

Letters to the Editor.

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Chimæras Dire: Transplantation of Heads of Insects.

WITH some astonishment I notice my friend, Dr. W. T. Calman, agreeing with the German authors Hans Blunck and Walter Speyer in his letter to NATURE of July 5, p. 11, entitled "Chimæras Dire," which is written with much sarcastic humour, but little knowledge of the subject. The title itself is misleading. Walter Finkler has never claimed to have produced Chimæras in adult insects, a term signifying in biology "simultaneous development of parts compounded from tissues of different species (or races)"; he has merely studied the possibility of replantation of heads and described the results thereof. He has neither written that "The head of a herbivorous water-beetle persuaded a carnivorous body to be content with, and seemingly to digest, a vegetable diet," nor that "a Dytiscus strove to moderate the colourings of its wing-cases to suit the sober tastes of its new Hydrophilus brain." The only part of Finkler's work referring to nurture (*Archiv f. mikrosk. Anatomie u. Entwickl.mechanik*, xcix., 1923, p. 113) alludes to the passage of coloured algæ through the re-established connexion between the cut ends of the œsophagus in *homoplastic* experiments on the replantation of Hydrophilus-heads, while the assumption of a darker hue after heteroplastic replantation of a Hydrophilus-head to a Dytiscus-body refers to the yellow crossbars of the thorax in the swimming beetle (pp. 127-128), a result Finkler ascribes to the influence of eyesight, but that can perhaps be more readily explained on the assumption of tyrosinase diffusing from the head to the thorax.

Dr. Calman's sentence, "a male head led a female body into unwonted perversities," will, I am afraid, also produce a wrong impression of Finkler's observations. Finkler's xenoplastic experiments on the exchange of heads between a male and a female Hydrophilus were conducted to see if the reproductive glands have any influence on the sexual instinct as displayed by the head in the antennal play of the male (and the several reflexes of the legs inspired by the œsophageal ganglions of the intact imago). The result was that no such influence could be detected (p. 124). The male head kept its usual reaction towards the female, and the female head did not acquire this character when transplanted to a body of opposite sex, quite in agreement with the many experiments on other insects, where removal or even heterological exchange of the reproductive glands in larvæ always failed to display any change in the secondary sexual characters of the imago.

As to the knowledge of Drs. Blunck and Speyer, "already known by a long series of anatomical and biological researches on the very water-beetles that were among the chief of Finkler's *corpora vilia*," of the physiology of these insects, I have just stated an example of it: they have maintained that a Hydrophilus with Dytiscus-head could never live in water, because the former needs its feelers for respiration. Any one can easily convince himself of the fallacy of this belief, dating from an unlucky fabulation of Nitzsch (1811!) and repeated, it is true, in all treatises on the physiology of these beetles since his time. It

is only necessary to amputate both antennæ of some Hydrophilus and keep the beetles as usual in water with some algæ. No inconvenience will befall them on account of this loss. I have a paper in the press on this subject for the *Zoologischen Anzeiger* which is to appear shortly, discussing the various criticisms of Finkler's experiments by several authors in Germany. I need not, therefore, go into further details now.

I should, however, like to add that Finkler has not "ignored requests to produce his chimæras, alive or dead, for investigation by others." His transplantations were produced alive at the meeting of the zoological section of the Zool. Bot. Society of Vienna on November 11, 1921, for general inspection, and some dead specimens were handed on to Dr. Boulenger (has not Dr. Calman had the opportunity of seeing these himself as an "exhibit at a Royal Society soirée"?); the total preparations of the beetles, of which Finkler's Plate IV. gives but a poor impression, are in our Museum and hundreds have seen them. Wit is appropriate "in the pages of *Punch*"—but in the pages of NATURE we should try to keep to strict truth.

As to Mr. J. T. Cunningham's recent note (NATURE, July 26, p. 124) on "Transplantation of Heads of Insects," I am puzzled if it is meant as a joke or is the author really used to making his experiments on five individuals? (By the way, I am sure he cannot have read Finkler's paper, or he would have known that Finkler has attempted the transplantation of the head alone in the meal-worms without success.)

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Radial Velocities and the Curvature of Space-time.

THE question of the reduction of the Doppler effect from the earth to the sun, or conversely, raised by Prof. Eddington in NATURE for May 24, is completely settled in my letter of May 10, which was published in NATURE for June 7, p. 818.

In his letter, however, Prof. Eddington mentions another point, the possible occurrence of an "imaginary star constant v_0 " in

$$D^2 = r^2/R^2 + v_0^2/c^2, \dots (1a)$$

which requires an explanation.

The actual position is this. With some R -value, derived from previous material, a new object of estimated distance r may show an effect $|D|$ smaller than r/R . Then (1a) calls for a negative v_0^2 or an imaginary v_0 . What is the meaning of such a value? Simply, that the orbit *does not pass* through O , the sun, but ends at some perihelion distance $r_0 = R\sigma_0$, where the motion is reversed. Such radial motions are possible in de Sitter's world. Even then the analytical form (1a) may be retained, provided we remember that v_0^2/c^2 is to be replaced by $-\sigma_0^2$. In fact, by the equation of motion (NATURE, March 8)

$$\frac{R}{c} \frac{d\sigma}{dt} = \pm \cos \sigma \sqrt{1 - \cos^2 \sigma / k^2} = \pm \frac{v}{c},$$

or by the original meaning of the constant, $k = \cos^2 \sigma c dt/ds$, we have

$$k = \cos^2 \sigma / \sqrt{\cos^2 \sigma - v^2/c^2} = \text{const.}$$

If the star passes through the sun, $v = v_0$ for $\sigma = 0$, and $k = (1 - v_0^2/c^2)^{-\frac{1}{2}}$, and the formula

$$D = k[1 \pm \sqrt{1 - \cos^2 \sigma / k^2}] - 1 \dots (1)$$

reduces approximately to (1a). But if it does not