NATURAL SELECTION, MICROEVOLUTION AND MACROEVOLUTION

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Natural Selection, Microevolution and Macroevolution

The use of logical validity and empirical data will show that natural selection occurs at the micro-evolutionary level but does not occur at the macro-evolutionary level.

The difference between micro-evolution and macro-evolution is analyzed speculatively by Mayr (1986, pp. 399-488).[1] One theory is gradualism. Just add little differences to little differences and the ultimate outcome is the macro-evolutionary big difference that separates one large taxon from another. Opposed to gradualism is the stability of large taxons, such as that defined by four appendages, land vertebrates, that defined by six legs, insects, and that defined by eight legs, spiders. These three taxons have, each, its defined architecture, its bauplain. Next in the formation of macro-evolutionary structure is a theory of intensification of function. This includes the evolution of light sensitive cells to culminate in the highly developed eye, certainly a macro structure. Thence the theory of change of function has, speculatively, the example of feathers first being used for insulation and second being used for wings. A further macro-evolutionary feature is two approaches to the bridgeless gaps between taxons. One is the lack of fossils in the fossil record causing a gap. The other is the gap explained as rapid change, unfossilized, and then a long era of exactly alike fossils – punctuated equilibrium. A final theory to achieve change is a large aread species that buds off peripheral species; and these new species then diverge to achieve larger taxon difference. These are a few of the theories that account for macro-evolution.

What will be taken up next is natural selection, micro-evolution, and macro-evolution. It will be proved by logical validity methods that natural selection can be discerned at the micro-evolutionary level but cannot be discerned at the macro-evolutionary level. Thus there is use of a branch of knowledge not usually used in biology, but it is extremely important to use this knowledge if one wishes to understand matters correctly. Additionally, there is a shift from the theoretical-speculative emphasis to a factual-deductive emphasis.

Let us start off with a case of observed natural selection on the island of Daphne Major in the Galapagos Islands (Boag and Grant, 1981).[2] There was a draught on Daphne Major. From December through June 1976 rainfall was 127 mm. From December through June 1978 rainfall was about the same, 137 mm. But in the same period in the intervening year, 1977, there were only 24 mm's of rain. It is during this period that the plants of Daphne Major grow. And it is during this period that the finches, members of *Geospiza fortis*, build nests and have their young – the male doing the building and thus attracting the female (Weiner, 1995, pp. 70-82).[3]

In 1977 no plants grew, and the previous years' small seeds decreased in abundance faster than large seeds due to the feeding of *fortis.* As a result, larger birds survived better on the larger seeds than the smaller birds. For the bird population decreased from about 1200 at the start of 1977 to 180 at year's end. Averages of 642 birds before and 85 birds after 1977 were in weight (g.) 15.79 before and 16.85 after, in tarsus length (mm.) 18.76 before and 19.11 after, in bill length (mm.) 10.68 before and 11.07 after, and bill depth (mm.) 9.42 before and 9.96 after. These numbers show the decisive change from smaller to larger average size (though seemingly a small change). These numbers show a decisive case of natural selection. In Weiner's words "this was the most intense episode of natural selection ever documented in nature." (Weiner 1995, p. 78)[3]

Weiner provides no analysis of these simple happenings, no thought about what natural selection is. This omission, this flaw can be corrected as follows. With *bigger* before the semi-colon and *not bigger* after the semi-colon, and with *selected* before and *not selected* after the semi-colon, we have the following formula to portray the change to the bigger size before the semi-colon and after the drought from the smaller size after the semi-colon and before the drought.

Fortis is bigger, if it is selected; *fortis* is not bigger, only if it is not selected –

or,

Fortis is better adapted, if it is selected; *fortis* is not better adapted, only if it is not selected –

or,

Bigger *Fortis* is better adapted, if it is selected; not bigger *fortis* is not better adapted, only if it is not selected.

Briefly: bigger, adapted, if selected; not bigger, not adapted, only if not selected. This is the way natural selection works at the micro-evolution level. But the same formula as above – that if this; not that only if not this – this same formula does not work in the larger features of nature.

Take large birds:

A bird (a seagull) is well adapted to long flight, if it was selected for this; a bird (a duck) is *not* well adapted to long flight only if it was not selected for this.

But ducks are numerous. And ducks fly a long, long way. So the not well adapted was selected – the worse was selected. That is, the duck is considered not well adapted because it has small wings and a rapid wing beat, is aeronautically inferior, and yet it was selected.

What has gone wrong? First we must be sure that the formula – a flawless valid formula – has been applied right. Again we have:

Better adapted, if selected; not better adapted, only if not selected.

The first part, better adapted if selected, seems exactly true of a seagull. But the second part, not better adapted only if not selected, certainly does not describe a duck. Let us see why.

The second part can also be:

if not better adapted, then not selected, which is, with T (true) and ⊥(false, not) for each clause:

1. if ⊥ then ⊥ (if not better adapted, then not selected).

There are three more possibilities , where *not* not = T :

2. if ⊥ then T (if not better adapted, then *not* not selected),
3. if T then ⊥ (if *not* not better adapted, then not selected),
4. if T then T (if *not* not better adapted, then *not* not selected).

Suppose 1. and 2. describe a duck. Suppose 1. is True (T) as a whole and 2. is false (⊥) as a whole. Thence to think that if the duck is not better adapted then it was not selected (1.) comes out false in the case that if it is not better adapted then it was *not* not selected (2.), that is, it was selected – is to think the worse really was selected and 1. is not true and 2. really is true. 3. and 4. describe a seagull, where 4. is true as a whole (if better adapted, then selected) and where 3. is false as a whole (if better adapter, then not selected). That is, a seagull is considered well adapted because it has large wings and a slow wing beat (is aeronautically superior) and 4. really is true. The better adapted seagull was selected and the worse adapted duck was sslected too.

