The specimen consisted of the left tube and mesosalpinx, together with an ovarian cystadenoma measuring 8 by 9 by 8 inches, which contained 4 pints 10 ounces of dark-coloured fluid. The cyst wall was mostly thin, but in one moderately large area the wall was heavily infiltrated with blood and measured 1 inch in thickness. The remains of broken-down septa could be seen on the inner surface of the cyst, but there were no papillomata.

The microscopic sections are of very little interest, and show chiefly fibrous tissue infiltrated with blood.

The patient made an uninterrupted recovery, the temperature never rising above 99.2°.

Without borrowing too much from the above-mentioned article by Dr. Spencer, it may be of interest that this case is similar in several points to some of those he mentions. Thus he points out that malignancy is rare (4 per cent.); that the cheerful woman who is not too fat is a good subject for operation despite her age; that no time should be wasted at the operation; and that the after-care is very important, for there is a liability to chest complications and mental disturbance in these old women.

CASE II.

J. W., a widow, aged 71, had never been pregnant. She passed through the menopause when 48 years of age. She was first seen in the medical out-patient department because she had had pain in the small of the back for three days. Some five and a half weeks previously she had had an attack of diarrhoea lasting for sixteen days. The importance of this symptom will be realized. Usually her bowels were opened regularly.

When the physician made his examination he found a "lump" on a rectal examination. I was asked to examine the case, and made the following note: "Sigmoid colon palpable and tender. Uterus rather large for patient's age. In close apposition to its right lateral border is a semi-solid tumour not quite as large as a tennis ball. High up in the posterior fornix is a solid wedge-shaped mass. No evidence of carcinoma of the breast or of the stomach. No ascites. On rectal examination no rectal growth can be felt."

The diagnosis of ovarian cyst—possibly a dermoid—was made and ovariectomy advised.

On August 25th I opened the abdomen and found a right ovarian tumour, the size of an orange, embedded in adhesions. The adhesions were separated and the cyst—which on section proved to be a dermoid—removed. Further exploration revealed the real cause of the trouble. High up in the rectum was a carcinoma. It would have been out of reach to rectal examination, but was probably the "wedge" described in the "present state." Unfortunately the growth was inoperable, as it had become adherent to, and had invaded, an adjacent coil of small intestine. There were no obstructive symptoms and no distension of the bowel. Colostomy was not performed.

The operation took thirty minutes, the abdominal wall being closed as in Case I, except that interrupted sutures were used for the fascia.

The great interest of this case to me is the mistake—which I hope to profit—which I made in diagnosis. In the first place I suspected that the tumour was a dermoid from the peculiar consistency which one associates with these tumours when examined bimanually. Now I should have realized that it was unlikely that a dermoid would suddenly begin to give trouble at 71 years of age, and I should have paid more attention to the one attack of diarrhoea. Then, although no rectal carcinoma could be reached by the examining finger, the sigmoidoscope might have revealed the real trouble. One other point of interest is that dermoids form less than 2 per cent. of ovarian tumours removed after 70 years of age (Spencer, loc cit.).

The further history of the case is as follows:

Recovery from the operation was fairly satisfactory. The wound healed by first intention, but the patient began to feel abdominal pain some ten days after the operation. Flatulence became a troublesome symptom, her appetite failed, and her general condition deteriorated. Some time afterwards she was admitted to the surgical wards and colostomy was performed.

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A NEW DAYLIGHT LAMP FOR ACTINOTHERAPY AND GENERAL ILLUMINATION.

BY

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THE principal sources of radiation which are employed in actinotherapy are natural sunlight, arc lamps, mercury vapour lamps, and incandescent tungsten filament lamps. Solar radiation, compared with that from any other source of light, has the greatest luminous efficiency. The distribution of the spectral intensity of sunlight is variable, and hitherto no artificial source of light has been comparable to the sun either in relative intensity or in the nature of the rays emitted. The lamp which is described has been designed to produce a balance of visible and ultra-violet rays comparable to that of sunlight in relative intensity of radiation and in biological action.

Solar radiation, as it reaches the earth at sea-level, emits a number of waves of light extending from 2,900 A.U. in the ultra-violet region to 30,000 A.U. in the infra-red region. The energy distribution may be summarized as in the following table, which approximately indicates the percentage energy in selected regions of the spectrum.

TABLE I.

