

The disadvantage of the short flame arcs is that the maximum exposure with them reaches $2\frac{1}{2}$ hours, whereas with the long flame arc it never exceeds an hour, and when two long flame arcs are used simultaneously, one in front and the other behind, the time needed for treatment can be cut down to half an hour. The direction of the radiant emission from these two types of lamp varies considerably. The greatest ultra-violet emission from Finsen lamps is given off at an angle of about 45° to the lower carbon, whereas the maximum emission from the long flame arc is given off by the flame itself, and is therefore greatest in the horizontal direction.

With the Finsen arcs, irradiation is given while the subject is lying on a couch, first in the prone and then in the supine position. The subject should be seated on a chair during exposure to the long flame arc, and first the front of the body and then the back irradiated, the arc flame being on exactly the same horizontal plane as the lowermost ribs. If preferred, irradiation can also be made in the reclining position on a couch, the subject lying on his side and facing the lamp, and then lying on his other side with his back to the lamp. With carbon arc lamps, the distance of the subject from the

lamp should be as short as the heat comfortably allows, but not too short, because burning with the infra-red rays can, of course, occur. The initial exposure to each side of the body with the short flame arc should not exceed ten minutes, and should be gradually increased to a total of seventy-five minutes, back and front. With the long flame arc fitted with white flame carbons, an exposure of each side of the body for five minutes, at a distance of approximately four feet from the arc, should be made. This time is gradually increased to a maximum of thirty minutes.

A trustworthy alarm system should be installed to give warning at the termination of the exposure, but it is generally safer for a second person to be present.

During exposure the eyes must be carefully protected with suitable glasses or some other material which is opaque to the ultra-violet rays.

Irradiation is generally carried out every other day, and can be continued regularly for months, though it is only fair to say that many actinotherapists consider that it is advantageous to make an intermission of about a month after every twelve exposures.

Ultra-Violet Radiation for Domestic Use.

By Prof. S. Russ.

IT seems very natural for people to want to make use of 'artificial sunlight' in their homes, especially during the rather sunless seasons, but there are some points which should be considered before it becomes a general practice, especially among those who seem to get along very well as they are.

In the first place, how nearly are artificial sources of radiation a copy of sunlight as it reaches most of us, nearly at sea-level? Perhaps the nearest approach to this is given by a high temperature filament lamp, though this will err on the side of having too big a proportion of radiation in the red and yellow part of the spectrum. Such lamps are of course largely used therapeutically, but mainly for the radiant heat which they give in a very convenient form.

All the forms of arc lamps, carbon, carbon-cored, tungsten, titanium, or mercury vapour, give out a composite radiation which is very different from sunlight, as it contains a large proportion of ultra-violet radiation. So that none of these sources which are often described as providing artificial sunlight can be said to do so unless a large part of the ultra-violet is screened off, and the remain-

ing part of the spectrum very carefully compensated so as to resemble sunlight as nearly as possible.

In the second place, even if a source were invented that gave a fairly exact replica of sunlight as it comes into our houses, would it be used to any extent, and if so, for what purpose? This raises the question rather at the root of the matter; Why this quest for body irradiation? Undoubtedly much more attention is now given to housing, particularly to ventilation and lighting; it seems in fact an inevitable part of the hygienic trend which aims at abolishing the smoke pall of big cities, and the basement life which many seem able to survive. But we shall probably not be far wrong in attributing the demand for some source of artificial sunlight rather to a wish for ultra-violet radiation, and this in turn is probably due very largely to the discovery that irradiation with ultra-violet rays can cure rickets in children. It is perhaps not so much this plain fact as the story of its unfolding that has appealed so strongly to the imagination. This discovery has shown how a deficiency disease can be cured by exposing the body to radiation which penetrates but a fraction of a millimetre into the skin. The inferences

drawn from this have of course been boldly acted upon, and in consequence the substance in the skin which when irradiated produces vitamin D, the anti-rachitic factor, has been tracked down. The whole sequence of discoveries following on that of Mellanby in 1915, that rickets was a deficiency disease, forms a most impressive example of what well-directed scientific effort can achieve.

The question now before us is whether, in view of the admitted value of ultra-violet radiation in the treatment of rickets and general deficiency diseases in children, it would be a good thing for the general public to make good the deficiencies in diet (which undoubtedly affect a big proportion of the population) by exposing their bodies to frequent, perhaps daily, doses of ultra-violet radiation. The position taken up by the writer is that it is inadvisable on many grounds, and probably nationally uneconomical.

One need perhaps not lay great stress upon the fact that such a daily ray bath would cost an appreciable sum. A source suitable for home installation has to be safe; therefore it would probably have to be some form of closed arc, such as a mercury vapour lamp requiring no handling of leads from the mains. The initial cost of such a lamp, if the demand were on a big scale, might be so low as £5 or £6. Consumption might reasonably be 4 amperes at 200 volts, say 800 watts; if used daily for 10 minutes for one-half of the year, the running costs, apart from breakage and depreciation, would be 12s. per annum, taking power at 6d. per B.O.T. unit; for many households a cost that need not be taken into account, but on a big scale—a big item.

Some count should be taken of the risks run by repeated exposure of the body to a form of radiation to which it is quite unaccustomed; almost as foreign to it, in fact, as X-rays or gamma rays. Without in any way wishing to become an alarmist on the subject, I think that definite risk would be run by anyone exposing his body to repeated doses of ultra-violet radiation unless he were under proper medical supervision. The various reactions of the skin to ultra-violet radiation, which happen soon after the exposure, are well recognised by medical men, but it is too soon yet to know much about later reactions which may occur as they sometimes do after exposure to X-rays.

