A QTAG application has been submitted for your review from Scott Grubbs from Biology in Ogden.

Amount Requested: 2286

Description of Project: From 2003 to 2012 I collaborated on a long-term ecological and taxonomic project on the stoneflies of the Talladega Mountain region of eastern Alabama. Four species were described as new from this region (Grubbs 2005; Grubbs & Sheldon 2008, 2009), specimens of other species were valuable for additional taxonomic treatments (Grubbs 2010, 2011, 2015, 2016; Grubbs & DeWalt 2008, 2012; Grubbs et al. 2013), and an ecological treatment of an endemic species was published (Sheldon & Grubbs 2014). A large summative, ecological paper (Grubbs & Sheldon 2018) was also published in early 2018. Overall, 12 papers in total resulted based on data and specimens obtained during this successful work. Several ecological papers were in planning stages by my collaborator prior to his untimely death in late 2017.

Later in 2018, however, after the last paper was published, I realized that one species in particular was actually undescribed. The objectives herein are simple â to collect ample fresh material of the undescribed species and start working on the formal description during summer and fall 2019. Unlike prior systematic work in my lab, I want to integrate molecular phylogenetic analyses into this project. This is a new and exciting direction for me, one that will introduce modern molecular methods that are increasingly-used by taxonomists and systematists. The mitochondrial cytochrome c oxidase subunit I gene will be used for molecular phylogenetic analyses for the proposed new species plus with several related species.

The expected outcome will be a manuscript submitted to a peer-reviewed journal in late 2019 or 2020 prior to the end of this academic year.

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Explanation of How the Funds will be used: Funds will be used for three reasons:
1. To offset costs of (a) travel to/from appropriate localities mainly in Talladega National Forest in eastern Alabama, (b) tent camping if possible (weather depending), and (c) per diem. I will camp either at a Talladega National Forest campsite or stay in a hotel in the vicinity (Oxford or Talladega) if weather is poor due to rain. Three days total, including round trip travel, should be sufficient. All time on the ground will be spent collecting.
2. Supplies for SEM work.
3. Supplies for DNA extraction, DNA amplification, and packaging of samples to send to a third-party laboratory (e.g. North Carolina State University).

Justification for the critical need(s): I have material of the new species in my collection but they are of insufficient quality to describe as new to science. In recent years (2008â��2012) specimens were collected between early April and mid-May. The intent is to use a long weekend during the next 60â��90 days to travel and collect enough fresh material to start on this project during summer 2019. In the meantime, I will replenish materials needed for SEM work and stock my laboratory with enough supplies for the molecular component of the proposed research.

A project timeline and line-item budget were completed and available.

Update on a prior QTAG award â�� I was awarded a QTAG in May 2018 (â��Discovery of a new species of stonefly (Insecta, Plecoptera) from West Virginiaâ��). A manuscript emanating from this work was submitted for publication to Zootaxa in February 2019. A minor revision is nearly complete and ready for resubmission for publication.

A QTAG application has been submitted for your review from Elizabeth Lemerise from Psychological Sciences in Ogden.

Amount Requested: $730

Description of Project: Description of Project (Objectives/Anticipated Outcomes)

Self-regulation develops rapidly in the preschool years, and its development depends on both neurological maturation and sensitive, responsive, and language-rich rearing environments. â��Hotâ�� self-regulation consists of monitoring, flexibly representing, and controlling thought and action in situations activating appetitive and reward functions (e.g., Carlson, 2005; Hongwanishkul et al., 2005). A classic example of â��hotâ�� self-regulation is the delay of gratification paradigm where a child must decide whether to wait for a larger reward (2 cookies) or have an immediate smaller reward (1 cookie which the child has right in front of him/her, raising the â��heatâ��). â��Coolâ�� self-regulation is considered to be more cognitive and intentional and consists of inhibition, working memory, and the flexible control of attention (Blair, 2016). One example of a â��coolâ�� self-regulation task is peg tapping, where the child must tap once when the experimenter taps twice and twice when the experimenter taps once.