Ultra-violet Region:	
2,900-4,500 A.U. = 12%	= 12% total energy.
Visible Region:	
4,500-5,500 A.U. = 20%	} = 51% total energy.
5,500-6,700 A.U. = 17%	
6,700-8,000 A.U. = 14%	
Infra-red Region:	
8,000-14,000 A.U. = 25%	} = 37% total energy.
Over 14,000 A.U. = 12%	

The absorption of ultra-violet rays by the layer of ozone situated some thirty miles high produces a very rapid fall in the intensity of rays shorter than 3,000 A.U. and limits the solar spectrum under best conditions to approximately 2,900 A.U. Coblenz has pointed out that it is difficult

to make an exact radiometric comparison between the radiations from the sun and those from other sources of light, because all the sources are at different temperatures and have different types of emission spectra. The experiments carried out by Professor L. Hill have shown that the high intensity of rays from 3,500 to 2,900 A.U. present in sunlight produces biological action and affects the living skin in the same way as the shorter ultra-violet rays of weaker relative intensity emitted by the usual artificial sources of light.

The incandescent tungsten filament gas-filled lamps emit a "continuous band" type of spectrum similar to sunlight, but have a greater relative proportion of red and orange rays, and the ultra-violet rays are limited to 3,300 A.U. They are efficient for visible ray therapy, but do not produce erythema action on the normal skin, this effect being mainly due to rays shorter than 3,100 A.U. Mercury vapour lamps made of quartz emit ultra-violet rays as short as 2,200 A.U.; they are of great intensity in the green, blue, and violet portions of the visible spectrum, and 60 per cent. of their total energy is due to ultra-violet rays. The great intensity of erythema-producing rays present restricts the use of these lamps. Dosage must be carefully controlled, and the specialized technique of "short ray" therapy should be employed. A vitreosil screen or a mercury vapour lamp made of frosted vitreosil instead of quartz cuts out all rays shorter than 2,500 A.U. and reduces the intensity of the ultra-violet rays from 3,500 A.U. to 2,500 A.U. to about one-tenth. At a distance of 30 inches the minimal erythema dose is produced by a quartz mercury vapour lamp in three to five minutes; with a frosted vitreosil lamp the same intensity of erythema is produced in forty-five to sixty minutes. The mercury vapour lamp is a cold lamp and does not contain visible red rays or any great intensity of visible heat rays, but by the combination of tungsten filament lamps and the vitreosil mercury vapour lamp a source of light rich in heat, visible, and long ultra-violet rays is produced. The effects produced are similar to the biological action of sunlight.

COMPONENTS OF THE LAMP.

The lamp which has been constructed consists of (1) a frosted vitreosil mercury vapour tube, 4 feet long, of the Hewitt vacuum type; (2) a series of tungsten filament gas-filled lamps of low voltage; (3) a selective glass filter for ultra-violet rays shorter than 2,500 A.U. (See Fig. 1.) The vitreosil mercury vapour tube is automatic in starting; it can be placed in any position, either horizontal or vertical, and it is completely silent. A direct or alternating electric supply of 3.5 to 7 amperes and 150 to 250 volts is necessary, making a kilowatt output of 0.7 to 1.5 approximately. The spectro-photographic examination of the lamp shows that ultra-violet rays up to 2,500 A.U. are emitted. The intensity of radiation from 3,850 A.U. is greatly reduced compared with that emitted by the quartz mercury vapour lamp running at 3.5 amperes. In the visible region of the spectrum the lamp is rich in green, blue, and violet rays, but is almost entirely deficient of red visible light. The tungsten filament lamps are incandescent gas-filled lamps of

FIG. 1.—New daylight lamp

12-volt and 48-watt capacity. A number of these lamps are connected in series. Spectroscopic examination of this source of light shows that it is rich in infra-red, red, orange, and yellow rays, and emits ultra-violet rays to 3,300 A.U. The intensity of red and orange visible light is relatively in excess of the blue and violet light present.

By the combination of a suitable number of tungsten filament lamps and the vitreosil mercury vapour tube a daylight effect can be produced, by which objects appear to have the same colour as in daylight. The excess of blue and violet rays in the mercury vapour tube is compensated by means of the greater proportion of red and yellow rays emitted by tungsten filament lamps. At a voltage of 210 D.C., eighteen 12-volt and 48-watt tungsten filament lamps connected in series and combined with the vitreosil mercury vapour tube, running at 3.5 amperes, gives a white, comfortably warm, and regularly diffused natural light. The ultra-violet screen is a sheet of glass (sanalux 2 mm. thick) 3 ft. 11 in. by 9 in., which filters off all rays from 2,900 to 2,500 A.U. Photographs taken by means of the rays of this lamp compare favourably with those taken in daylight.

By means of a Griffith's cadmium photo-electric cell T. C. Angus has measured the intensity of ultra-violet rays emitted by this source of light. His observations are recorded in the following table.

TABLE II.

Distance from photo-electric cell to lamps=48 cm. Figures in chart indicate the time in seconds taken to discharge gold-leaf electroscope.