One very well recognised feature of prolonged exposures is the pigmentation that occurs in most, though not all, skins. If the thing were carried to extremes and people in the winter months

pigmented themselves very considerably, it is open to doubt whether this would be a very good thing. Pigmentation means opacity to radiation generally, ultra-violet or luminous; and it could well be argued that in winter months one is far better guarded against heat losses by having a skin rather devoid of pigment; the general feeling of well-being quite likely depends on the tissues being illuminated to some extent by daylight.

People who spend a good part of their time in the tropics generally appear to lack vitality. There are lots of factors contributing to this, quite apart from the diseases peculiar to these zones; high temperatures and excessive humidity no doubt account for a good deal, but the continual exposure to solar radiation, besides tanning the skin, may set up other changes in the body which react upon the general vitality.

Experimentally it is found that when ergosterol is exposed to the full radiation from a mercury lamp, the amount of vitamin D gradually increases with the exposure up to a certain point, but a stage is reached when this stops. Whether this is due to the gradual formation of a neutralising body perhaps cannot yet be stated, but a recent report on nutrition by the Medical Research Council mentions that there are constituents of diet which appear to nullify the action of vitamins.

The reason for mentioning this here is that it seems a doubtful thing to advise people to install sources of ultra-violet radiation in their homes until more is known about the effects of repeated doses of these rays upon the body.

It is indeed relevant to inquire on what grounds it can be advocated. It is known that these rays can help those on an inadequate diet to avoid some of the consequences of such deficiency, but this can be done equally well by supplying the accessory food factors at much lower cost, and in a far more certain manner than by the population taking such medical matters into their own hands.

It may, however, be argued with considerable weight, that ultra-violet radiation does far more than this for people. There are some who positively hunger for sunlight and feel much fitter for some ultra-violet radiation, and the question is whether there is any valid reason why they should not have it when it can be got so easily.

The enormous sale of patent medicines throughout the country shows how willingly people will do without medical help, especially if they think the ailment a trifling one, so that there is of course nothing to prevent people getting any of the various appliances for generating ultra-violet radiation and

using them in their own homes, but surely they should not be *advised* to do so. Suppose, for example, that it were a part of the regular equipment of a household, and normally healthy children were periodically given doses of this radiation, could it be looked upon as anything short of an experiment? If so, are such domestic experiments on a large

scale to be encouraged? There are many who will feel that the balance of health is maintained by so many factors, many of which are clearly recognised, that on such slender grounds it is better not to bring into this delicate balance a kind of radiation that no living race has been accustomed to before.

Medical Aspects of 'Artificial Sunlight' in Private Houses.

By P. R. PEACOCK, M.B., B.S.

THOUGH ultra-violet therapy has been practised in an empirical way from the earliest times, the association of sunshine with good health being in the nature of a primitive instinct, it is only during the past thirty years or so that any serious attempt has been made to establish it on a scientific basis.

Systematic clinical observation gradually led to an appreciation of the value of the alpine climate in the treatment of tuberculosis of the bones, joints, and lymph glands, and the establishment of centres for treatment of this crippling disease by heliotherapy in the Swiss Alps was largely a result of the patient work of Bernhard, followed by Rollier and others. The notable extension of ultra-violet therapy by Finsen brought the curative rays within the reach of those in comparatively sunless countries and marked the start of the modern practice of artificial actinotherapy.

The success of ultra-violet treatment for 'surgical' tuberculosis, saving as it has many children from mutilating operations, is undoubtedly one of the reasons for the popular desire for ultra-violet rays, but the more recent and far more spectacular series of discoveries linking the demonstration by Mellanby of the nature of rickets with the subsequent rapid strides of research, culminating in the synthesis of vitamin D from ergosterol by Rosenheim and Webster, probably constitutes an even stronger influence.

It is as well to have a clear idea of the real justification for ultra-violet therapy before considering the type of pseudo-medical publication or manufacturers' advertisement, from which it might be concluded that ultra-violet rays will not only prevent and cure all known diseases, but will also regulate even minor variations from the physiological standard of normality. Such one-sided propaganda has been much in evidence in recent years, and that it has borne fruit is easily judged from the number of hairdressers and beauty specialists who make a fine thing out of ultra-violet and 'violet-ray' treatments, not to mention the

bottles of 'ultra-violet lubricant' and 'radio-active' bath salts, for both of which commodities the writer has been assured that there is a good demand.

In addition to the specific cure of rickets and the successful treatment of surgical tuberculosis, the value of ultra-violet rays in the treatment of septic wounds and burns was abundantly proved during the War. There is evidence that actinotherapy is of value in disturbances of the parathyroid gland and deficient calcium metabolism; possibly the rôle of ultra-violet rays is the same in these conditions as in the case of rickets, since there appears to be an intimate association between vitamin D and the absorption of calcium from the alimentary tract. Certain conditions are also directly benefited by the local reaction of the exposed part, increasing the blood supply and facilitating the removal of toxic products of the morbid state; the successful treatment of chilblains and of varicose ulcers is probably to be explained on these lines.

The powerful bactericidal action of ultra-violet rays is well known, but this property is rarely made direct use of in practice, owing to the very slight penetration of the rays, and to the fact that many of the bacteria that normally infest the skin are effectively screened from the rays in the sweat-glands or hair-follicles.

These few points have been selected from a great many known facts in order to emphasise the importance of recognising that actinotherapy is based on established facts, and it is only on such lines that it should be used. There are, however, many who would spoil a good case by overstatement, or hide their ignorance of the facts, and a dislike for critical investigation, behind a mass of plausible speculation as to some mysterious property of this or that type of arc lamp, and hinting darkly that science cannot detect properties of the rays with which nevertheless they themselves are familiar.

As there are specific cures, so there are specific diseases due to light and ultra-violet rays, and, although these are fortunately rare, they should be