

Reversion and Ancestry in Early Genetics

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Why was reversion to ancestral characters so interesting?

And then, why wasn't it?

Outline

1. Disappearing problems in HPS
2. Reversion: a big deal!
 - 2.1 Charles Darwin
 - 2.2 Francis Galton
 - 2.3 The biometrical school
3. Reversion: no big deal!
4. How did this happen?

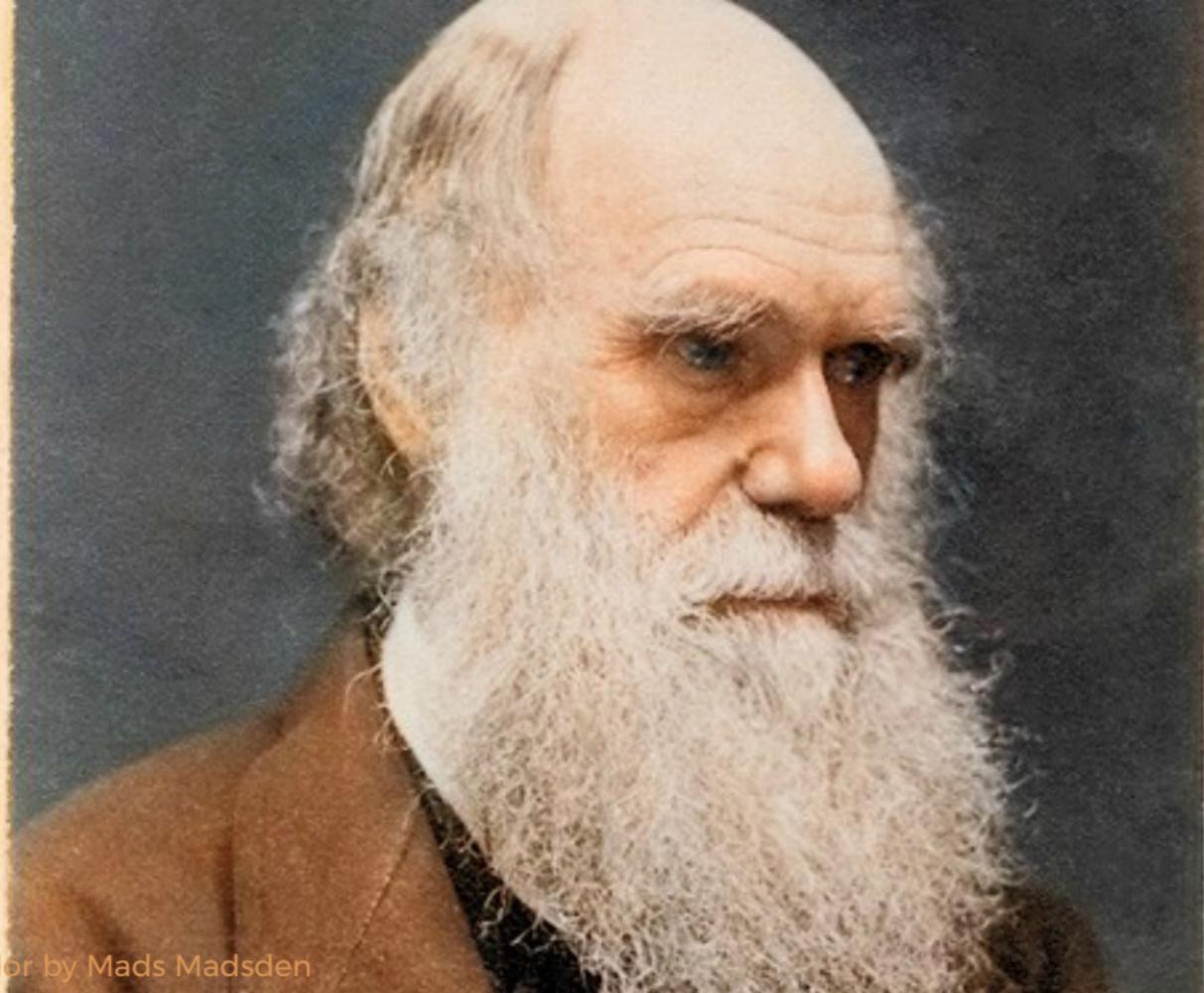
The take-home: The rise and fall of reversion sheds light on the philosophical commitments of late-19c biology.

