Tastes Like Chicken?

by Joe Staton
Museum of Comparative Zoology
Harvard University, Cambridge, Massachusetts

Photos by A. Kaswell

The field of culinary evolution faces one great dilemma: why do most cooked, exotic meats taste like cooked *Gallus gallus*, the domestic chicken?[1]

It is curious that so many animals have a similar taste. Did each species evolve this trait independently or did they all inherit it from a common ancestor? That is the burning question.

Evolutionary Theory: Some Background

First, some tasty technical background.

The different traits of an organism (its hair or lack thereof, its teeth or lack thereof, its lungs or lack thereof, its taste, its color, etc.) can have distinctly different evolutionary origins. Some of an organism's traits are inherited from many, many, many, many (thousands, or millions, even) generations of ancestors. Other of its traits developed late in the evolutionary history.

If you compare the traits of two different kinds of organisms, you may find that:

1. Some of the things they have in common were inherited from a common ancestor; while
2. Other things they have in common were *not* inherited from any common ancestor— but happened to have

A meat counter featuring some of the author's favorites, including turtle, emu and boar.

developed independently for each organism.

Modern evolutionary analysis helps us try to sort out and understand the true origins of all sorts of traits. Here's how you do it.

First, you need to make a diagram showing which kinds of organisms evolved from which other kinds of organisms. (How to make this kind of chart is a whole question in itself. For a good introduction to it, see *Phylogeny, Ecology, and Behavior: A Research Program in Comparative Biology*, by Daniel R. Brooks and Deborah McLennan. University of Chicago Press, 1991.) Such a chart will usually turn out to be tree-shaped, and so it is called a "tree" of evolutionary ancestry (the jargon phrase for this kind of "tree" is "a *phylogeny*").

Cat tastes mammalian. In essence, it tastes like tetrapod.

If you are interested in a particular trait, you can go through the tree and mark every kind of creature which has that trait. These markings on the evolutionary tree then show you whether:

1. The trait developed just once, and was then inherited by the creatures that subsequently evolved. (You will see that the trait is spread over connected branches of the tree. The name for this is synapomorphy.)
2. The trait developed independently more than once. (You will see that the trait only occurs in isolation, on tree tips. The jargon phrase for this is convergent evolution)

Here is an example of a *synapomorphy*. Crabs taste like lobsters because they both evolved from the same group of crabby-lobstery-tasting crustaceans.

Here is an example of convergent evolution. My finger is "rubbery" to chew on. The stalks of certain plants, too, are "rubbery to chew on." This "rubbery-ness" that the plants and I share has nothing to do with common ancestry. A chewy gristle evolved long ago among my animal ancestors. By happenstance, an unrelated, but equally chewy, substance evolved in the ancestors of those plants I mentioned.

By the way, if a trait appears on nearly all branches of an entire group of organisms, then it is called a *plesiomorphic* trait. This means its appearance is best explained by a single event in the ancestry of the entire group. For example, all animals have muscles (meat, if you will).

This type of analysis (as well as this type of jargon) is at the heart of much of evolutionary biology today.

Swan tastes avian. In essence, it tastes like tetrapod.

Tasting the Tetropods

For the current study, I examined a sampling of tetra- pod (see Table 1A). Just so we have our jargon straight: tetrapod means "four-legged," and *vertebrates* means "animals that have back bones."

Many kinds of tetrapod are sold as exotic meats in marketplaces around the world. Being an affirmed carnivore, I have tasted nearly all of these species (prepared from fresh, canned or, in some cases, frozen meat). I judged the flavor of each kind of meat. In cases where I was not able to try the meat first hand (so to speak), I have consulted experts or used common knowledge. I tried to do most of the sampling myself, so as to reduce the variation in data from different tasters (n = 1, variance = 0).

I should mention a couple of technical points, for the benefit of my academic rivals. First the phylogeny used here is based on those described elsewhere (for mammals, Novacek[2]; and for other groups, Maddison and Maddison[3]). While the evolutionary relationships I describe here may be controversial, minor changes would not affect the results of this study. Second, I used the computer program MacClade, version 3.06[4] to map the flavor onto the phylogeny.

Fowl-Tasting Food

As you might expect, most of the birds (*Aves*) have a "chicken-like" taste. The exception here is ostrich, with its "beef-like" flavor. Its meat was darker than the darkest chicken I have ever had. However, it may have been too heavily seasoned for an adequate assessment.[5] With only this exception, all birds I sampled "taste like chicken."

