Introduction
Animal Models
Verebrate models
Intvertebrate models
Drosophila
C. elegans
Honeybee

Tabakoff (2000) wrote on the advantages of Animal Models in Alcohol research. They noted that scientists cannot ethically use human subjects in alcohol studies because of the nature of the studies. If a scientist wants to study organ damage or tolerance/dependence, they must use an animal model. It is also noted that different animals are chosen depending upon the nature of the scientist's research. Animals are usually chosen because of their close biological similarities to humans. It would stand to reason that primates would be the number one choice, but these studies can be extremely costly. Most scientists use small rodents, and use animals in both face validity models and predictive validity models.

Bennett (2006) talks about the use of mouse models in alcohol research. The ability to manipulate the genetics of a mouse is an advantage to researchers. Although primates may have more behavioral similarities to humans for alcohol studies, mice genes are exceedingly homologous to human genes. Also briefly mentioned is alcohol research done with drosophila and c.elegans.

Heberlein (2001) wrote on the advantages of using Drosophila as a model for alcohol studies. Drosophila have gene homologs in the human genome. These homologs correspond to certain neurotransmitters in the human brain.

Davis (2008) investigated the effects of ethanol on c. elegans, specifically teratogenic effects of ethanol. Cites vertebrate models – rat, mouse, guinea pig, chick and sheep. Invertebrate models have also shown the effects of alcohol behaviorally, physically and physiologically. The c. elegans genome is fully sequenced. Might help pinpoint genes in humans.
Alcohol exposure affected size, rate of development, reproductive success and life expectancy of c. elegans. Not sure if effected each process individually, but perhaps one single toxic effect. Acknowledges the usefulness of studying c. elegans and the effects of alcohol on development.

Heberlein (2004) again wrote on the advantages of using Drosophila. States drosophila have most of the same neurotransmitters as vertebrates (mammals). When intoxicated, drosophila exhibit some of the same behaviors as humans – "incoordination, loss of postural control, and eventually sedation and immobility." The concentrations that drosophila were exposed to caused the same type of behaviors (impaired locomotion and sedation) seen in rodents and humans at very similar concentrations. Both drosophila and humans have a history of being naturally exposed to ethanol – drosophila through rotting fruits and humans the same via primate frugivory. Drosophila also provide important molecular information as it pertains to ethanol behaviors.

Abramson (I) (2000) wrote that honeybees would be a useful model because the insect willing consumes ethanol (not only when mixed with a sucrose solution), ethanol affects the behavior and honeybees will self-administer ethanol. The article covers ten different experiments that lead to his conclusions. This article goes onto say that bees provide researchers with many different behaviors that can be tested. He finishes up saying it would be critical to find that bees share the same biomedical complications associated with chronic alcohol consumption with humans.

Abramson (2007) gave the rationale for using honeybees as a model of alcohol studies. Acknowledges the use of vertebrate models, but says invertebrate models have been used since 1888. There are similarities in the molecular structures between arthropods and vertebrates. Bees give several advantages – cost, genetics, behavior, natural history and alcoholism. Paper runs through several different experiments that exhibit how bees are a great model and can be used as such. Bees self-administer alcohol, exhibit learning behaviors and even give some behavioral data that is similar to vertebrate models.

Lieber (1973) worked to find an animal model of liver disease caused by alcohol. Rats has been used in the past, but liver disease never progressed as it did in humans. Focused on using baboons because metabolism presumed closer to humans. He was able to reproduce the histologic features of human liver disease in baboons. Lieber went on to research alcohol-induced liver disease using baboons as an animal model; wrote several papers concerning this topic, including one dated 1982.

Sullivan (2005) states that animal models provide researchers with the ability to control certain aspects of alcohol research, such as genetics and environment. Symposium of papers using rats and baboons as models for alcohol research – specifically using neuroimaging.

Wolf (2003) talks about recent studies using Drosophila and c.elegans as animal models for drug research. Invertebrates have been chosen because their nervous systems are more simple and the genetics are rapid. Vertebrates and these invertebrates share molecular similarities of the nervous system, most major neurotransmitters are shared. Flies, humans and worms share many of the same sites of ethanol action. This contributes to another reason why these invertebrates tend to be a good animal model. Drosophila show behavioral responses to ethanol similar to that of vertebrates. The concentrations of ethanol that cause behavioral responses in flies cause the same effect in rodents and disinhibition/euphoria in humans.

Fry (2004) states that drosophila have evolved to tolerate high levels of ethanol.

Matthews (2001) used rats as models for self-administration of ethanol. This study used a sucrose-fading technique, rats are trained to respond to sucrose solutions and as time progresses ethanol is added to the solution. This study was trying to replicate ethanol dependence and tolerance which is hard to compare with humans when the solution is forced.

Dudley (2004) humans are ancestors of frugivorous primates. These primates ate ethanol producing fruit. This information may give insight to modern human preference and consumption of alcohol. The evolutionary basis for alcohol preference in modern humans is that it is associated with nutritional reward. Also mentions that the enzymatic pathways in drosophila and humans are very similar and lead to inebriation. The evolutionary data suggests that humans have been exposed to low levels of ethanol throughout their lives as a result of eating fruit.

Mitchell (2006) – talks about effects of ethanol on c. elegans. Many genes are