

Photographic Irradiation

I HOPE you will allow me space to correct a slight misunderstanding which has got into the present discussion on photographic irradiation. Mr. Crofts (*NATURE*, vol. x. p. 245) places my views in opposition to those of Lord Lindsay and Mr. Ranyard. Mr. Stillman (*NATURE*, vol. x. p. 381), who has given us such valuable information on the molecular condition of different preparations of collodion, also takes the same view. Now in reality Lord Lindsay's and Mr. Ranyard's views are not opposed to mine. I have simply attempted to prove that molecular reflection was a *cause* of photographic irradiation, not that it was the *only cause*, as I quite agree with Lord Lindsay and Mr. Ranyard, that the imperfections of the lens are also causes of photographic irradiation, and in *NATURE*, vol. x. p. 185, I pointed out one form of irradiation due to the lens. But the imperfection of the lens which is most fatal is that pointed out by Lord Lindsay and Mr. Ranyard, namely, the inability of the lens to bring all the rays to a focus, whether this results from the imperfections of the outside portion of the lens, or from imperfect achromatic* correction. No maker of lenses will tell you that any lens, far less that every lens which he puts out, is perfectly corrected for dispersion. Working with such an instrument, it is very clear that if we only allow an exposure sufficient to give an image on the part of the collodion where the great proportion of the rays are focused, then the photographic impression will give very nearly the true boundary line. But suppose we allow more light to pass through the lens, either by turning the camera to a brighter light or by giving a longer exposure, then it is clear that the unfocused rays which gave no impression when the exposure was short, will now impress themselves on the collodion, and thus the photographic impression will be extended beyond the true boundary line.

That there should be difference of results in experiments on photographic irradiation is quite to be expected, as there are so many variables in the experiments. The light, temperature, and condition of the collodion are all constantly changing, and the conditions under which the experimenters work, and the apparatus and chemicals used, are different for each experimenter; different results may therefore be expected. If the experimenter use a good lens, and employ only the central portion of it, the imperfection due to the lens may be small in quantity. But if his lens is imperfectly shaped and badly corrected for dispersion, and he uses the full aperture, the result will be very different. Again, if the experimenter work with different collodions, Mr. Stillman has shown that, altogether independent of the lens, a very slight change in the preparation of the collodion greatly alters the amount of irradiation. So far as I can at present judge, the imperfections of the lens and molecular reflection are not opponents, but allied enemies, which we must meet on the same field.

JOHN AITKEN

Darroch, Falkirk, N.B.

Can Land-crabs Live under Water?

WHEN in Atchin, in Sumatra, during the second Dutch expedition, it occurred to me to put to experimental test a statement which I thought I had seen in some book or other—this book turns out to be Prof. Marshall's work on "Physiology"—to the effect that land-crabs are drowned when kept immersed in water.

On one occasion I kept one of these crabs under water for two hours, after which time it was as lively as ever; and on another day a larger specimen was kept submerged for exactly four hours, after the lapse of which time it was somewhat subdued, but by no means moribund.

Unfortunately the duration of my experiments was always limited by the necessities of ablution, as our largest receptacle for fluids was a small-sized Huntley and Palmer's biscuit-tin, which served as our only washing apparatus, as well as the laboratory—eventually a very leaky one—for my experiments, for a period of four months spent under an equatorial sun.

New University Club, Sept. 22

J. C. GALTON

* We here require some new word, or we must greatly extend our conception of achromatism, as we have here to deal with rays far beyond the limits of the sensitiveness of the eye; and the word achromatic, as applied to lenses for chemical purposes, is somewhat misleading. I may here offer two suggestions as to how the imperfect power of the lens to bring all the different rays to a focus may be partially corrected:—(1) By using a collodion which is as nearly as possible only sensitive to those rays which a lens can bring to a focus; or (2) by providing each lens used for making accurate observations with a screen, which shall stop back all the rays beyond the limits which the lens can focus.

Salivary Glands of Cockroach

I SEE in *NATURE*, vol. x. p. 381, a letter on the salivary glands of the cockroach, by Dr. W. Ainslie Hollis, in which he remarks:—

"As far as my experience carried me, the sacculi, the supposed reservoirs of the saliva, never contained naturally any liquid whatever, but on opening the thorax were invariably found to be collapsed and empty."

A few days ago I was observing some of these creatures. I examined several shortly after they were caught; in these the sacculi were empty, but others which I had kept alive in a cup with only a few drops of water for a day or two, had invariably the sacculi distended with liquid.

I will not attempt to explain these facts, but leave that to others more capable than myself.

Belfast, Sept. 21

CHAS. WORKMAN

THE AUSTRIAN POLAR EXPEDITION

THE Vienna correspondent of the *Times* supplies some interesting details concerning this important expedition. Events have proved that there has not been an expedition better fitted out, as to ship, stores, or crew, than that in which this North Pole Expedition left Bremerhaven on June 13, 1872.

As to the crew of twenty-four men, it was composed of three naval officers, Lieutenants Weyprecht and Brosch and Ensign Orel; two engineers, and fifteen picked Dalmatian sailors; Lieut. Payer, of the Jägers, an Alpine Club man, with two Tyrolese mountaineers; Haller and Kletz, and the Hungarian Képesy as surgeon. It was thus calculated for land work not less than sea work, and events proved that the company had been well sorted.

The object of the expedition being to find a north-easterly passage towards the coast of Siberia, the expedition having arrived at Tromsø, and having taken on board Capt. Carlsen as harpooner and ice-master, started on the 14th of July for the sea and the coast of Novaya Zemlya. At Novaya Zemlya they met the Norwegian yacht *Fshbjörn*, in which Count Wilczek and Baron Sternberg, two of the chief promoters of the expedition, had come over from Spitzbergen to establish a store for them near Cape Nassau. They were for two years the last human beings they saw. The stores being laid in a cleft of the ice looking more promising, the ships parted company on the 21st of August, the *Tegethoff* going north, the *Fshbjörn* south. The hope proved to be fallacious long before evening. The *Tegethoff* was icebound, and never was got out again. The temperature sank, copious snowfalls cemented the loose ice-fields, and the *Tegethoff* was surrounded by a solid mass of ice.

In this precarious state the ship lay for five months, the ice freezing together and bursting in turn, and so exposing it perpetually to fresh pressure. All was prepared for leaving the ship. The stores were brought on deck and a portion placed on the ice. This was the most trying time of the whole. Every moment the alarm was sounded and the signal given for leaving the ship. It was sufficient to wear out the strongest. In spite of this, meteorological and other observations were carried on. The strain on the mind told on the state of health in spite of all precautions, and scurvy and pulmonary affections set in.

All this time the ship was being driven in a north-easterly direction until, towards the end of January, 1873, 73 W. long. and 79 lat. were reached on February 25. The sun appeared again after five months on the horizon, and on the 25th the pressure of ice ceased. A massive wall had been formed round the ship, protecting it from further injury. The drifting was now to the north-west. Milder weather having set in, the hope revived of setting the ship free, and for five months the work went on. By dint of boring and blasting the fore part of