

represents a Maxwellian wave surface travelling with the fundamental velocity c , and the function W is the action function and consequently represents a de Broglie-Schrödinger wave surface travelling with the velocity c/β . Relative to an observer travelling with the velocity c , the Maxwellian function ψ disappears from W , and the Schrödinger wave surface coincides with the surface of the electron, both in fact reducing to a plane Maxwellian wave surface

$$l_1x_1 + m_1y_1 + n_1z_1 + ct_1 = 0, \quad (5)$$

where the suffix 1 relates to the new observer. This suggests that our electrons would appear from a ray of light as rays of light, and a similar argument may show that our rays of light would appear as electrons. This reciprocal relation between matter and radiation involving a dual aspect of each, if accepted as a principle, may help to elucidate problems of interaction between these two fundamental entities of physical science. Fuller details will be published later.

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Cairo, Sept. 19.

Magnetic Reaction of Carbon Filaments.

AN ordinary magnet, or a current carrying winding adjacent to the filament of a carbon filament lamp, produces the oscillation shown in the accompanying photograph (Fig. 1) when the filament is glowed, the effect commencing at the dark heat radiation point and increasing with increasing filament radiation.

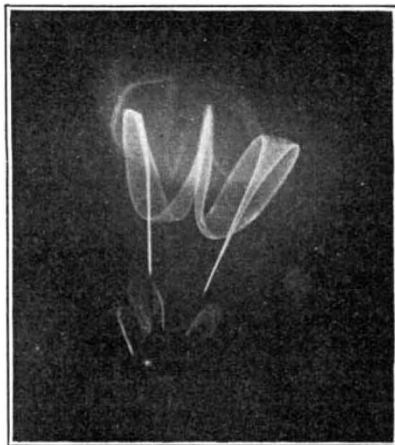


FIG. 1.

When filament and winding currents are both direct, simple distortion occurs. The cold filament placed in actual contact with a magnet shows no affinity thereto.

It thus appears that, when radiating, the carbon filament assumes magnetic properties which may be due to

- (1) Decrease of inertia of the filament ;
- (2) Atomic rearrangement ;
- (3) Impurities in the filament.

Regarding the last, some filaments have been produced from a colloidal zinc salt.

As a matter of interest, tungsten and tantalum filaments gave no magnetic reaction, though it should be said that these filaments are more rigidly supported than the carbon type.

The best results are obtained with a carbon filament lamp having large and few filament coils, for example a 150-volt size.

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Using a horseshoe magnet, positions of maximum magnetic disturbance will be found when the poles are in the planes of the coil axes, the effect decreasing gradually towards the mid-points.

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Rearing Experiments with Starfish and Obstetric Toads.

PERHAPS readers of NATURE would be interested to hear the results of two rearing experiments which were carried out under my supervision this summer by two of my pupils in the Zoological Laboratory of the Imperial College of Science.

(1) The common starfish, *Astenas rubens*, was obtained from Plymouth. The eggs were artificially fertilised and the larvæ were reared through their entire development, until they metamorphosed into young starfish—a process which occupied 2½ months. This feat had been accomplished in Plymouth and in Millport, but this is the first time that it has been done with eggs which travelled 226 miles from the sea. The development and beating of the larval heart were studied. Mr. Murtri, the pupil who carried out the experiment, also studied the development and beating of the larval heart of *Echinus miliaris*—a species which we rear in our aquaria through its entire development every year. The heart of *Echinus* beats almost four times as fast as that of *Asterias*.

(2) Through the kindness of Mr. E. Boulenger, director of the Aquarium of the Zoological Society, a consignment of thirty specimens of *Alytes obstetricans* were obtained from Germany. These were entrusted to the care of my pupil Miss Sladden, who has great skill in rearing Amphibia. Eighteen of the specimens were removed to our greenhouse, in which a temperature of from 80° to 85° F. was maintained to see if they would become acclimatised, but almost all of them died within a few weeks. The remaining 12, including two males carrying eggs, were kept under approximately natural conditions and all survived. Each of the two males carried from 30 to 40 eggs; from each batch 20 tadpoles hatched out. Of these 40 tadpoles, no less than 38 were successfully reared through the metamorphoses. After metamorphosis 18 of the young toads were transferred to the greenhouse, 10 were transferred to an out-of-doors vivarium, and 10 to an indoors vivarium. The little toads are now two months old, and only one has died—that one being amongst those subjected to warmth.

Thus Kammerer's statements that *Alytes* could become acclimatised to a high temperature and that in these circumstances it would revert to a water-inhabiting life have been confirmed. Whether we shall have the skill, resources, and time to rear further generations of *Alytes* is still on the "knees of the gods".

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Age of the Tahitian Coral Reefs.

DR. CYRIL CROSSLAND (NATURE, Oct. 12, p. 576) refers to my discovery of coral fragments in a parasitic tuff-cone at Tataa Point, at the north-west corner of Tahiti. The size and water-worn character of these fragments and of the associated basaltic pebbles in the tuff suggest that the cone was built by eruptions through an old beach sprinkled with coral debris. Had the eruption burst through a solid reef, it may reasonably be supposed that large angular blocks of