These self-regulation abilities are at the core of readiness for school (Blair & Raver, 2015). School readiness problems are especially associated with poverty and low parental education; substantial numbers of children who begin school lack essential components of academic and socio-emotional readiness (Rimm-Kaufman, Pianta, & Cox, 2000). Children who are not ready for school fall further behind with each year of school; this achievement gap becomes progressively more difficult to overcome (Duncan & Magnuson, 2012; Reardon, 2011). This school readiness gap is particularly dire in Kentucky where approximately 50% of children entering kindergarten are not ready for school (Kentucky Center for Workforce Statistics, 2018). â��Hotâ�� and â��coolâ�� self-regulation have been studied largely separately, and the longitudinal examination of both in the same study is lacking. Understanding the developmental sequence of â��hotâ�� and â��coolâ�� self-regulation abilities will inform the development of school curricula for children who are at high risk of poor school readiness. Self-regulation abilities can be nurtured in such interventions when curricula are developmentally appropriate (Diamond et al., 2007).

The overall goal of the current longitudinal study (conducted by Drs. Lemerise-Principal Investigator and Lickenbrock-Investigator) is to examine â��hotâ�� and â��coolâ�� self-regulation as predictors of academic and socio-emotional school readiness in three and four year-olds who attend Head Start and daycare. More specifically, we will examine age differences in self-regulation and their relation to school readiness at the beginning and end of the school year as well as developmental change in self-regulation over the course of the school year. We hypothesize that self-regulation will improve with age, and that â��hotâ�� self-regulation will be mastered sooner than â��coolâ�� self-regulation. Because of the different developmental trajectories of â��hotâ�� and â��coolâ�� self-regulation, there may be age differences in the prediction of school readiness (e.g., â��hotâ�� may predict better for 3 year-olds than for 4-year-olds). Wave 1 of data collection occurred in Fall 2018, and the remaining data collection will occur in Spring 2019 (end of school year). Funds are being requested to help defray costs associated with the Spring data collection.

This study utilizes a multi-trait, multi-method perspective when examining self-regulation as predictors of school readiness. This approach is advantageous in developmental psychology research because it allows for a holistic view of the predictors of a developmental phenomenon. More specifically, children are administered a set of commonly used â��hotâ�� and â��coolâ�� self-regulation tasks (see below) by trained, research assistants. Children complete the self-regulation tasks in two sessions (Fall, Spring); Fall data have been collected. Children are individually tested in quiet rooms at their centers, and tasks are filmed for later coding of emotional and behavioral reactivity by trained, research assistants using established coding schemes. Children were randomly assigned to two order conditions in which different sets of â��hotâ�� tasks are administered (time per order= 30-40 minutes), this these tasks can only be completed once by the child. â��Hotâ�� self-regulation tasks include: impossibly perfect circles (children asked to draw a perfect circle for 3.5 minutes), no stickers left (child is told there are no stickers left, but later is given a sticker), gift delay (child asked not to peek while experimenter wraps a surprise gift), snack delay (child is instructed to wait for a treat), lock box (toy is locked in a transparent box and child is given the wrong keys, after a delay the experimenter returns with the correct keys), disappointing gift (child is given the wrong toy, after a delay is given the correct one) (Cole, 1986; Goldsmith et al., 1993; Smith-Donald et al., 2007; Stifter et al., 2011). â��Coolâ�� self-regulation tasks include: pencil tap (child taps once with a pencil when experimenter taps twice, and twice when the experimenter taps once), dimensional card sort (child sorts cards based on varying rules), head toes knees shoulders (Simon Says but does the opposite of what the experimenter does), and day/night (child is instructed to say day when he/she see a card with stars/moon; says night when he/she sees a card with a sun; Diamond et al., 2002; Ponitz et al., 2009; Smith-Donald et al., 2007; Zelazo, 2006). Percentage of correct responses are recorded for the â��coolâ�� regulation tasks. The two experimenters also fill out an assessment of participantsâ�� behavior during the task.

