

was very sweet indeed and made our visit all the happier and enjoyable. We did not feel bored or formal. Alas! all good things must come to an end. We shook hands with Her Excellency and departed in exuberant spirits, not to the school, but for a drive—a clap of hands. We felt we were back at school. The evening was delightfully cool and pleasant. A gentle breeze was playing. We were happy indeed, singing, laughing, joking. Pit, pat down came the rain drops pattering down the window panes. We enjoyed the drive all the more. After three quarters of an hour's drive, we reached our Lady Reading Health School. Hungry? Yes, happy and ready to go to bed. Thus we came to the end of a perfect day.

Rachel Jane Piggott. Sindh's Lady of the Lamp. An Appreciation.—Trained in midwifery at Queen Charlotte's Hospital, Marylebone, Miss Rachel Jane Piggott came to Sindh in 1895 under the Church of England Zenana Mission Society. Thus for just three years less than fifty, she worked unceasingly for the women and children of Sindh. She died on September 16th, 1942.

Miss Piggott's great contribution was the pioneer work she did in the teaching and training of dais. She also worked ceaselessly to educate women in health by health classes and the writing of books and leaflets. She was a fearless and enthusiastic worker, whether through plagues and epidemics or in her constant attacks on ignorance and apathy. Thus she worked to reduce the maternity and infant mortality in the province. She was active in social service and village uplift work of every kind and worked as a Director of the Sindh Co-operative Institute and later as its president for two years. Her love of human beings was complemented and matched by her love of animals. She was President of the Society of Prevention of Cruelty to Animals at Hyderabad, Sindh. Birds—even to the sparrows—and all the beasts of the field were her friends and, like St. Francis of Assisi, she worked to prevent suffering among all living beings. Hers was a large and generous sympathy but with all it was clear-sighted and salted with humour.

A "great little woman" she has done much for the women and children of Sindh.

Infra-red Rays or Artificial Heat Therapy

By J. D. DURAIRAJ, R. N. (MADRAS.)

We owe our life to the energy that we receive from the sun in the form of heat and light. This energy is propagated to us through a distance of about 93 million miles. Scientists believe that the whole space of the universe is filled with an imponderable substance called Ether. The heat and light emitted by the sun are propagated through this medium in the form of waves which are similar in some respects to the waves on the surface of a pond. The nature of a radiation depends upon its wave length or its frequency. The waves whose lengths range between 3800 A. U. and 600 A. U. roughly are able to produce impressions upon the retina of our eyes. They are, therefore, called visible light. If we look at a rainbow, we see seven different colours (Spectrum) violet, indigo, blue, green, yellow, orange and red. The shortest and the longest waves are violet and red, respectively, and those waves that are shorter than violet rays and longer than red rays are called ultra-violet and infra-red rays respectively. Now I am going to deal only with infra-red rays.

Through the ages of medicine, many and strange methods of producing hyperæmia have been employed; liniments, cataplasms, fomentations, hot-water bottles, mustard plasters, bee stings and counter-irritants, of all descriptions. Yet all these methods were based on sound instinct. The productions of local hyperæmia around a lesion is curative. Early in the present century the work of Professor August Bier established therapy with artificial means. Nature often does not provide a sufficiency. We can well suppose that certain bacterial diseases are only so persistent and chronic because their casual agents do not give out the necessary inflammatory stimuli which unlock

the healing forces of the body, and that we can in this regard effectively assist nature by artificial means. The ideal means of applying heat is by means of radiation, absorbed in the tissues and producing hyperæmia around the lesion. The mechanism is explained as follows:

Whenever energy meets resistance at any point, heat is generated at that point. Now the skin is a poor conductor of heat, but it readily transmits light. This light in the deeper tissues meets resistance, otherwise it would be transmitted through the whole body and it is at the various point of absorption that the light rays are transformed into the heat energy.

Definition.—Infra-red rays, otherwise called heat rays. These invisible rays were discovered by Sir William Herischell in 1800. Infra red rays are electro-magnetic ether vibrations. Infra-red irradiation of the body is a form of actinotherapy:—"that is treatment of disease by rays resembling sun-light, but generated from artificial sources". They produce heat and are used therapeutically.

Infra-red Therapy Equipment.—Therapeutic administration of infra-red rays involves the choice of an efficient generator, giving infra-red rays of that quality which will penetrate human tissues sufficiently to produce hyperæmia around a specified focus in the muscles, tissues, joints etc. The sollux lamp introduced by Hanovia is the commonly used infra-red therapy equipment. The apparatus comprise a 1000 watt bulb fitted in 15 inch polished aluminium reflector. It has got a control and pilot light with tripod base and a long stand. For local use bulbs of 300 to 500 watts are used.

