to certain stages of brain growth and differentiation.

In regard to aetiology, attention has long been centred on "endogenous" or genetic factors. In animals, such as mice or guinea-pigs, it is possible to produce neural (and somatic) malformations by selective breeding, and some of these—for example, hydrocephalus in mice—may be compared with certain forms of the human disease (Grüneberg, 1947). The resemblance is, however, remote, and at best only suggestive. More direct study of the causes of mental retardation and neural malformations in man reveals the great complexity of the genetic and environmental factors involved (Penrose, 1954).

Realization that maternal rubella and irradiation can act as teratogenic agents has stimulated search for further environmental causes. Experimental work has been fruitful. It is now established that many foetal anomalies may be produced at random or by design when pregnant animals are exposed to different drugs—especially the "antimetabolites"—for example, aminopterin, galactoflavin, acetylpyridine, methylfolic acid—as well as oxygen deprivation, irradiation, and deficiency or excess of certain vitamins in the diet. The literature on this subject is already voluminous and has not yet been comprehensively reviewed, but it may be useful

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