In a separate session, children are administered three subtests from the Woodcock-Johnson achievement tests to measure academic school readiness (Letter Word Identification; Applied Problems, and Picture Vocabulary, Woodcock, McGrew, & Mather, 2001) by trained, research assistants lasting 15-20 minutes. In the Fall and Spring childrenâ��s teachers complete two, validated measures of socio-emotional school readiness (Social Competence and Behavior Evaluation, Preschool edition (SCBE-30), LaFreniere & Dumas, 1996; Emotion Regulation Checklist (ERC; Shields & Cicchetti, 1997, 1998), which have been previously used with Head Start samples. 96 children have completed the Fall 2018 time-point. This project has been approved by the WKU IRB (IRB # 18-461).

Project Outcomes. The results of this project will provide much needed longitudinal data on self-regulation at a time when these regulatory skills are developing rapidly. These data are interesting from a basic research perspective, and they also have applied significance due to the relevance of self-regulation for school readiness. Understanding which self-regulation skills are undergoing development and at what point can inform educational programming for preschool age children, particularly programs aimed at low income children, like Head Start. Self-regulation skills can be trained and nurtured (Diamond et al., 2007), and a better understanding of the sequencing of these skills will contribute to the development of effective preschool curricula. Moreover, data on the aspects of self-regulation that predict academic and socio-emotional school readiness will also contribute to the design of effective preschool curricula. This project also provides excellent hands-on training in research and working with the public to undergraduate and graduate students, including 4 under-represented students in STEM. These data will be presented at appropriate professional meetings (e.g., Society for Research in Human Development, Society for Research in Child Development, National Head Start Conference) as well as submitted for publication (Social Development, Journal of Experimental Child Psychology, Early Education and Development, Early Childhood Research Quarterly). The data will also be useful in supporting applications for external funding; Drs. Lemerise and Lickenbrock have previously collaborated on an R-15 application to the NIH NICHD, which was not funded. One of the reviewersâ□□ comments acknowledged that Drs. Lemerise and Lickenbrock had no previous collaboration. The current project would strengthen a new grant application (e.g., to Kentucky Academy of Science/Fall 2019) by providing evidence of a collaboration as well as add relevant preliminary data.

Explanation of How the Funds will be used: Most of the requested funds will be used to provide teachers with an honorarium (gift cards from Walmart) for filling out the Spring 2019 measures of socio-emotional school readiness. Teachers will be filling out two measures on each of up 20 children. We are thanking them with a modest amount of $5 per student; this modest incentive ensures that teachers will complete the measures. Remaining funds are to purchase supplies needed for the â□□hotâ□□ and â□□coolâ□□ self-regulation tasks and for copying measures by the WKU Print Shop. Supplies for the self-regulation tasks include snacks and supplies for the snack delay measure (M & Ms; Goldfish crackers, clear plastic cups, and small paper plates), and prizes for the gift delay and disappointing gift tasks (small toys, approximately $5 per toy). We have some toys left over from the Fall data collection; we are requesting funds to replenish our supplies of small stuffed animals (N = 50) and toy cars (N = 48). Given the departmentâ□□s small budget for copying, generally larger jobs are sent to the print shop and paid for with grant or professional development funds; therefore we are requesting funds for 200 copies of an 8 page Experimenter report measure (filled out by both interviewer and camera operator) as we have exhausted our supply of this measure.

1.	Teacher payments:	$5 giftcard per student x 96 students =	$480.00
2.	Toy prizes for â□□hotâ□□ tasks	($55/stuffed animals; $45/cars)	$100.00
3.	Photocopying of measures		$100.00
4.	Supplies for snack delay task		$ 50.00
5.	Total requested		$730.00

The teacher payments and toy prizes (common practices in developmental psychology research) are essential to complete the project. Teachers will have multiple target children in her classroom. This little incentive (though modest) will help to ensure that the teacher completes the teacher ratings of school readiness. The toy prizes (will be ordered from Oriental Trading Company) are a nice incentive for the children as a small token of appreciation for their participation.