	No Vita Glass Screen.	With Vita Glass Screen =7,200-2,800.
Atmospheric quartz M.V.L. (3.5 amps.) ...	Immediate	27.1
Frosted vitreosil lamp (3.5 amps.) ...	160.0	1,185.0
New daylight lamp, vitreosil tube and visible light (3.5 amps.). Only 9 in. of lamp tested ...	29.9	276.0

The results of his experiments indicate (1) that the intensity of ultra-violet rays up to 2,900 A.U. is reduced to one-tenth of that emitted by the quartz mercury vapour

lamp, and (2) that the ultra-violet rays from 2,900 to 2,500 A.U. increase the photo-electric effect nine to ten times.

BIOLOGICAL ACTION.

1. *Erythema Production*.—The minimal erythema dose produced by the lamp without the ultra-violet glass screen (using all rays as short as 2,500 A.U.) is 45 to 60 minutes at a distance of 30 inches. With the ultra-violet glass screen it is possible that at 30 inches an erythema could be produced after several hours' exposure.

2. *Action on Infusoria*.—The lethal time for infusoria at a distance of 30 inches was 40 minutes when exposed to unfiltered rays extending to 2,500 A.U., and 120 minutes when exposed through the ultra-violet glass filter to rays extending to 2,900 A.U.

3. *Action on Bacteria*.—A surface culture of staphylococci exposed on a melted agar plate to the source of light was killed in 15 minutes at a distance of 30 inches (rays 7,200 to 2,500 A.U.). Using a sanalux glass screen to filter off rays from 2,900 to 2,500 A.U. lethal action was observed after 150 minutes' exposure. No destruction of bacteria occurred after 2½ hours' exposure through a window-glass screen transmitting rays from 7,200 to 3,300 A.U.

4. *Action on the Haemo-bactericidal Power*.—The hair of the back of a rabbit was removed by means of a depilatory, and the animal was exposed to the rays of the lamp for 2½ hours at a distance of 30 inches. Samples of blood were collected before and after irradiation, and the bactericidal properties of the blood samples before and after irradiation were tested in the usual way. The bactericidal power of the shed defibrinated blood tested *in vitro* had increased after irradiation, in a similar way to the response which occurs after exposure of the skin to sunlight and other artificial sources of ultra-violet rays.

FIG. 2.—Photograph of spectra. 1a, The sun filtered through Br and I screen to show ultra-violet rays. 1b, The sun's spectrum. 2, Quartz mercury vapour lamp. 3, Glass mercury vapour lamp. 4, Incandescent glass tungsten filament lamp. 5, Vitreosil mercury vapour tube and tungsten filament lamp. 6, Vitreosil mercury vapour tube, tungsten filament lamp, and special ultra-violet screen to cut off rays from 2,900 to 2,500 A.U.

SUMMARY.

This lamp affords a useful source of artificial light which can be used for actinotherapy or for general purposes of illumination. Without the sanalux glass filter ultra-violet rays as far as 2,500 A.U. are emitted, which are low in intensity and slowly produce erythema after 45 to 60 minutes' exposure of the normal white skin. Infra-red, visible, and long ultra-violet rays of a constant intensity are transmitted and comfortably warm the body. The total current consumption is 7.5 amperes. The lamp is easily manipulated, requires no attention, and can be tilted to any angle which may be necessary for treatment. It will make an excellent "bed cradle" lamp for treatment of ambulatory cases.

The glass filter cuts off all rays shorter than 2,900 A.U., and the lamp can in this way be utilized as a safe type of artificial light for general use. It is comparable to the solar radiation, and prolonged exposures can be applied

without dangers of injury to the eye or production of rapid erythema. The nature of the light is similar to daylight, and all objects appear in their natural colours. For this reason the lamp should be of practical use in photography and for general purposes of illumination. The spectroscopic examination and the biological investigations which have been described show that this lamp transmits rays of therapeutic value, and is in many respects "artificial sunlight." The lamp is manufactured by the Hewitt Electric Company, Ltd., Horsham, Surrey.

THE INFLUENCE OF MOVEMENT ON THE TRUNK OF THE HUMAN BODY.

(NOTES ON PHYSIOLOGY AS SHOWN BY A STUDY OF SCOLIOSIS.)

BY

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In a study of the possible movements of individual vertebrae and the vertebral column as a whole, made prior to 1911, it was found that rotation of the trunk by means of the upper extremities was followed by rotation of the lumbar vertebrae in one direction and of the dorsal vertebrae in the opposite direction. This discovery of an apparent paradox led to an avid study of the influence of movement on the vertebral column. The study was undertaken in the hope that some light might be thrown on the subject of pathological scoliosis. In this brief paper will be shown what has been learned of the physiological in the study of the pathological.

