

Young's extensive professional writings in the nascent sciences of medicine, which, perhaps not unjustly on the whole, have become neglected. But his Croonian lecture, unearthed from them by Peacock, as delivered to the Royal Society soon after he had got the two volumes of "Lectures" off his hands, dealing with propagation in the arteries, in relation to the elastic pulsation through the perhaps perfect elasticity which surely must in the final causes of the organic world subserve some function, was a subject of pure hydraulic science in which he became, afterwards at any rate, very competent, with regard to which the last word has perhaps scarcely yet been said.

Young was also closely and most effectively, yet as usual most concisely, concerned with the problems of geophysics, such as the tides and the figure of the earth, also with the statistical doctrines of insurances and the duration of life: the former from his prominent official connexion with the Board of Longitude, the latter from his position as adviser to a life insurance society.

A judgment, near the end of his life ("Biography", p. 483) on the merits, as regards fruitful discovery, of various modes of intellectual training and investigation, is characteristic and perhaps still

authoritative. Dr. Young's opinion was

"that it was probably most advantageous to mankind, that the researches of some enquirers should be concentrated within a given compass, but that others should pass more rapidly through a wider range—that the faculties of the mind were then exercised, and probably rendered stronger, by going beyond the rudiments and overcoming the great elementary difficulties, of a variety of studies, than by employing the same number of hours in any one pursuit—that the doctrine of the division of labour, however applicable to material products, was not so to intellect, and that it went to reduce the dignity of man in the scale of rational existences".

His own astonishing scientific record, combined with very remarkable erudition in classical literature and general philology, and even with an assiduous cultivation of the Graces which in early life tended to make up for the austerities of a Quaker training, forms a remarkable example, surely nearly unique, of what can be achieved by mental industry, working largely inward on itself; and, one may add, it offers an incentive to the biographical exploration, as a chapter in the newer psychology, of the methods of thought of the pioneers in discovery, which in our nation has been none too keen.

Infra-Red Photographs of Racial Types

By PROF. C. G. SELIGMAN, F.R.S.

MORE than a year ago, I received from Mr. L. Bloch, of the Ilford Research Laboratories, a number of photographs—'couples' of dark-skinned subjects, all or mostly negroes—taken by ordinary and by infra-red light. The difference in appearance is very remarkable: on one hand the normal photograph, on the other such striking modification in colour of face and often pattern of clothing that a close examination is necessary to realise that the two prints are photographs of the same subject. The most remarkable feature is that under the infra-red rays the normal dark skin of the negro appears of a waxy white pallor. This is so striking and renders the two photographs of the same face so unlike each other that the suggestion was made that the infra-red photographs exhibited Mongoloid characters not obvious in the prints taken under normal conditions. This, however, is not so, nor are any Mongolian characters observable in the infra-red prints of a much longer series of negroes and other 'coloured' men which have recently been submitted to me. The idea perhaps originated in the somewhat deep-set appearance of the eyes seen in many subjects in the infra-red prints. Examination shows that this is an expression of the obliteration

in the infra-red photographs of a considerable amount of the finer facial modelling, due largely to the loss of shadows and the finer gradations of tint. Those who have not a series of photographs for reference will best appreciate the change by examining a photograph published by Dr. S. O.

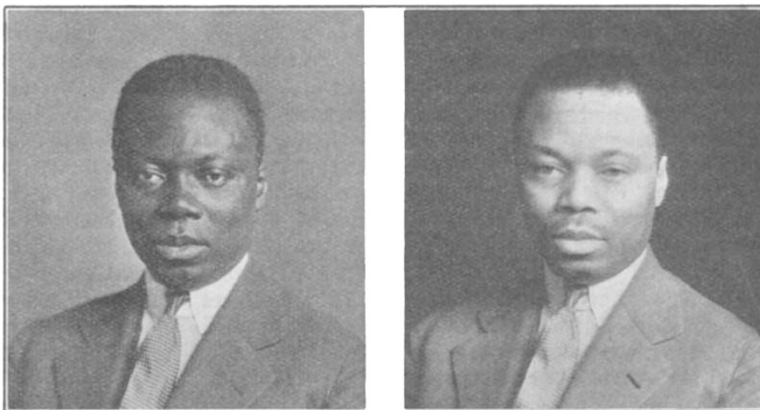


FIG. 1. Photographs with panchromatic (left) and infra-red (right) materials of a West African Negro (Temne). Note the waxy pallor of skin and lightening of irides; there is absence of the finer modelling but the unruptured hairshafts show up through the superficial layers of skin.

