

Re: How does a new species emerge?

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From: Philip Deitiker (*Donevenask_at_worlnet.att.net*)

Date: 08/26/04

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johnSPAM@wilkins.id.au (John Wilkins) says in
news:1gj46d1.cysuwz1v4511cN%johnSPAM@wilkins.id.au:

> Philip Deitiker <Donevenask@worlnet.att.net> wrote:

>

>> johnSPAM@wilkins.id.au (John Wilkins) says in
>> news:1gj2t5r.tll1ke1xd8d1qN%johnSPAM@wilkins.id.au:

>>

>>> Philip Deitiker <Nopdeitik@att.net.Spam> wrote:

>>>

>>>> 5. Sh!t happens speciation. This is when after a long
>>>> period of regional spreading and failure to form
>>>> isolates that rate of barrier formation exceeds the
>>>> rate at which genes flow across the population,
>>>> selection is for speciation within certain groups. The
>>>> basic assumption here is that the 'barrier' genes drift
>>>> across the population at a slow rate, that selective
>>>> genes can cross the barrier until the barrier genes
>>>> become selective on their own, and the barrier seals
>>>> up.

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>>>> I didn't forget it – I don't even understand it. What
>>>> are selective genes and barrier genes? What is barrier
>>>> formation? How is this significantly different from
>>>> (depending on conditions) allopatric or sympatric
>>>> speciation?

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>>>> Sympatric involves separation into 'niche' maximization or
>>>> stratification.

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>>>> Allopatric involves a separation that precedes speciation

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>>>> Whereas you could say Semiallopatric which would imply
>>>> that there is not complete separation, but that mate
>>>> selection is not random and maybe focused for cultural
>>>> reasons to within the group and gene flow is slow relative
>>>> to the evolution of traits that might alter fertility or
>>>> sexually viable crossprogeny in pairwise sampling.

>>

>> *Semiallopatric is too long, and 'Shit happens' frustrates*

>> *people whose patron saint is a thesaurus; :^).*

>

> *Are you referring to Mayr's "dichopatric" speciation here,*

> *or something like Wu's "speciation genes" hypothesis? In*

> *any case I fail to see what you mean by selective genes and*

> *barrier genes.*

The barrier gene meaning that no extrinsic barrier separates two species, the barrier is intrinsic meaning they could potentially mate, intermix by choice [key word is choice], but generally fail to intermix and when they do mate fail to produce crossprogeny that have good reproductive fitness.

> *Can you elaborate, as I still don't know*

> *what you mean?*

We define species per say as groupable organisms that for example if we could plot several distinguishing traits on a multicomponent plot with all other species, that these species would form an 'object' in which the cloud created by the scatterplot should not overlap with other scatterplots. This may or may not be a formal species and the separation may only be due to isolation. Whereas a formal species would, as I would define it, that you take several samples of opposite sexed members and cross them, within the species the opposite sexed members while produce crossprogeny and the between an opposing group they will not produce viable crossprogeny.

The construct on this argument is that the breeding has to be of some free will. IOW keeping two animals in a zoo and depriving both of opposite sexed individuals of their own species for a long period, or using artificial insemination or other technological strategies would violate the natural limits of a formal species, IOW they would overcome the genetic predisposed limitations for crossbreeding that might exist if 2 individuals came into contact with each other in the wild.

Therefore at the formal species level geographic isolation is only a formative variable, it is not 'the barrier' and from a species definition point of view the nodality of a [sub]populations genetic traits are only potential indicators of a formal species, the actual limits to crossfertility may not be measurable in a 'feild biologist's' repertoire of identification, and a biologist cannot always test the formal constraints.

As a result the definition of a species may not be in phase with the actual limitations on crossbreeding. The process of speciation which might resolve this is not visible in most context because of time frames. However there are examples of rather closely related populations that failed to produce fertile crossprogeny that are successful when challenged. While

it may be true that one or the other group has gone through an isolative period, the gross morphological differences are inadequate to define cross-infertility, the [end resulting] cross-infertility has occurred at the submorphological or micromorphological level. This I think is well established now and I do not need to defend this, in essence morphological differences within a genera is often not the best predictive determinant of 'formal' species boundary. So what is the best predictor, or should I say what can be added to the list of predictors that would improve its ability to predict without actually testing.

The resolution of the problem in terms of the process, the process does not necessarily require isolation but does need spread and numbers. The problem is between two or three aspects.

1. The prospect of breeding with an individual at great distance (Maintaining the ability to breed with an individual at great distance, negative selection for such speciating genes

2. Genetic drift

[optionaly] 3. Positive selection for traits that

If mutation and genetic drift are faster than the rate at which gene flow occurs across the total population then specific traits which can lead to speciating might occur even with no strict barriers in place.

