

Reduction in human biology: When, why and how much?

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Biology of Human Behavior: Some Philosophical Issues

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Reductionism or not?

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E.g. Laland and Brown introduce several, incompatible notions of reductionism that they recommend biologists of human behavior adopt simultaneously.

And critics, such as John Dupré, accuse biologists of human behavior of subscribing to forms of reductionism they do not subscribe to.

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“Ban on miracles” (Sterelny and Griffiths)

Reductionisms

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How much?

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How much?

Population genetics

Reductionisms

Explanatory

How much?

Population genetics

to



Molecular biology

Reductionisms

Explanatory

How much?

Population genetics

to



Molecular biology

or to



Quantum mechanics

Reductionisms

Explanatory

Population genetics to molecular biology:

Reductionisms

Explanatory

Population genetics to molecular biology:

All facts and regularities identified by population genetics are ultimately explicable in terms of molecular facts and regularities.

Reductionisms

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Population genetics to Quantum Mechanics:

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Population genetics to Quantum Mechanics:

All facts and regularities identified by population genetics are ultimately explicable in terms of quantum facts and regularities.

Rosenberg on Reductionism

How much?

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1. “Although the reductionism here defended claims to show that the how-possible ultimate explanations must be cashed in for why-necessary ultimate explanations, these explanations are still ultimate, still evolutionary—they still invoke the principle of natural selection. And until this principle can be reduced to physical law, it remains open to say that even at the level of the macromolecules, biology remains independent from physical science. Thus, the reduction of molecular biology to physical science remains an agenda item for physicalism” (Rosenberg, *bw*, 24)

Rosenberg on Reductionism

How much?

2. “The reductionist does not claim that biological research or the explanations it eventuates in can dispense with functional language or adaptationalism. Much of the vocabulary of molecular biology is thoroughly functional. Nor is reductionism the claim that all research in biology must be “bottom up” instead of “top down” research. So far from advocating the absurd notion that molecular biology can give us all of biology, the reductionists thesis is that we need to identify the patterns at higher levels because they are the explananda that molecular biology provides the explanantia for. What the reductionist asserts is that functional biology’s explanantia are always molecular biology’s explananda” (Rosenberg, bw, 23).

Should we reduce to the Quantum level?

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No. There are no obvious explanatory pay offs;
there is unnecessary precision.

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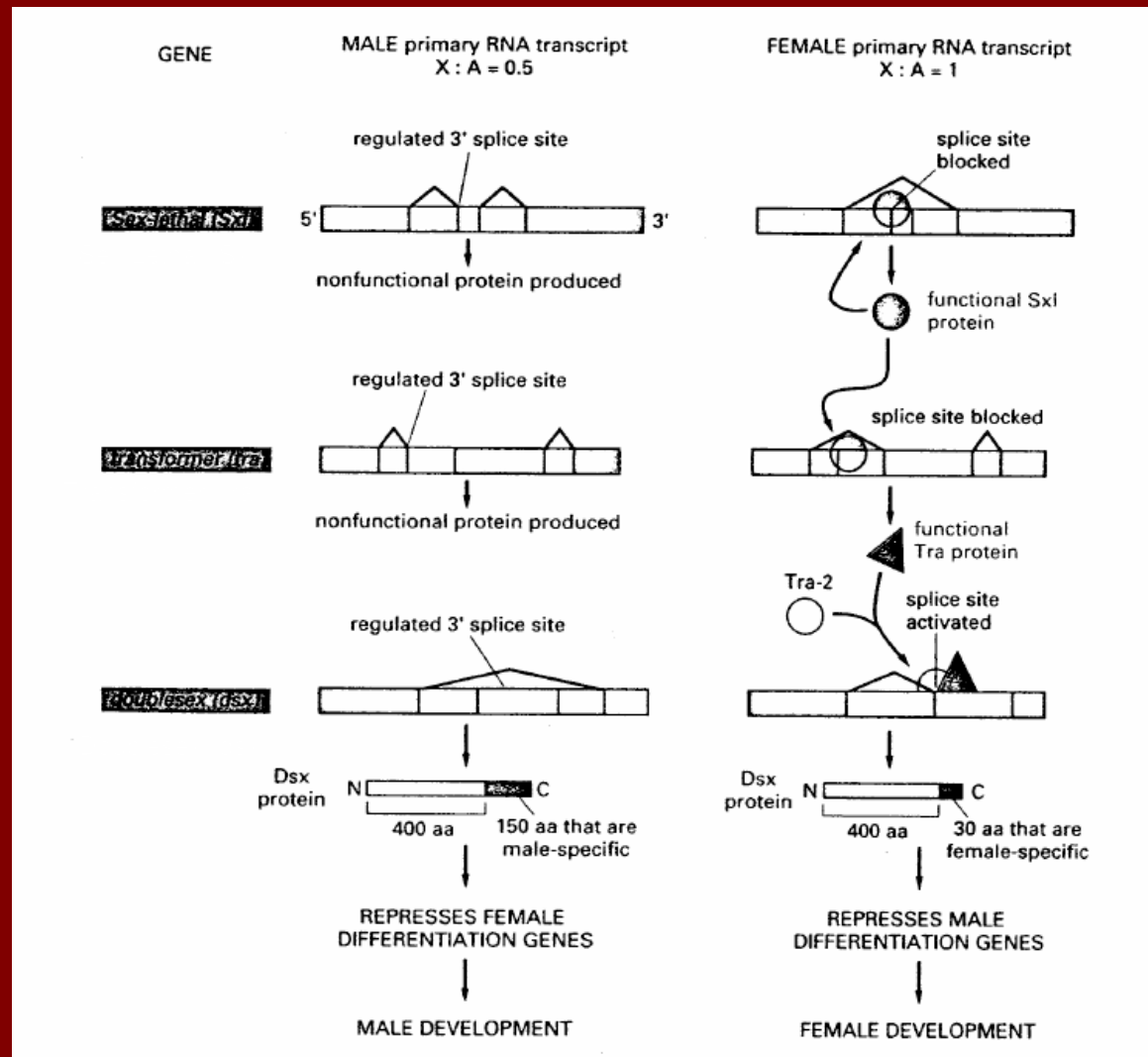
And, where explanatory gains are made for population genetics by looking to developmental molecular, the method is integration not reduction.

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Sex Determination by Alternate Splicing in Drosophila



Adapted from Baker 1989

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In contrast, actual sequence style reductionism commits us to to the whole cellular, and often extra-cellular, environment relevant to local protein production.

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E.g. optimality based work on senescence and Hawkes' Grandmother hypothesis.

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Conclusion:

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Successful reductionism is strategic and not global and deciding when, why and how much to reduce should be based on local explanatory payoffs.

QuickTime™ and a
TTF (Uncompressed) decompressor
are needed to see this picture.

Thanks.