and consequently correspondent to that of the above-mentioned cylinder of plaster, increased in weight, in an atmosphere saturated with aqueous vapour, by only 3·5 mgr. in twenty-four hours.

If we argue that the hygroscopicity is the cause of the curvatures, we might assume that *Phycomyces* is only affected by bodies which absorb very little water, and that the above-mentioned bodies, which are without effect on *Phycomyces*, are too strongly hygroscopic. But then a positive curvature ought to be seen, at a certain distance from the bodies, where the hygroscopic effect is weaker; and this is by no means the case.

With all these facts in view, I cannot agree with Errera's hypothesis that the attracting effect of iron depends on a kind of hydrotropism. According to the statement of Errera, many hygroscopic bodies attract the hyphæ, but it is hardly to be presumed that this is actually owing to hygroscopicity, as other hygroscopic bodies are without effect. It seems to me that this is a case of radiation, depending on the molecular state of the body, and manifesting itself by the physiological effect.

In one point Errera corrects my statements as to the effect of iron. I had found that the condition of the surface (burnished, roughly brightened, or somewhat rusty) did not affect the results. Errera says that the effect of burnished steel is very slight, and this I can confirm as regards very well burnished steel. In this circumstance Errera finds a confirmation of his hypothesis, since a burnished surface gets rusty, *i.e.* absorbs water very slowly. In my opinion this fact only implies that the state of the surface is of a certain importance for the radiation in question, as is known to be the case with regard to the radiation of heat and light.

It is self-evident that my idea of this phenomenon, as dependent on molecular vibration, is a mere hypothesis. It is, however, somewhat confirmed by the fact that similar physiological effects are produced by some phenomena, which we must, from the present stand-point of science, declare to be molecular vibrations; and the statement of this fact is the principal object of this paper.

Platinum belongs to the inactive metals, and well-burnished steel has, as mentioned above, a very slight effect. But if exposed for some time to direct sunlight, these bodies become active, *i.e.* the sunlight creates in them a condition which, though otherwise imperceptible, manifests itself by the fact that the body, clearly and even powerfully, attracts *Phycomyces*. The power of attraction appears on the illuminated as well as on the opposite side of the body. This condition of the body lasts for a few hours, but afterwards ceases.

This phenomenon is somewhat mysterious. It is indeed astonishing to see how the same piece of platinum-foil, which during a series of experiments was without effect on our *Phycomyces*, will attract them after being exposed to the sun, without undergoing any outward change.

But this phenomenon is not entirely without analogy. It is a well-known fact that a number of nonluminous bodies after being exposed to illumination emit light in a manner which has been described as phosphorescence. Some bodies phosphoresce only for fractions of a second, others for more than twenty-four hours. Metals do not belong to the phosphorescing bodies, but in the present case a kind of phosphoresence seems to take place which is not perceptible to our eyes, but, on the other hand, is effective on *Phycomyces*. The phenomenon might be designated as dark phosphorescence.

It is interesting to note that E. Becquerel, who thoroughly studied the phenomena of phosphorescence, had foreseen something of the kind. He says ("La lumière, ses causes et ses effets," 1867, i. p. 259): "Même si les corps ne sont pas lumineux dans le phosphoroscope, on ne peut dire qu'il n'existe aucun effet après l'action du rayonnement; car la lumière pourrait exciter des vibrations d'une autre vitesse que celles qui sont perceptibles à nos yeux (et en général plus lentes), et capables de donner lieu soit à des effets de chaleur, soit à d'autres actions moléculaires encore inconnues."

With regard to the requisite intensity of light, I need only state that in August intense sunlight during seventy minutes was sufficient to cause activity, whereas an exposition of five hours in cloudy weather was without effect. I have not found out the shortest effective period of the insolation; and as to the duration of the state induced by light, I can only say that bodies activated in the afternoon, which, on being tested at once, caused curvatures in three to four hours, were without effect the next morning.

That the effect is due to light, not to heat, is proved by experiments in which the steel and platinum plates were heated for hours to the temperature (40°–45°) indicated by the thermometers during the insolation.

That the ultra-violet rays of the sun have no particular share in the phenomenon, is proved by the fact that the light which has passed through a solution of quinine-sulphate activates the respective bodies.

In experimenting with other metals, and various non-phosphorescing bodies, I could not demonstrate with certainty any such activation by light, which fact, however, does not exclude the possible occurrence of a dark phosphorescence of too short a duration to cause a physiological reaction.

Finally, I have to mention that certain bodies are rendered active by heat. I have found zinc to be one of them. Having heated a stick of zinc (5 mm. in diameter) in a blow-pipe flame until it began to melt, and having then allowed it to cool down to the temperature of my hand, I got, after an experiment of a few hours, the most beautiful curvatures in *Phycomyces* I could wish for. After cooling down for several hours, the stick was no longer active in this manner. Here we can justly speak of positive thermotropism, which is all the more interesting, as Wortmann in his experiments (*Botanische Zeitung*, 1883, p. 462) found only negative thermotropism in *Phycomyces*.