A Menu of Mammals

Patterns of flavors for cooked mammals are not as clear-cut. The origins of "beef-like" flavor coincide with the origins of hoofed mammals. However, it is impossible to tell whether "beef-like" flavor evolved before or after "pork-like" flavor did. Of course, this argument rests on the hearsay evidence that humans themselves have a "pork-like" flavor.[6] I leave it as an exercise for interested readers to settle this point.

However, "chicken-like" flavor did not originate among the birds. It arose earlier in evolutionary history. Among both amphibians and land-based (jargon: *terrestrial*) animals, some degree of "chicken-like" flavor developed and has persisted among all the tetrapods. In fact, among the vast and varied four-legged community, there are only minor exceptions, such as the evolution of "beef-like" and "pork-like" flavor among mammals.

If we look at more distant relatives, the picture is different. Consider, for example, tuna (a non-tetrapod vertebrate) and shrimp. Each has its own unique flavor (i.e., "fishy" and "shrimp-like").

Scrumptious Salamanders

Several meats were excluded from this study, for evolutionary or ethical reasons (see Table 1B), but we can make predictions about their cooked flavor.

Amphibians (besides the ones I tested) have been considered delicacies by many cultures. I asked Carl Anthony, a herpetologist at John Carroll University, about one in particular. "The Chinese giant salamander, *Andrias davidianus*, is

Table 1: A list of animals (listed here by common name(and genus) and their flavor when cooked. I included non-tetrapods (called the outgroup) and tetrapods (called the ingroup). Animals that were tested directly or whose flavor was deduced indirectly are in the grouping marked "A." Grouping B consists of other animals of unknown or virtually unknown flavors.

Animal	Flavor
GROUPING A	
Outgroup…	
Shrimp (*Penaeus*)	Shrimp
Tuna (*Thunnus*)	Fish
Ingroup…	
2-toed Amphiuma (*Amphiuma*)	Chicken
Bullfrog (*Rana*)	Chicken
Snapping turtle (*Chelydra*)	Chicken
Iguana (*Iguana*)	Chicken
Snake (*Crotalus*)	Chicken
Alligator (*Alligator*)	Chicken
Pigeon (*Columba*)	Chicken
Goose (*Anser*)	Chicken
Quail (*Coturnix*)	Chicken
Chicken (*Gallus*)	Chicken
Ostrich (*Struthio*)	Beef
Kangaroo (*Dendrolagus*)	Chicken
Rabbit (*Oryctolagus*)	Chicken
Muskrat (*Ondatra*)	Beef
Cow (*Bos*)	Beef
American buffalo (*Bison*)	Beef
Deer (*Cervus*)	Beef
Pig (*Sus*)	Pork
Horse (*Equus*)	Beef
GROUPING B	
Human (*Homo*)	Pork?
Mouse (*Mus*)	???
Chinese giant salamander (*Andrias*)	???
Tyrannosaurus rex	???

prized for its flesh," Anthony reported. "They are threatened, however, so eating them at this point is out of the question."

I asked about Anthony's experience with other salamanders. He admitted licking an uncooked [i.e., LIVE] *Desmognathus ochrophaeus*, once. However, Anthony states, "We can't assume they would taste similar. Besides all I can remember of the experience is 'mmmm, salty.'"

Based on a variety of factors, we can predict that cooked salamanders would "taste like chicken." Their relatives all do.

Munching on Mice

Mice present a different problem. I will not eat them raw (are you surprised?), and nor can I predict how they would taste cooked. Their relatives, so far as I have been able to determine, have either "chicken-like" (in the case of the rabbit) or "beef-like" (in the case of the muskrat) flavors. Farley Mowat, in his book Never Cry Wolf, rates mouse meat as "pleasing, if rather bland."