Actions.—The physiological effects of this form of therapy may be summarized thus:—
1. Dilatation of superficial vessels and glands. 2. Removal of venousstasis and promotion of normal circulation. 3. A bactericidal action on superficial germs and as a practical result of this we get, (a) relief of pain (b) restoration of functional activity both in the skin and the deeper glands. When absorbed the infra-red rays are converted into heat. The depth of absorption depends on the transparency of the skin, tissues, fascia and blood to the radiation. The limits of therapeutic radiations are 7500 A. U. and 90000 A. U. (Units).

Therapeutic Effects.—(Metabolism; local and general).

1. Induction of increased elimination and tissue growth.
2. Diffusion of heat throughout the body by the blood.
3. Increased perspiration when exposures are long.

Simple Non-Infectious Inflammation.

1. Relief of pain and pressure by tissue relaxation.
2. Increased local metabolism and elimination.

Acute and Sub-Acute Infectious Conditions.

1. Increased hyperæmia locally.
2. Inhibition of the activity of the germs.
3. Stimulation of elimination by perspiration and usual oxidation. The effects of exposing the entire body to external heat are (i) increase in body temperature; pulse rate and metabolism, (ii) loss of fluid through the lungs, and through perspiration which also carries out salt, urea, and fatty acids, (iii) their pain relieving effect, (iv) the relief of spasms, (v) relaxation of tissues.

Contra-Indications.—There are few contra-indications to infra-red therapy, but caution is indicated when giving general exposure. In patients with diminished leucocyte counts or in cases of marked low blood-pressure. Heat lamps are contra-indicated in very many acute inflammations which may re-act by an immediate increase of pain; also in suppurating processes where a dispersion may occur and also in conditions where there is a tendency to internal hæmorrhage, with general treatment. Phagocytosis is active and cellular proliferation is stimulated; there is a diminution in the number of red corpuscles, while the calcium content of the body is reduced. For this reason, the general bath by infra-red radiation should rarely be given.

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Technique. *Preparation of the Patient.*—Infra-red irradiations mean long exposures, frequently repeated. It is, therefore, advisable to make the patient comfortable during treatment. The treatment room itself should be comfortable and well lit. It is a good maxim to try the lamp on one's own body before treating patients with it. Before treating the patient first of all enquire whether he is sensitive to heat. Explain first of all how the treatment acts. It is well to mention that pain may be increased or shift about, after the first few treatments.

The Skin.—When using the luminous source, remember that the object of treatment is to get the rays absorbed below the skin. So avoid over heating the skin itself. With fair and delicate skins, inunction with lanoline before the first treatment may be advisable. It is advisable to keep the skin cooled; occasional moistening with a fine spray or a draught of air directed on the skin from a fan will assist. If profuse perspiration occurs, sponge the skin as needed. Except as a means of warming the patient, preceding or during ultra-violet ray treatment, general exposures are not given. Only the treatment area is exposed.

Distance.—Short treatments are comparatively useless. The first exposure should be timed for 30 minutes, and subsequent treatments may be progressively increased up to 60 minutes. Since the degree of tolerance varies with each patient, as a rough guide, the first treatment could be given with open reflectors 25 to 30 inches from the skin to the nearest point of the emitter. The distance can be slightly and progressively reduced during subsequent treatments.

Repetition.—Frequency of treatment will depend on the cases; for example, for pleurisy, every other hour; for acute spasms twice daily; for rheumatic conditions every other day.

Special Precautions.—When giving treatment near the eyes especially for sinusitis, adequate protection must be given to the eye-balls. If goggles are used, they must be infra-red proof. Diabetic patients, and those sensitive to heat, also those recently narcotized, are easily burned and require close supervision during treatment. Any inflammable objects should be removed from parts exposed to the beam of the rays.

Therapeutic Uses. (i). *Acute infections.*—Infections on the surface, and many beneath the skin, will yield to reflected rays from an incandescent lamp, either being destroyed by these rays or a large number of phagocytes which, in consequence of the hyperæmia produced, come in through the widely dilated vessels. The early application of reflected radiant light and heat will promptly arrest any abscess. Light applied for one or two hours daily promotes the healing process in open wounds as well as infected wounds. Applying radiant heat you create hyperæmia which opens the channel of drainage, relieves the stasis and brings in all of nature's own antibacterial resources to overwhelm the already weakened germs in gonorrheal ophthalmia.