Some other bodies are quite different from zinc. The same plate of platinum that was rendered active by an hour's insolation, remained, after being heated red-hot for five minutes, just as inactive as before. Also in copper, cobalt, nickel, tin, lead, and glass, no effect was to be produced by great heat. There is not the slightest doubt but that plants, in their thermotropic curvatures, are affected by vibrations issuing from the molecules of the body applied, and this is also very likely the case with regard to the effect of light. It therefore does not seem unjustifiable to assume that even molecular vibrations, which are inherent in the bodies themselves, or connected with some change that they undergo, may cause similar physiological effects.

FREDRIK ELFVING.

THE NEW IODINE BASES.

FURTHER details are given in the latest *Berichte*, by Prof. Victor Meyer and Dr. Hartmann, concerning their recently-discovered basic compounds of iodine. It will be remembered that the fundamental base from which these new substituted bases are derived is the hypothetical compound $HO.IH_2$, and that the derivative $HO.I\langle{}^{C_6H_5}_{C_6H_4I}$ had been isolated as a strongly alkaline substance readily soluble in water, and which forms salts with acids with elimination of water, exactly like ammonium hydroxide. For the parent substance, therefore, the name iodonium hydroxide is proposed. At the conclusion of their first paper, Prof. Meyer and Dr. Hartmann announced that they had just succeeded in isolating the simpler di-phenyl derivative $OH.I\ (C_6H_5)_2$, and the present communication describes the strange mode of its genesis, and the character of the free base and its salts. The beautifully crystalline iodide was frequently obtained in small quantities during the whole course of Prof. Meyer's work with iodoso-benzene. It was observed that methyl iodide acts with great energy at the ordinary temperature upon the latter compound, and the product yields in contact with moist silver oxide a liquid from which potassium iodide precipitates crystals of the new iodide, $I.I\ (C_6H_5)_2$. It was subsequently found that when iodoso-benzene itself is triturated with moist silver oxide, the filtered liquid likewise yields similar crystals of diphenyl-iodonium iodide upon the addition of potassium iodide. This discovery led to a systematic study of the conditions of the reaction, and it was eventually elicited that freshly prepared iodoso-benzene is incapable of so acting, but that by a few days' exposure in a thin layer to daylight, or, better still, by heating for some hours to 60°, it is rendered capable of producing the new base when brought in contact with oxide of silver. Moreover, it was ascertained that potash or soda are likewise capable of bringing about the change, although owing to subsidiary decompositions, not so advantageously as moist oxide of silver. It has finally been proved that the reaction depends upon the fact that upon heating to 60° or exposure to sunlight iodoso-benzene, $C_6H_5\ IO$, is partially converted into the more highly oxidised compound $C_6H_5.IO_2$, and by the action of moist silver oxide upon the mixture of the two diphenyl-iodonium hydroxide and silver iodate are produced, in accordance with the following equation:—

$$C_6H_5.IO + C_6H_5.IO_2 + AgOH = AgIO_3 + HO.I(C_6H_5)_2.$$

When a mixture of the two iodine aromatic derivatives, in the proportions required by the above equation, together with sufficient oxide of silver, is vigorously agitated for three hours in a triturating machine, such as that in use in the Heidelberg laboratory, and filtered, the clear solution upon the addition of potassium iodide solution yields over ninety per cent. of the calculated weight of crystals of diphenyl iodonium iodide. The iodic acid remains partly as silver salt in the residue, and partly as iodate of the new base in the solution.

The salts of the iodonium bases bear a remarkable resemblance to those of lead, silver, and in particular thallium. Those of the first discovered base were described last week, but those of the diphenyl base are still more interesting, and many of them crystallise well.

The iodide obtained as above described forms large and beautifully grouped acicular crystals which melt at 175°–176°. During the act of melting it passes completely into mono-iodo-benzene, of which it is a polymer:—

$$I.I(C_6H_5)_2 = 2C_6H_5I.$$

The chloride, $Cl.I(C_6H_5)_2$, is slowly precipitated upon the addition of a soluble chloride to the aqueous solution of the free base, in crystals which are very similar in aspect to those of lead chloride. From hot aqueous solutions excellent crystals separate upon cooling.

The bromide, $Br.I(C_6H_5)_2$, crystallises likewise from hot water, and the crystals are perfectly colourless, and frequently attain large size.

The aqueous solution of the free base, $HO.I(C_6H_5)_2$, is very stable; it may be preserved unchanged for many days. Upon concentration of the strongly alkaline solution a thick syrup is eventually obtained of powerfully alkaline nature, but which has not yet been crystallised. It absorbs carbon dioxide with great avidity, forming a carbonate of the base, which effervesces upon the addition of a dilute acid; the carbonate, indeed, very much resembles that of thallium, being soluble in water.

Strangest of all these reactions, perhaps, is the behaviour of the solution of the base towards soluble sulphides. Sodium sulphide precipitates a bright yellow sulphide of the base, closely resembling arsenious sulphide, while ammonium sulphide precipitates a beautiful deep orange-coloured polysulphide, identical in appearance with freshly precipitated antimonious sulphide. Both sulphide and polysulphide decompose after a time with separation of an oil, consisting in the former case of iodobenzene and phenyl sulphide, and in the latter case of the same substances together with other phenyl sulphides. The work is being continued, and Prof. Meyer hopes before long to have something further to communicate concerning this unexpected and exceptionally interesting class of compounds. A. E. TUTTON.

