

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts. No notice is taken of anonymous communications.]

[The Editor urgently requests correspondents to keep their letters as short as possible. The pressure on his space is so great that it is impossible otherwise to insure the appearance even of communications containing interesting and novel facts.]

Mr. Romanes on Physiological Selection

I HAVE just seen Mr. Romanes's article in the *Nineteenth Century*, and his letter specially replying to myself in your issue of January 13 (p. 247). I do not propose to continue the discussion, but ask leave to make a few observations on some features of his reply in both the article and the letter.

On the question of the "inutility of specific characters," he appeals to authority against me, and especially to Darwin's very cautious remarks, which seem to me to support my view much more than they do those of Mr. Romanes; but in any case this is a matter in which I decline to accept authority as an infallible guide. The impossibility of proving a negative is proverbial, but my opponent declares that his negative—the uselessness of specific characters—wants no proving, but must be accepted till in every case the affirmative is proved. Here, again, is a canon of criticism the validity of which I wholly deny.

As to the swamping effects of intercrossing, there is again an appeal to authority, and Mr. Romanes now explains away (in the *Nineteenth Century*) what he had said about "simultaneous variations," by asking me to show such variations as the occurrence of an incipient spur on a duck's foot or horn on the head of a racehorse, in the belief, apparently, that these are the class of characters which are distinctive of closely-allied species! Such a demand, seriously made, appears to me so preposterous as to render further discussion of the matter with such an adversary out of the question.

The argument to show that the supposed physiological variations would be perpetuated, seems to me as weak and unsatisfactory as ever. The question is really not worth further discussion till the required variations are proved to exist in the requisite abundance and possessing the peculiar relations to each other and to the rest of the species which would alone give them any chance of survival.

I now leave the question, as between myself and Mr. Romanes, to the consideration of those naturalists who may be able to bestow upon it the requisite time and attention.

ALFRED R. WALLACE

Washington, U.S.A., January 30

Instantaneous Shutters

IN reference to the interesting paper by Mr. Mallock in *NATURE* (February 3, p. 325), I quite agree with him in his condemnation of a drop-shutter of any form.

But I would point out a form of shutter that I have myself found of the greatest value—one, namely, working horizontally across the lens. It has the very great advantage in landscape work that it can carry an aperture of this form ∇ or any modification thereof, the advantage gained thereby being that the sky receives a far shorter exposure than the foreground, a point of much importance in landscape photography. The ∇ piece is loose, and any shape cut out of black cardboard or paper can be inserted. Of this power I have frequently availed myself when photographing snow-clad mountains.

The shutter can be made to pass across the lens at any speed, from the most instantaneous flash to slower motions, and it has the further advantage of working immediately behind the lens—the proper place, I think, for a shutter.

H. STUART-WORTLEY

South Kensington Museum, February 4

Svastika Cross and Sun

Is there any evidence that the *svastika* represents the sun? and is it not a simple conjecture? (*NATURE*, February 10, p. 345).

The *svastika* 卐 is a complex emblem, and there is a possible origin which has not been investigated. It decomposes into

two ┘ , and this is a character to be found extensively distributed throughout the syllabic and alphabetic systems. If ┘ is a symbol for man and fish, it will not be related to sun immediately.

The theory of Mr. Haliburton and others, and mythological conformity, give the cross or Tau as naturally derived from the Pleiades, and not from the sun. The cross is also a symbol for the nose in prehistoric sculpture.

HYDE CLARKE

32 St. George's Square, S.W., February 12

Life-Energy, or the Dynamics of Health and Disease

SINCE it is admitted that matter is indestructible, it is obvious that life can be only the manifestation of that energy which is set free by the reduction of compounds embodying more energy to states of combination which embody less energy.

Life therefore is the result of the continuous interchange of partners between the compound molecules constituting chemical and organic compounds.

"In any transformation which takes place without the application, or the giving out, of work, the heat developed is the equivalent of the excess of the original over the final potential energy due to the chemical affinities involved; the final state of every combination is that in which the potential energy of chemical affinity is a minimum" (Tait).

If these words formulate the law which governs those combinations of elementary substances known as inorganic compounds, how much more must they refer to the combinations of the same elementary substances which go to form organic compounds?

Life thus becomes an expression for the sum of the difference between the original potential energy of the food and the final potential energy of the excretions. All change in the configuration of matter, whether physical or chemical, must be accompanied by either the evolution of, or the absorption of, energy.

Energy, as far as is known, has but one source, the sun.

Whether that energy act by direct impingement of solar rays producing the ascending scale of effects from genial warmth to fatal sunstroke, or whether it be second-hand, from the decomposition of vegetable matter, or third-hand, from the decomposition of animal substances which obtained it from vegetable substances, its origin is still the same.

Assuming then the universality of this energy, which shows itself in all the intangible forms of life, and growth, and all organic change, it will be the effort of the writer to adduce evidence to prove that much which is still mysterious in both health and disease is due to its subtle action too.

The vibrations of direct solar energy which fall upon the optic nerve give rise to those molecular disturbances which produce the subjective sensation of light.

Physical change is thus originated by an immaterial agent. Work is done, and cannot continue to be performed without renewal of the material acted on.

But when the vibrations of direct solar energy fall upon the tissues of a growing plant, energy is incorporated into those tissues. This energy so attunes the atomic vibrations in the plant molecules as to bring them into combining harmony with the carbon and hydrogen atoms present in the forms of carbonic acid and water.

The hydrocarbon compound, starch, is formed, and embodies within itself the energy which made it starch.

Each molecule of starch maintains its individuality as starch only so long as it retains within itself that solar energy under the influence of which it became starch; as soon as part of that energy is lost the starch is degraded to its original condition of carbonic acid and water. Yet that energy which works such molecular miracles is sought for among the products of decomposition in the form of heat only, and if not recognisable as such is put out of count in the world's work.

While it is thus evident that the vegetable kingdom lives a constructive life, storing up energy from an extra-terrestrial source, it is equally demonstrable that the animal kingdom lives a destructive life, unable to add aught to the sum of energy required for the work of the planet. Consequently an approximate expression for the value of the energy incorporated in the plant may be found in the work done, as a result of its consumption, by the animal.

4500 grains of plant carbon are daily excreted by every average man in the form of carbonic acid. Carbon and oxygen independently embody a greater sum of original energy than is