Disappearing Problems in HPS



[T]he reception of a new paradigm often necessitates a redefinition of the corresponding science. Some old problems may be relegated to another science or declared entirely “unscientific.” Others that were previously non-existent or trivial may, with a new paradigm, become the very archetypes of significant scientific achievement.
(Kuhn 1962, p. 103)

Reversion: A Big Deal!



color by Mads Madsen

Moreover, when two birds belonging to two distinct breeds are crossed ... the mongrel offspring are very apt suddenly to acquire these characters; for instance, I crossed some uniformly white fantails with some uniformly black barbs, and they produced mottled brown and black birds; these I again crossed together and one grandchild of the pure white fantail and pure black barb was of as beautiful a blue colour, with the white rump, double black wing-bar, and barred and white-edged tail feathers, as any wild rock-pigeon! (Darwin 1859, p. 25)



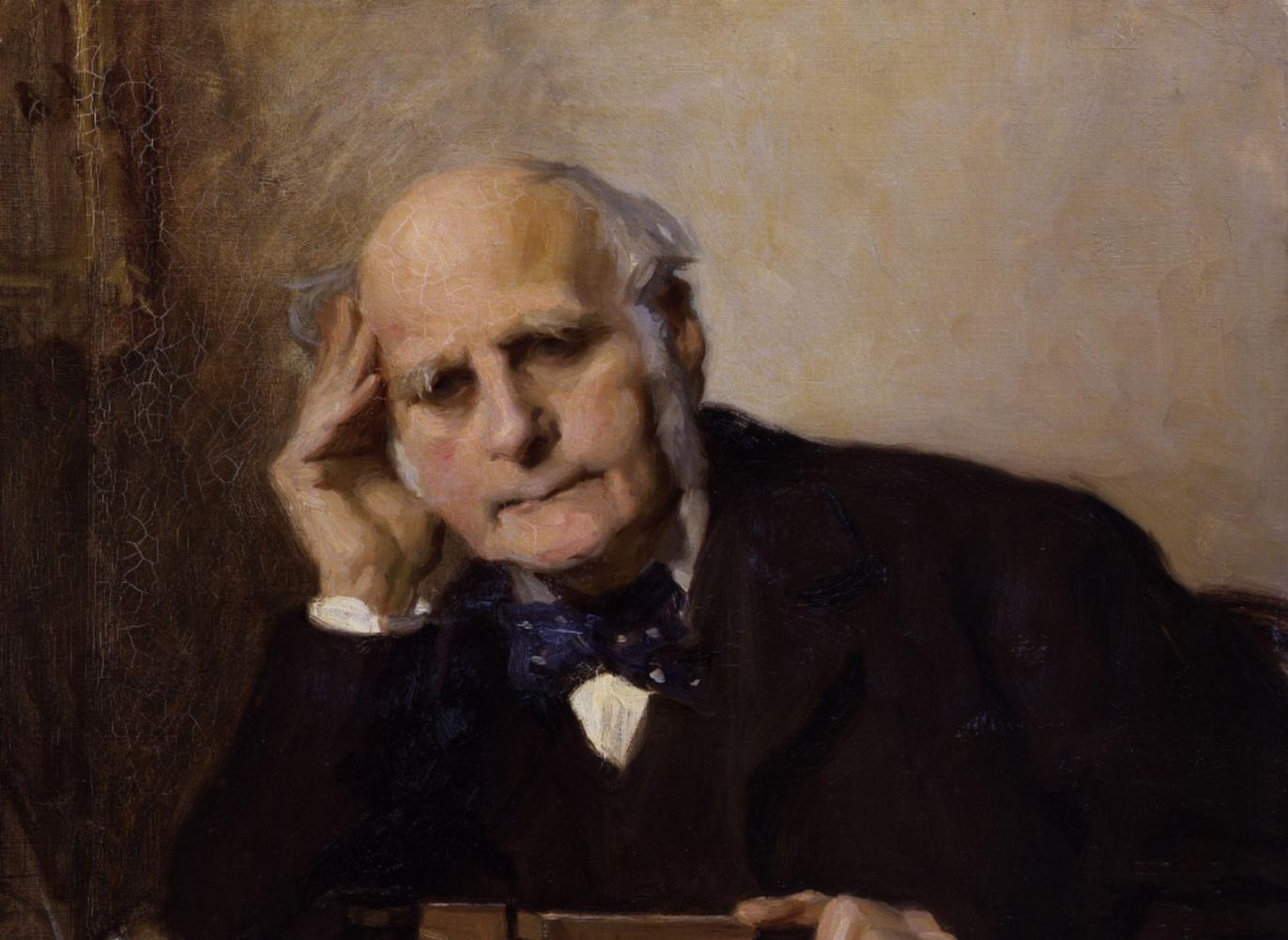
With respect to reversions; I have been raking up
vague recollections of vague facts; & the
impression on my mind is *rather* more in favour
of reversions, than it was when you were here.—
In my abstract [i.e., the *Origin*] I give only a
paragraph on the *general* case of reversions,
though I enter on detail on some cases of
reversions of special characters.— (Darwin to
Hooker, 3.5.1859)