2. *Ear, Nose and Throat.*—Infra-red irradiation finds wide use in treating the common disorders of the ear, nose and throat. In many cases it helps to abort serious complications. It produces an active hyperæmia, relieves the sense of fullness and congestion, enhances local nutrition, soothes the pain and promotes comfort when applied to the facial regions for relief of coryza, rhinitis, acute and sub-acute sinusitis, catarrhal deafness, otitis media, mastoiditis, boils in the ear, nose, etc.

3. *Respiratory Diseases.*—In acute stages of bronchitis or in pulmonary congestion from almost any causes, light applications to the chest afford a more prompt relief of chest pain and respiratory distress. In lobar and bronchial pneumonia its beneficial influence is manifested by marked relief of pain and dyspnoea and an improvement in the general comfort of the patient. Heat lamps applied to the chest often give good service in treating bronchial asthma; bronchitis and pleurisy in its recessive stages are also indications for heat lamp treatment. Infra-red irradiation will give comfort to a patient who complains of pain in the chest.

4. *Disorders of Circulation.*—For boils, abscesses, whitlows, bubos, and carbuncles, local infra-red irradiation is of great value. These suppurate more readily after treatment and heal more quickly. The hyperæmia and vaso-dilatory actions

promote circulation in the tissues; irradiation is, therefore, of value in treating cases characterized by sluggish circulation. For local treatment of ulcers there has never been anything that could compare with radiant heat.

5. *Radiant heat* is indicated in all forms of chronic rheumatism and rheumatoid arthritis. It relieves pain and stiffening of muscles. Radiant heat is of particular value in ankylosis, arthritis, osteo-arthritis, bursitis, flat foot, lumbago, and myalgia. It relaxes muscle spasms and also pain, increases the blood circulation locally in and around the affected joint, and encourages movement. The best results are obtained in all the above cases by using radiant heat followed by massage.

6. *Injuries*—For contusions and muscles sprains, radiant heat is valuable to secure absorption of the products of hæmorrhage to eliminate swelling and pain, and to secure restoration of function. Colle's fracture or Pott's fracture, accompanied by swelling, are best treated by radiant heat followed by massage. Passive motion and infra-red are started as soon as possible in all fractures case where a joint has been immobilized. In sprains, back strain, sprained ankle, infra-red radiation is of immense value.

7. *Nephritis*.—There is probably no other condition in which the systematic use of external heat may have such specific early consequences as in nephritis.

8. *Nervous and Dental*.—Heat is also of great value in neuralgia, sciatica, and migraine, and in dental surgery, the analgesic effect is outstanding.

9. *Skin Diseases*.—Deep X-ray therapy is made much safer for the patient when infra-red radiation is applied in combination. It has a definite preventative or curative action in radio dermatitis.

10. *Genito-Urinary*.—The results are gratifying in gonorrheal complications; in orchitis, epididymitis and prostatitis furunculosis and herpes-genitalis. Infra-red treatment has been found very useful for relieving the pain of dysmenœrhea and also for ovaritis.

Combined Therapy.—The ultra-violet rays are in many senses complementary to the infra-red rays. It is thus valuable in therapeutics to apply brief general infra-red irradiation preceding or during ultra-violet irradiation. Clinical reports on this combined therapy show excellent results in tuberculosis adenitis, surgical tuberculosis, cholecystitis, rheumatism and neuralgia. As a preliminary to massage, infra-red irradiation reduces spasm, relaxes the muscles and tissues and greatly enhances the effect; when applying drugs, etc. by inunction, it is found very effective in obtaining penetration, to smear the ointment on the skin and then applying infra-red irradiation.

Colour Therapy.—To obtain maximum penetration into the tissues, with a minimum of absorption and heating in the skin the best method is to use a luminous source with red filter. Red light is also valuable in neutralizing the effects of ultra-violet over dosage.

Glossary.

A. U.—Aungstrom Units (one hundredth of a millionth of a meter).

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1. "Pre-eminent in The Relief of Pain"—By Hanovia Ltd.
2. Radiations—By E. S. Parameswaram, M. A.
3. Artificial Sunlight and its Therapeutic uses—By Humphris.

Text-Books for Dispensers

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Can be obtained from Miss Wilkinson, 5, Rajnarain Road, Delhi.

Materia Medica by Miss Carter, V.P.P. from the Punjab Religious Book Society, Lahore.