The word "scoliosis" is taken from the Greek, and signifies twisted. It means more. At the time these studies were begun it was felt that there were two types of pathological scoliosis—namely, "functional" scoliosis and organic scoliosis. The first was characterized by lateral deviation of the spine and rotation of individual vertebrae without apparent change in their internal architecture. The second was characterized in addition by distinct bony change.

As years have passed it has become more common to accentuate the fact that scoliosis may be physiological or pathological. Of physiological scoliosis it may be said that the trunk assumes this position many times each day. Physiological scoliosis is due to posture, and in it there is never any change in the architecture of the individual vertebrae. Whenever the trunk is rotated or bent to the side a certain definite roll of the component parts of the trunk takes place. This roll forms a picture which is known as physiological scoliosis, and is the counterpart of pathological scoliosis. Every attitude is either one of strain or non-strain. Thus it is felt that physiological scoliosis may be the forerunner of pathological scoliosis.

The complex picture which is known as scoliosis, when analysed, is shown to be represented by a lateral deviation of the spine, or by lateral deviations of the spine. A posterior prominence of the ribs of one side is also seen—indeed, the rib wall seems often to become crushed in towards the spinal column. It is so flattened that frequently the posterior prominence becomes razor-like. On the opposite side the thoracic wall is broadened, and there is an anterior protuberance of the ribs. There is, indeed, a flattening of the ribs and a diminution of the thoracic cavity on one side, with a flanging out of the ribs and a corresponding increase of the thoracic cavity on the other side. The spinal column is usually curved in the dorsal region, the curve being convex towards the side on which the ribs are flattened. There are compensatory curves, usually in the cervical and lumbar region. The formation of these compensatory curves may depend on the laws of gravity.

This picture, known as scoliosis, is the same either in physiological scoliosis or in pathological scoliosis, with the difference that from physiological scoliosis, which is due to movement, there is a return to the so-called normal, or passive, position, while from pathological scoliosis there is no return to the normal. In physiological scoliosis there

is never change in the architecture of individual vertebrae, whereas in pathological scoliosis change is common.

Many endeavours have been made to use our knowledge of physiological scoliosis in order to treat pathological scoliosis. Superimposing physiological scoliosis of a reverse character on a pathological scoliosis already existing was practised. These endeavours were not successful because pathological scoliosis is always greater than physiological scoliosis, and it is impossible to change the greater by the lesser.

One of the most interesting physiological facts brought out in these studies of scoliosis was that rotation and lateralization (side-bending) both cause scoliosis of exactly the same character. The same picture is seen in either of these movements—indeed, it is impossible to turn the trunk as a whole without the occurrence of a certain definite order of movement of its component parts. It is also impossible to lateralize the trunk, or bend it to the side, without a certain definite order of movement of the individual parts taking place. The turning of the trunk to one side causes exactly the same change as the bending of the trunk to the same side.

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Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

MONILIASIS AND TUBERCULOSIS.

In 1914 a young woman was under my care with chronic bronchitis and asthma, from which she had suffered for several months. She was not doing well, and I sent her to a chest hospital, where her condition was diagnosed as tuberculosis. For domestic reasons, however, she refused to enter an institution, and I was enabled to make a number of careful examinations of her sputum. I did not find tubercle bacilli, but yeast cells were constantly present. Mouth contamination was excluded by the fact that all the sputa I examined were fresh, and from each one I picked out portions from the pellets. Fermentation reactions proved that the yeast cells were maltose, non-saccharose fermenting monilia—in fact, the thrush fungus. After prolonged treatment with alkalis, potassium iodide, and adrenaline, the patient recovered, and has been in good health since. In the case of this patient and other similar cases I did not attach importance to the presence of yeast cells, and assumed some other cause for the bronchial catarrh, until I read some papers by Colonel E. P. Marett of Jersey. In an examination of the sputa of a number of cases of suspected tuberculosis he found that 40 per cent. contained blastomycetes, 40 per cent. blastomycetes and tubercle bacilli, and 20 per cent. tubercle bacilli without blastomycetes. His experience suggested, furthermore, that the first class, if left untreated, soon passed into the second, a damaged lung being particularly susceptible to tuberculous infection, and that the outlook for the second class was less hopeful than for the class of pure tubercle bacillus infection. This latter class, he maintains, should be treated apart from the second in order that double infections might be avoided; the outlook for the second class may be improved by the immediate treatment of the curable blastomycetic infection; and the first class can be cured by means of alkalis, potassium iodide, and blastomycetic vaccines. I think it probable that Colonel Marett has brought to light a truth unsuspected by his predecessors—that chronic blastomycetic bronchial catarrhs occur frequently, and that they are the commonest precursors of tuberculosis in this country. The system of treatment he has devised is within the reach of everybody; its application cannot fail to secure greater efficiency in the treatment of tuberculosis and to diminish the frequency of the disease.

Ealing, W.13.

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