For instance lets say you have a population of animals in North and South America. NA Animals are free to travel to SA and vice versa. However free to travel animals typically never travel more than 10 miles from their place of birth to breed, and when they travel they tend to interbreed into larger groups versus shorter distances to interbreed in smaller groups. Over time the north american population will evolve, only members that exist between the two populations will continue to hybridize and at the extremes of all populations new formal speciating elements (FSE)are evolving; however incompatible traits that form in the north, for example, because of the rate of gene flow, the predominant trait would negatively select the more recent traits. There would then develop an incompatibility boundary between north and south america. The boundary would not be 'formal' in the sense it would only initially limit infertility because the intermediate group would have both SA FSE, NO FSE and NA FSE. SA FSE could cross with NO FSE and NA FSE could cross with NO FSE. This however would only be negatively selective at the north end of the SA population whereas the rest of the SA population would eventually replace the NO FSE state with the SA FSE, and crossfertility could then only occur with the 'core' state. The same would be said of the NA population. Eventually the gene flow from essentially speciated populations would push the intermixing zone into a

smaller and smaller region. At the same time the hybridization zone at the center would have reduced rates of reproduction, and decreased fitness because of gene flow and the incompatibilities it creates. So at the same time the north or south population could burst into the intermediate zone via a wholesale migration (rule violated because the number of competitors reduced) adsorbe some members and essentially create a broad boundary between 2 species.

>From a human point of view I have created the following optional scenario (3). The evolution of the human mind is tied to human cultural evolution, the selection of mental capability is at the level of culture, and it acts not only on the individual but the group. One of my predictions, based on the study of HLA, is the behavioral variation in humans is under a heterozygous selection at the constraint selection by other group members (positive) and thus unfavored behaviors are negatively selected. Like HLA this primarily falls under mate selection strategies. This strategy has been maintained in human evolution to provide complimentary abilities in group members such that group members can specialize and therefore the group itself becomes like an individual, because no one individual can possess all traits and accomplish all tasks for the group. During the course of human evolution there has been selection by the groups for new traits that add new cultural elements to the group, the group perceives the addition of new elements and then positively selects the individual who provides these elements by the provisions of mates or mating opportunities. The added cultural elements are then used for competitive expansion of the group. Therefore there is a connection between the appearance of traits and culture and thus the competitiveness of a group. However culture could ebb and flow between groups, the inventor of a new culture need not be present when it is copied, nor his genes. Therefore the culture might become proprietary to the group, and the genes that allow this (since not all members of the group might possess all genes at the time) also 'desirously' proprietary. Groups themselves may not be aware of this, but selection for groups that resisted intermixing after acquiring new predisposing genes would maintain a greater ability to selectively expand compared to groups that mix out traits and culture, and failure to interbreed may reinforce the culture of exclusion and result in a failure for culture to flow via channels of gene flow typical between groups.

In such a scenario the rise of culture producing traits at rapid pace, such as during the pliestocene, could result in the positive selection of intrinsic 'barriers' that are completely out of synch with any geographic barriers and potentially could result in more rapid speciation under circumstances where it would have otherwise required certain environmental change or disruption in situ. Whereas this is also not a situation where

teh groups overlap, because overlapping groups would facilitate cultural motion, once a group goes into 'proprietary' mode they would neccesarily expand to remove interlaced groups from their territories until they reached a geographic position in which the competing groups had greater temporary regional advantage over them.

I see this as what happened in africa, as the best explanation for the development of the human species. And at any given time any of these groups (probably with varying capability of intermixing over long ranges, some with more 'core' like intermediate capability, some more self-isolative). Geography of course helps this, extreme arid adaptability or extreme wetlands adaptability could, genetically, both have created that 'last' pocket from which humans emerged. But neither of these I think is key, because it appears that an extension of the african population in the northeastern eurasia did the same thing. The fact of the matter is that protohumans may have been deligated as a shrinking pod within africa of another 'proprietary' group that then gets the tables flipped on it as protohumans get the next 'trait' and the human population bounces out of 'generic' competitive constraints and then displaces the group that was going to displace it and it appears that no further development elsewhere in the world could stop this.

If this scenario is a valid scenario then my prediction is that if competitive isolation and selective speciation(3) is the cause, then the selective genes will be most intense at the boundary and may fade in intensity in contact with other groups elsewhere. This would mean that while humans could not mate with other proximal groups potentially they could mate with more distal groups. The evidence at the moment favors the potential intermixing with populations in east asia, but not in supersaharan africa(Levantine or Morrocan) or NW Eurasia (Neandertals).

It may be true that this is just semantical and that one could apply sympatric speciation to this example; however I don't think it is fair to call it sympatric if the inevitable consequences on interregional mosaic formation is the elimination of one group for another, that two groups cannot coexist in the stable state. This is not true for sympatric species, and if one or either group is eliminated it is not due neccesarily to competition between the 2 derivatives, which would have to be the case in the example above. So I don't think you can call it sympatric speciation without changing the definition.

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Philip

Mol. Anth. Group <http://groups.yahoo.com/group/DNAanthro/>
Mol. Evol. Hominids <http://home.att.net/~DNAPaleoAnth/>
Evol. of Xchrom.

sci.anthropology.paleo: Re: How does a new species emerge?

<http://home.att.net/~DNAPaleoAnth/xlinked.htm>

Pal. Anth. Group <http://groups.yahoo.com/group/Paleoanthro/>

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