THE ETHNOGRAPHY OF THE ARAN ISLANDS, COUNTY GALWAY.

WHEN Professors Cunningham and Haddon opened their anthropometric laboratory in Dublin, rather more than two years ago, one of their objects was to promote systematic research in the country districts of Ireland. We have now received the first-fruits of the laboratory in the form of a paper on the ethnography of the Aran Islands, by Prof. A. C. Haddon and Dr. C. R. Browne, read before the Royal Irish Academy. The lines of research originally proposed have been considerably exceeded, and the paper before us is in reality a brief monograph of the islands. The observations, however, have been made chiefly on the inhabitants of Aranmore, the northern and largest of the three islands forming the group; and the southern island, Inisheer, was not visited at all.

The inhabitants of Inisheer, and of the middle island (Inishmaan), have been less subject to foreign influence than Aranmore, but the proximity of Inisheer to the mainland having rendered intercourse with Ireland easy, appears to have given to the inhabitants of that island a somewhat distinctive character.

The number of individuals actually measured by the authors was twenty-seven, twenty of them being natives of Aranmore, and the other seven being Inishmaan men; all were males.

The general physical characters of the people are thus described:—

Height.—The men are mostly of a slight but athletic build; and though tall men are occasionally to be met with among them, they are, as a rule, considerably below the average Irish stature. The Aran average is 1645 mm., or about 5 feet $4\frac{3}{4}$ inches; that of 277 Irishmen is 1740 mm., or 5 feet $8\frac{1}{2}$ inches.

Limbs.—The span is less than the stature in a quarter of the cases measured, a rather unusual feature in adult males. The hands are rather small, but the forearm is often unusually long.

Head.—The head is well shapen, rather long and narrow, but viewed from above, the sides are not parallel, there being a slight parietal bulging.

The mean cephalic index, when reduced to the cranial standard, is 75·1, consequently the average head is, to a slight extent, mesaticephalic; although, as a matter of fact, the number measured is nearly evenly divided between mesaticephalic and dolichocephalic. The top of the head is well vaulted, so that the height above the ears is considerable.

The forehead is broad, upright, and very rarely receding; not very high in most cases. The superciliary ridges are not prominent.

Face.—The face is long and oval, with well-marked features. The eyes are rather small, close together; they are marked at the outer corners by transverse wrinkles. The irises are in the great majority of cases blue or blue-grey in colour. The nose is sharp, narrow at the base, and slightly sinuous or aquiline in profile. The lower lip is, in many cases, rather large and full. The chin is well developed. The cheek-bones are not prominent. In quite a large proportion of cases, the ears, though not large, stand well out from the head. In many men the length between the nose and the chin has the appearance of being decidedly great. The complexion is clear and ruddy, and but seldom freckled. On the whole, the people are decidedly good-looking.

Hair.—The hair is brown in colour, in most cases of a light shade, and accompanied by a light and often reddish beard. As a rule, the hair on the face is moderately well developed.

Sight and Hearing.—The sight and hearing of the people are, as a rule, exceedingly keen, especially the former. The range and distinctness of the vision is astonishing, as we have had occasion to know; and we are informed by Dr. Kean that, on a clear day, any of the men whose eyesight is average can, with the naked eye, make out a small sailing-boat at Black Head, twenty miles away, before he can see it with a good binocular.

The observations of the authors tend to show that the natives of Inishmaan are rather lighter than the Aranmore men.

The population is decreasing, but as the number of births is considerably in excess of the deaths, the decrease must be attributed to emigration. That some of the inhabitants live to a very advanced age is evidenced by the fact that a tombstone in Killeany records the death of a man in the 119th year of his age.

The islanders appear to be exceptionally honest, straightforward and upright in their dealings, and illegitimacy is almost unknown.

They are singularly non-musical, there being no piper, fiddler, or musician of any sort on the islands.

The majority of the people can understand and speak English, but Irish is the language most generally spoken among themselves.

Almost all the marriages take place immediately before Lent. There is no courting or love-making, but the young man who has decided to marry goes to the house where there is a suitable girl, and asks her to marry him; a man has been known to ask three girls in the same evening before he was accepted.

Wakes are held even upon those who die abroad. Occasionally a funeral procession stops on the road to the cemetery at certain spots, and the mourners raise small memorial heaps of stones; in Aranmore there are about two dozen of these roadside monuments; but the practice does not seem to date back beyond the beginning of the last century, and appears to have died out within the last twenty years.

The Aranites believe in fairies, banshees, and ghosts; and a corpse is always carried out of a house through the back door.

It is said that if anyone at a marriage repeats the benediction after the priest, and ties a knot on a piece of string at the mention of each of the three sacred names, that marriage will be childless for fifteen years, or until the knotted string has been burnt.