at every ordinate, so as to provide the data for drawing what I will call, for brevity in reference, the "gustograph" record. That something in the way of truth has then been obtained appears from the reflection that a man who had the air acceleration under his control for a given five minutes and a gustograph or acceleration record for some previous five minutes, would be able to reproduce the gusty phenomena of the air for that previous five minutes by controlling the air acceleration according to the gustograph record. He would not, of course, necessarily reproduce the actual *wind* of the previous five minutes, unless he happened to *start* the five-minute reproduction with the right wind value, but that agrees entirely, I believe, with the distinction there is between gustiness and wind in connection with aircraft.

As regards the safe "flyability" of the air by aircraft, I hazard the guess that it may be found convenient to connect it with such a quantity as the *maximum* gust over a random minute run of the gustograph, or perhaps with the *average* gust over the same period.

The proposal Prof. McAdie mentions—using the exponent of an exponential equation as the measure of the sharpness of a gust—looks easier to apply in examining the influence of particular classes of gusts than in obtaining continuous records from instant to instant. For the latter purpose it is, I submit, desirable that the gust should be defined by instantaneous conditions, independently of knowledge of things at a finite time either before or after the given instant. I may, however, be misunderstanding the exponential proposal in this connection.

If principles like those I suggest found acceptance, the question of having standard gustograph instruments would soon be likely to arise; for graphical differentiation of anemograph records is tedious, and discouraging to progress. I think gustographs may be designed on two broad principles: in the first there is an anemometer in which the *rate of change* of the reading is continuously recorded, and in the second there is an arrangement of fans and flywheels with torque-recording couplings between.

I shall be very pleased if what I have written contributes to the discussion anything which needed, in any case, to be brought under consideration.

S. L. WALKDEN.

London, N., April 25.

The Preparation of "Blood Charcoal."

PURE "blood charcoal" is a reagent of considerable importance to the physiological chemist. It is not only required for the decolorisation of liquids, but also for selective adsorption in an important series of quantitative estimations of animal fluids.

My stock of Merck's blood charcoal is nearly exhausted, and I cannot obtain a supply of any home-made article that is suitable.

I should be most grateful if any of your readers could give me any information as to the method of preparation of blood charcoal, or the name of a firm that would be willing to manufacture and supply the article. Material as good as Merck's would command a ready sale at home as well as in America, where they have had to abandon rapid and accurate methods of analysis owing to the lack of the necessary charcoal. Folin states, in a recent number of the *Biochemical Journal*, that no other charcoal will adsorb creatinine. I have got perfect results with two other specimens of charcoal, but inquiry reveals the fact that both of them came originally from Germany. Surely our technical chemists can produce articles as good as those of the Germans. SYDNEY W. COLE.

Biochemical Laboratory, Cambridge, May 9.

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STUDIES IN GENETICS.¹

(1) PROF. CASTLE was fortunate enough to secure in Peru a number of specimens of a wild species of guinea-pig, *Cavia cutleri*, Bennett, which is the probable ancestor of the numerous domesticated races which have had their origin in that country and have been introduced elsewhere. He found that this wild species produced completely fertile hybrids when crossed with various races of domesticated guinea-pigs, and the results of the hybridising experiments go to show that all the domesticated colour-varieties have arisen from *C. cutleri* by loss-variation or loss-mutation. It does not follow, however, that wild species have arisen in this way, as some believe, for it is significant that the Brazilian wild species, *C. rufescens*, yields sterile hybrid males when crossed with the domesticated varieties, while similar crosses between *C. cutleri* and domesticated varieties yield completely fertile hybrids. One of the general results of Prof. Castle's hybridisation experiments is to confirm his previous conclusion that size inheritance is blending and does not mendelise. It is not denied, however, that in special cases mendelising factors may exist that affect size.

In another study Mr. Sewall Wright deals with the genetic factors determining coloration in guinea-pigs and with the conditions which may account for continuous series of variations. "Intermediates between varieties which mendelise regularly have been found to follow very definite modes of inheritance, which, however, are very different in different cases, and could not possibly be predicted *a priori*." He shows that a complex of the most varied causes may underlie an apparently simple continuous series of variations.

Of great interest, again, are the prolonged breeding experiments that Prof. Castle has made with hooded rats. It is shown that the factor for hooded colour pattern may vary in genetic value. There may be genotypic variation in grade as well as phenotypic fluctuation—a conclusion which brings us back to a familiar Darwinian doctrine. "Racial changes," Prof. Castle writes, "may be effected through selection by the isolation of genetic fluctuations, as well as by the isolation of mutations. Moreover, genetic fluctuation makes possible *progressive change* in a particular direction, repeated selection attaining results which it would be quite hopeless to seek by any other means." The study of the hooded rats, previously reported on by Castle and Philipps in 1914, has been carried through three or four additional generations. "The additional genera-

¹ (1) "Studies of Inheritance in Guinea-pigs and Rats." By W. E. Castle and Sewall Wright. Pp. 192+7 plates. Carnegie Institution of Washington, Publication No. 241 (1916).

(2) "Gonadectomy in relation to the Secondary Sexual Characters of some Domestic Birds." By H. D. Goodale. Pp. 52+7 plates. *Ibid.*, Publication No. 243 (1916).

(3) "The Jukes in 1915." By A. H. Estabrook. Pp. vii+85+26 charts. *Ibid.*, Publication No. 240 (1916).

(4) "Fecundity versus Civilisation: A Contribution to the Study of Overpopulation as the Cause of War and the Chief Obstacle to the Emancipation of Women. With Especial Reference to Germany." By Adelyne More. With an Introduction by Arnold Bennett. Pp. 52. (London: G. Allen and Unwin, Ltd., 1916.) Price 6d. net.