Rawling*, in which oranges, apples, tomatoes, and dark cherries, on a plate with a polychrome design, appear as if the whole were modelled in pale-coloured wax, no trace of the design being visible.

There are two interesting and curious features

* "Infra-red Photography" (1933), p. 34.

in these infra-red photographs of coloured men, though neither is of racial significance (Fig. 1). Owing to the general lightening of colour, even the darkest eyes appear light; their irides as seen in the infra-red print appear of the same colour as blue-grey eyes in normal photographs. The other



FIG. 2. Photographs with panchromatic (left) and infra-red (right) materials of a white girl (Nordic type); hair, very fair; eyes, blue-grey; complexion, very fair; wearing blue and white striped jumper.

peculiar feature is that it is often possible to trace the appearance of a beard and moustache in prints of clean-shaven men, due to the human skin having its maximum transmission in the region of the infra-red, so that the hair follicles with their contained hair shafts show up as darker shading.

In the photographs of the white race, relatively few in number, some of these results are reversed (Fig. 2). There is the same waxy pallor of the skin in the infra-red prints, and freckles are obliterated, but the eye colour changes in the opposite sense. Instead of being lightened, eyes described as blue appear dark, so as to suggest deep hazel or medium brown. On the other hand, in an infra-red print of a man whose eyes are described as brown, the irides are if anything a shade lighter than in the normal photograph, thus approaching the lightened colour of infra-red prints of the eyes of the dark races. The normally dark eyes of a Japanese appear in the infra-red print about the same shade as the blue-grey eyes of a typical Nordic. In Europeans the less dark shades of hair may appear considerably lightened, just as the leaves of trees present a white, almost frosted, appearance in infra-red photographs.

To sum up: the differences in the normal and infra-red photographs of the varieties of *Homo*, though striking at first sight, do not appear to present any features likely to be of use to the anthropologist; they are, indeed, of photographic rather than anatomical interest.

Heavy Hydrogen*

By SIR J. J. THOMSON, O.M., F.R.S.

THIS lecture is on reminiscences connected with the Royal Institution, so that accounts of quite recent discoveries would not be within its scope. There is one subject, however, which is now attracting a good deal of attention—heavy hydrogen—which satisfies both conditions; it is a reminiscence and it is connected with the Royal Institution. In 1911 I gave a Friday evening discourse “On a New Method of Chemical Analysis”. By this method each kind of gaseous particle in a vessel through which an electric discharge is passing produces its own parabolic curve on a photographic plate. Thus if the vessel contained a mixture of hydrogen, oxygen and nitrogen, there would be six parabolas corresponding to the atoms and molecules of hydrogen, oxygen, and nitrogen respectively, along with others due to each of the compounds formed by these elements. The mass of the particle which produces any parabola can be determined from the position of the parabola.

Using this method, I detected the presence of a parabola which must have been produced by a particle of mass 3 (the mass of the hydrogen atom being taken as the unit). I obtained it first when

the gas in the discharge tube was hydrogen prepared in the ordinary way, but its appearance was very capricious, and only occurred in a small percentage of the experiments. I found, however, that if instead of using ordinary hydrogen, I used the gas given off by certain solids when bombarded with cathode rays, the (3) parabola appeared with great regularity. The amount of the gas producing it varied with the nature of the solid bombarded, but there were few minerals or salts among those I tried which did not give traces of it; potash (KOH) is a very convenient source and a specimen of black mica given to me by Sir James Dewar gave an exceptionally large supply.

I obtained the active gas also by deflagrating a very thin wire by passing a very large current through it, or even by raising a wire to bright incandescence. This indicates that the bombardment by cathode rays does not manufacture the gas but merely liberates it from the solid.

I made a very large number of experiments on the gas obtained in this way, the results of which were published in the *Philosophical Magazine* and summarised in my book “Rays of Positive Electricity” (Longman). One important property of this gas is that it can be stored after bombardment and tested long after it has been produced, showing

* From a Friday evening discourse delivered at the Royal Institution on February 9.