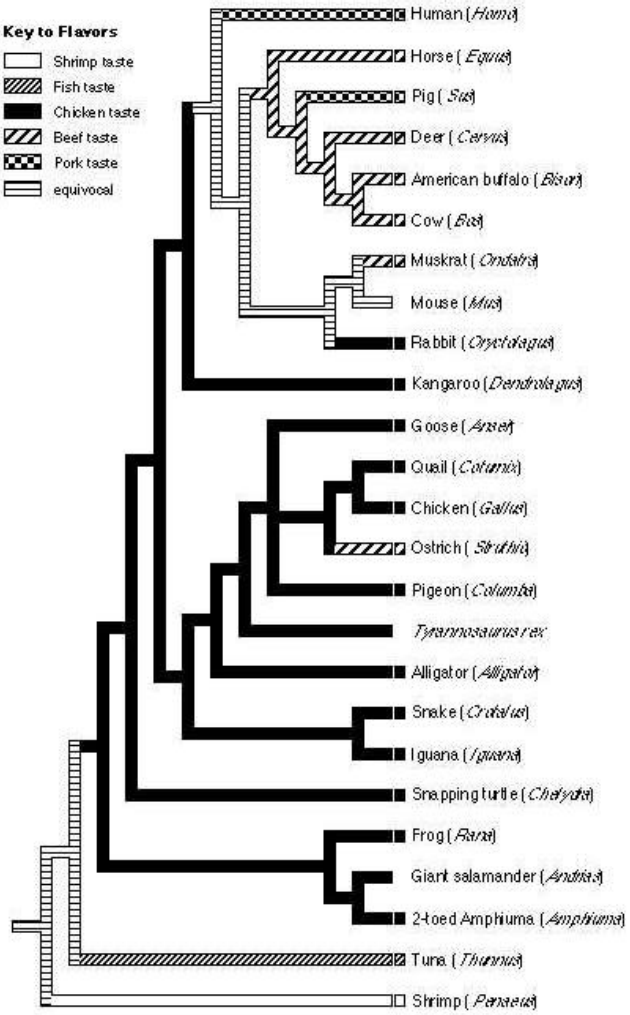
Were Dinosaurs Delicious?

But the most intriguing hypothesis that I can propose is for the flavor of dinosaurs. Pending the creation of a real "Jurassic Park," we can never be sure what *Tyrannosaurus rex* would taste like cooked in the open pit. Nor can we know the taste of Brontosaurus burgers (anecdotal testi-mony from the "Flintstones" notwithstanding). The only source of dinosaur in current times would be fossils. However, most museums are reluctant to release specimens for loan for the purpose of making prehistoric soup. I made several calls to the Field Museum, Chicago, USA, to borrow merely a single bone from their recent acquisition ("Sue" the *T. rex*, a large skeleton with many bones). My request is still tangled in red tape.
Fortunately, we now have knowledge that bears on the question of dinosaur taste. Based on recent evidence for the close ancestry of dinosaurs and birds, chances are that *T. rex* "tastes like chicken!"

A Slogan for Our Times

As a result of this study, I must conclude that cooked flavor is a result more of ancestral inheritance than of convergent evolution. Many animals taste similar because they evolved from a common ancestor that tasted that way. The meat of our argument is that "chicken-like" flavor is ancestral (that is, plesiomorphic) for birds and many other vertebrates, as well. Indeed, the emphasis on chicken in the statement "tastes like chicken"

Figure 1: A phylogenetic tree with the characteristic flavors mapped onto it. Two technical notes:
2. I have markedall characters with their earliest hypothesized evolution date.
b) Organisms with boxes at the tree tips were used as data input into the model; branch tips without terminal boxes are assigned a flavor (their branch or group was assigned the flavor) inferred by the program based on shared ancestry (MacClade, ver 3.06; Maddison and Maddison 1992).



is misleading. The common ancestor of most tetrapods would have tasted similarly, if we had only been there to cook and eat it.

I therefore propose that the use of "taste like chicken" be banished from common speech in favor of "tastes like tetrapod."

A Theory With Legs

This study puts the theories of ancestral flavor in tetrapods on a solid footing. It is tempting to propose further a theory of flavor based on leg number.

Do insects (6 legs) taste like spiders (8 legs), or do they taste more like lobster (10 legs)?

Are millipedes ten times tastier than centipedes?

These questions are under current examination in a joint research effort with other investigators to get a leg up on the broader implications of flavor evolution.

Notes

1. This might be true of uncooked meat, as well, but I will address this topic in a later paper.

2. "Mammalian phylogeny: shaking the tree," M. J. Novacek, *Nature*, vol. 356, 1992 pp. 121-5.

3. The Tree of Life Project, D. R. Maddison and W. P. Maddison, 1997, <http://phylogeny.arizona.edu/tree/phylogeny.html>

4. MacClade: Analysis of phylogeny and chararcter evolution, Version 3, W. P. Maddison, and D. R. Maddison, 1992, Sinauer and Assciates. Sunderland, Massachusetts.

5. I have only eaten ostrich as ground meat patties sold in an upscale brew pub Westwood, California, USA.

6. Many references are made in popular literature to use of the colloquialism "long pork" for human flesh, supposedly attributed to the length of the femur in the human "ham." For a description of this, and its impact on Polynesian Spam consumption, see P. Theroux's *The Happy Isles of Oceania*.