Description

The genus Drosophila has been used as a model to study metabolic rates and its relationship with size(Citation), sex(Citation), genotypes(Citation), temperature and oxygen stressors(Citation), and several metabolic pathways(Citation). Although, a lot of studies had use Drosophila as a model to unsuccessful attempt to correlate metabolism to longevity ([Arking et al., 1988](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/" \l "BIO023994C1); [Baldal et al., 2006](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/" \l "BIO023994C2); [Hulbert et al., 2004](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/#BIO023994C25); [Khazaeli et al., 2005](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/" \l "BIO023994C30); [Melvin et al., 2007](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/#BIO023994C44); [Miquel et al., 1982](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/#BIO023994C47); [Partridge et al., 2005](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/#BIO023994C56); [Promislow and Haselkorn, 2002](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/" \l "BIO023994C60); [Van Voorhies et al., 2003](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/#BIO023994C72), [2004b](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5399560/#BIO023994C74)) not so many studies have measured the changes in metabolic rates due to age, and little to nothing has being describe for Drosophila pseudobscura (Arlian, 1973). The few studies that have measured age-related changes in metabolic rates have been in Drosophila melanogaster and had found a significant difference across ages. D. pseudoobscura, has been increasingly used in genetics and behavior studies. Given its importance as a model and the increasing studies of metabolic rates measurements, there is an important need to understand how metabolic rates vary at different life times in D. pseudoobscura. Here, we measure the metabolic rates of Drosophila pseudoobscura at 2, 5, 7, 10 and 20 days.

Methods:

Stocks

Fruit flies Drosophila pseudoobscura (wild-type, MV2-25) were growth and maintained at 21°C with a 12 hour light-dark cycle in an incubator and reared on standard cornmeal–sugar–yeast–agar media in polypropylene enclosures. For experiments, adult flies were placed into fresh vial (sex-mixed) and discard after 24 hours to prevent additional stress (Priest, 2007). After eclosion, virgin females and males were collected and placed separately into fresh food and transferred every 7 days to fresh vials until assayed. To compare the changes in age, flies were assayed at 2, 5, 7, 10, and 20 days old.

All flies were incubated at 21°C for 4 hours to guarantee a good sample and to prevent stress due to starvation and its been related to cause major biochemical disturbances in lipids and other metabolic pathways (Chatterjee et al., 2014; Choi et al., 2015).

Metabolic rate measurements

Respiratory Quotients (RQ) was used to determine the metabolic rate. For this, a closed system respirometry was used with measures of both, O2 consumption and CO2 production, were the injected air samples with room air, were forced into a Whatman purge-gas generator (Whatman Inc., Haverhill, MA, USA) where both CO2 and water were removed from the air. The air then passed through a 340 l mixing tank and into an open mixing tank (30 l) where the air equalized to atmospheric pressure. Next, the air was pulled from the open mixing tank through a Drierite-Ascarite -Drierite column (Drierite-W.A. Hammond Drierite Company Ltd., Xenia, OH, USA; Ascarite-Thomas Scientific, Swedesboro, NJ, USA) to remove any minute traces of water or CO2. The air was pulled through an injection port where air samples were injected after the incubation time was completed. The air passed through a Li-6251 CO2 analyzer (Li-COR Inc., Lincoln, NE, USA), another a Drierite -Ascarite -Drierite column, and a Sable Systems Oxzilla II O2 analyzer (Sable Systems, Henderson, NV,USA). Finally, the air passed through a Sable Systems mass flow system MFS2 (Sable Systems, Henderson, NV, USA), which control the air flow (pulled the air) at a rate of 100 ml min 1 at STP. All data was recorded and analyzed using ExpeData (Sable Systems, Henderson, NV, USA). The analysis was performed by converting the data into units of ml h 1 and then subsequently integrating peaks to calculate the total CO2 production or O2 consumption per syringe.