When one thinks of a latent character being handed down hidden for a thousand or ten-thousand generations & then suddenly appearing, one is quite bewildered at the host of characters written in invisible ink on the germ.—
(Darwin to Hooker, 26.3.1863)

This principle of Reversion is the most wonderful of all the attributes of Inheritance. It frequently comes into action. What can be more wonderful than that characters, completely lost during scores or hundreds or even thousands of generations, should suddenly reappear perfectly developed....

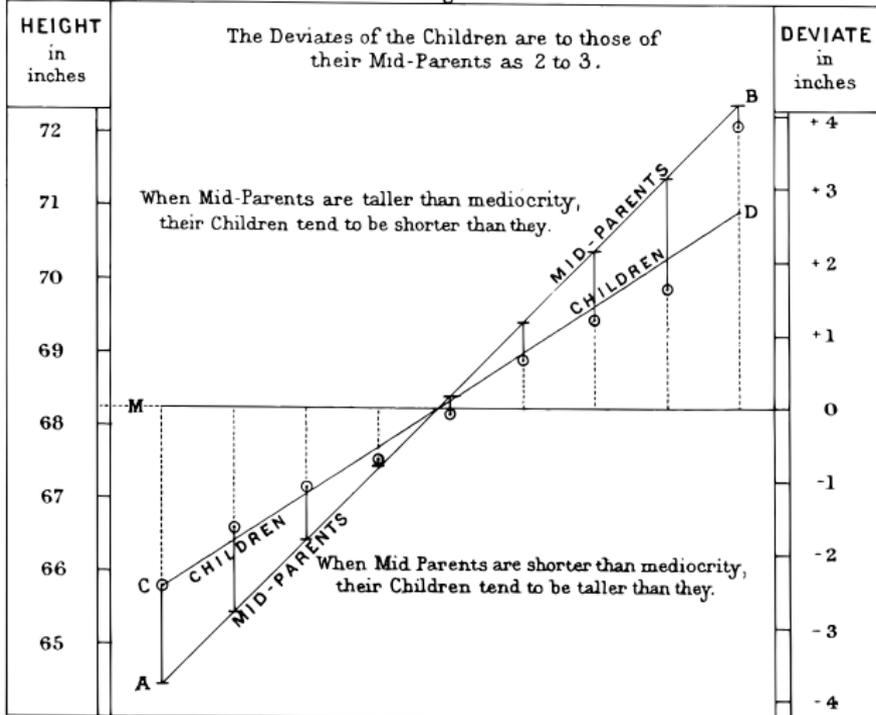
We are led to believe ... that every character which occasionally reappears through reversion, is present, though latent in each generation....