Take another example, land vertebrates in temperate regions:

> A vertebrate is well adapted, by being continuously active, to year-round temperature, if it was selected for this (the warm-blooded ones*); a vertebrate is not well adapted, by being discontinuously active, to year-round temperatures, only if it was not selected for this (the cold-blooded ones).

But since there are a lot of cold-bloodeders, it would seem sensible to think that a cold-bloodeder was *not* not selected. That is, the cold-bloodeder was selected. So that, in all, the not well adapted cold-bloodeder was selected. The worse was selected. So the well adapted warm-bloodeder was selected and the not well adapted cold-bloodeder was selected too.

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* Hibernators excepted.

The heart of the warm-blooded vertebrate has an efficient four part structure, whereas in reptiles and amphibians the heart is progressively less efficient as the ventricle becomes single and the heart has an inefficient three-part structure wherein deoxygenated venous blood and oxygenated arterial blood partially mix (Kingsley 1917, p.'s. 297, 298, 319, 320, 321, 325;[4] Romer 1972, pp. 117-124).[5] Thence, the warm-blooded cold-blooded physiological change and the four-part three-part morphological change can be gotten together as follows:

> A vertebrate (terrestrial) is better adapted physiologically and morphologically, if it was so selected; a vertebrate is *not* better adapted physiologically and morphologically, only if it was *not* so selected.

Thus we have for the part after the semicolon:

> not better adapted, only if not selected,

which is also:

> if not better adapted, then not selected.

And this has the four options (not = ⊥. *not* not is T):

1. if not better adapted, then not selected (if ⊥ then ⊥),
2. if not better adapted, then *not* not selected (if ⊥ then T),
3. if *not* not better adapted, then not selected (if T then ⊥),
4. if *not* not better adapted, then *not* not selected (if T then T).

Suppose 1. and 2. describe a cold-blooded, three-part heart vertebrate. Suppose 1. is true as a whole and 2. is false as a whole. Thence to hold that if the cold-bloodeder (a frog) is not better adapted then it was not selected comes out false in the case that if it is not better adapted then it was *not* not selected – that is, it was selected – is to hold that the worse really was selected and 2. is not false in reality (but 1. is false). 3. and 4. describe a warm-bloodeder (a squirrel) where 4. is true as a whole (if better adapted then selected) and where 3. is false as a whole (if better adapted then not selected). That is, a squirrel is considered well adapted because it is active in winter and summer and has a morphologically efficient heart and was selected in 4. for 4. really is true and 3. really is false. Again the better was selected and the worse was selected too.

Consider another example. Deciduous trees lose their leaves in winter and so they are well adapted to winter. But conifers usually do *not* lose their leaves in winter and so they are *not* well adapted to winter. That is:

> lose leaves, adapted;
>
> *not* lose leaves, *not* adapted.

Thence we can go on.

> A tree (any tree) is well adapted to winter (by losing its leaves), if it was selected for this; a tree (any tree) is *not* well adapted to winter (by having evergreen needle leaves), only if it was *not* selected for this.

But again, how can a conifer be considered not to have been selected by an evolutionary process just as the deciduous tree was selected. The adapted deciduous tree was selected evolutionarily and the *not* adapted conifer tree was selected evolutionarily too. From the evolutionary point of view it is very complex how angiosperms diverged from gymnosperms, how the distinction between the adapted deciduous tree and the not adapted (in winter) conifer came about. All that can be said is that the better was selected and the worse was selected too.

Consider a smaller example. Reptiles are four-legged, except snakes and a few lizards. Thus, any reptile is adapted to fast running (by having four legs), if it was selected in evolution for this; any reptile is not adapted to fast running (by having no legs), only if it was not selected in evolution for this. And why, one wonders, did snakes get to be, if they weren't selected in an evolutionary process, even though they were slow sinuous movers. A slow sinuous mover is the worst sort of thing in a world of predators. The worse was selected, a snake. The better was selected too, a lizard.

So, the whole issue of natural selection fails at the macro level, because *the better adapted and worse adapted are both selected. And the cardinal principle of natural selection is that only the better adapted is selected.*

The way that this result has come about is by using the logically valid formula: that if this; not that only if not this. This is a rearranged form of the basic formula of contraposition: if this, then that; if not that, then not this. In either form contraposition is the structure of all change anywhere any time. Contraposition is an indestructible part of the universe. But at the micro-evolutionary level it dictates that only the better adapted is selected, while at the macro-evolutionary level it dictates in an adjusted and modified form that both the better and the worse adapted are selected.

Footnote

Contraposition is mentioned briefly in Kahane 1986, pp. 86-87[6] and noted in Copi 1979, p. 40[7] as transposition. A truth value proof is given in Hulburt 2006, pp. 176-178 and an axiomatic proof, pp. 113-117, 191-195 using a three axiom system.[8] A four axiom proof is given in Hilbert and Ackerman 1950, pp. 27-28, 31-32[9] for half of contraposition. Contraposition is used in confirmation studies: the raven paradox (Hempel 1970, pp 10-15[10]; Kahane 1986, pp. 351-354).

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4. Kingsley, J.S. Comparative Anatomy of Vertebrates. P. Blackiston's Son and Co., Philadelphia (1917).

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