(Darwin 1865 [*Pangenesis draft*])



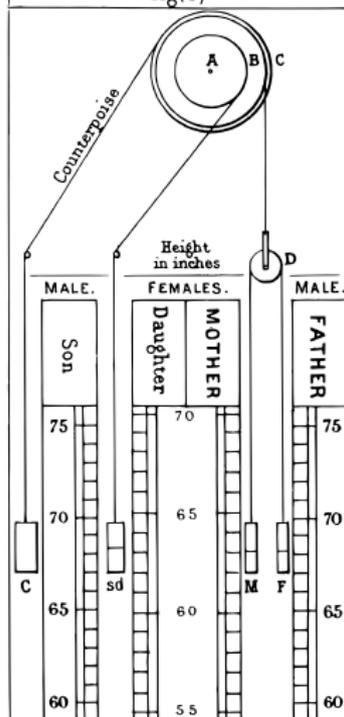
RATE OF REGRESSION IN HEREDITARY STATURE.

Fig. (a)



FORECASTER OF STATURE

Fig. (b)



J.P. & W.R. Embs, lith.

The child inherits partly from his parents, partly from his ancestry. Speaking generally, the further his genealogy goes back, the more numerous and varied will his ancestry become, until they cease to differ from any equally numerous sample taken at haphazard from the race at large. (Galton 1886, pp. 252–253)

A wide though limited range of observation assures us that the occupier of each ancestral place *may* contribute something of his own personal peculiarity, apart from all others, to the heritage of the offspring. ... the law might be inferred with considerable assurance *à priori*; consequently, being found true in the particular case [of basset hounds], there is good reason to accept the law in a general sense. (Galton 1897, p. 403)



What Mr. Galton really asserts is, that the proportions of reversion in an array of offspring are identical with the proportions of blend in the average individual. If this be true, then his law ... embraces the two distinct types of heritage, blending and exclusive. But I think it is most desirable to keep the two ideas quite separate, and speak of the one dealing with blended inheritance as the *Law of Ancestral Heredity*; the second, dealing with exclusive inheritance, as the *Law of Reversion*. (Pearson 1900, pp. 142–143)



The fundamental mistake which vitiates all work based upon Mendel's method is the neglect of ancestry, and the attempt to regard the whole effect upon offspring, produced by a particular parent, as due to the existence in the parent of particular structural characters... (Weldon 1902, p. 252)

Considering how reversion has been found by Mr. Galton in other cases, we might regard the hybrids which made up half the segregation generation as reverting directly to their parents, and the remaining half as reverting to the various green-seeded or yellow-seeded ancestors in various proportions... (Anon., *Nature* 70(1822):539)

Reversion: No Big Deal!



every union of two heterozygotes will then produce among the offspring some recessives, differing in appearance from their parents, but probably resembling some grandparent or ancestor (Fisher 1930, p. 9)



In short, it is more than doubtful whether the concept of atavism has any counterpart in reality; and, I think it will be agreed, that unless the concept can be applied to some demonstrable type of phenomenon, it were better that the term were altogether dropped from the vocabulary of the biologist. (Ashley Montagu 1938, p. 463)

A globe of the Earth is centered in the background, showing the Americas. Overlaid on the globe are several molecular models, including a blue and red one at the top left, a purple and green one at the top right, and a green one at the bottom left. The text "how did this happen?" is superimposed over the globe. "how did this" is in white with a black outline, and "happen?" is in a large, colorful, 3D-style font with pink, blue, and green gradients and a black outline.

how did this
happen?

Empirical Changes?

Relationships with Agriculture?

19C Progressivism?

In the latter half of the nineteenth century until well into the twentieth, atavisms and their close relatives came to haunt philosophical, literary, sociological, and psychological discourses as the shady side of the progressionist paradigm.
(Sommer 2005, p. 234)

Questions?



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