Justification for the critical need(s): Funds were obtained to cover expenses for the Fall 2018 data collection, however we do not have the funds to cover the expenses for Spring 2019 data collection. The QTAG funds are imperative to completing the project, and if they are not received the Spring 2019 data collection will not be completed. The first expenditures will be for the toy prizes and photocopying which will be ordered immediately. Teacher payments will be made by the end of the April when teachers have completed their measures.

A QTAG application has been submitted for your review from Farhad Ashrafzadeh from SEAS in OCSE.

Amount Requested: $2876

Description of Project: This project aims to establish a development system (testbed) for research and education for two types of autonomous vehicles: 1) Aerial autonomous vehicles (AAVs) and 2) Terrestrial autonomous vehicles (TAVs). Both platforms are intended for research and education and they are low-cost, open source, and programmable. The AAV platform can be programmed through Matlab/Simulink, and the TAV can be programmed using Robot Operating System (ROS). ROS is a set of open-source software libraries, drivers, and tools that allows us to build robot applications. These low-cost and flexible testbeds will enable us to develop, test, and validate novel and complex navigation and control algorithms for various applications. This project will also help us to identify and map opportunities around drones for STEM education.

The project has the following four objectives and outcomes. Each objective is followed by its own corresponding outcome.

- Objective-1: Acquire both AAV and TAV platforms and make them fully functional on basic tasks such as simple indoor flight missions in a known environment.
- Outcome for Objective-1: Have both AAV and TAV development platforms fully functional with demonstrated capability of programing AAV and TAV using Matlab and ROS respectively.

- Objective-2: Develop, simulate, and validate a mathematical model governing the dynamics of AAV. The simulation will be performed in Matlab, and validation will be carried out using experimental data gathered by on-board sensors. The AAV development system is equipped with a set of five sensors, all of which are accessible to users. These sensors are: 3D accelerometer, 3D gyroscope, ultrasonic, air pressure sensors, and downward-facing camera. The sensorsâ�� outputs can be directly saved in the Matlab workspace for postprocessing. Note that the mathematical modeling is intended to be performed only for AAV system as the three-month project timeline does not allow modeling for TAV.
- Outcome for Objective-2: A final project report will have a special section on mathematical modeling for AAV including simulation results and validation data, followed by discussions on the nature of the model (type of non-linearity, time-varying, systemâ��s order, etc.) as well as potential causes for differences between simulation and experimental results.

- Objective-3: Develop an algorithm by which a desired trajectory can be defined, and direct both mobile robots (AAV and TAV) to follow the pre-defined trajectory. Perform this task through 1) computer and Wi-Fi or Bluetooth communication with mobile robot and 2) embedment of the algorithm in the robotâ��s on-board hardware, performing the task as a standalone device. This algorithm will be developed in Matlab/Simulink for AAV and in ROS for TAV.
- Outcome for Objective-3: A report and demonstration for defining a pre-defined trajectory for both robots and their control using computer and standalone technologies.

- Objective-4: Identify research and education opportunities for autonomous vehicles capable of learning about their physical environments and using their past experiences in future missions. The findings of this project along with their supporting data will be used for both RCAP and NSF-IUSE grant applications.
- Outcome for Objective-4: A section in the final project report which tabulates both opportunities and gaps in autonomous vehicles for research and education. This table will inform the direction of both RCAP and NSF-IUSE grant proposals in 2019.

Explanation of How the Funds will be used: The fund will be used to acquire two low-cost programable autonomous vehicles with their associated development software and hardware. This includes purchasing:

1) a small but flexible aerial autonomous vehicle which is programmable using Matlab/Simulink and it costs $180 and

2) a research and educational platform for a terrestrial autonomous vehicle which is programmable using ROS and it costs around $2696.

As a result, the total requested budget for enabling hardware and software is $2876 for both platforms. The purchased platforms are required to achieve each objective listed in Section-1. In other words, none of above objectives can be accomplished without purchasing the enabling platforms listed above.

Justification for the critical need(s): This project is critical and immediate as the RCAP proposal is due by February 2019 and NSF-IUSE is due by May 2019. In fact, this project serves as a seed fund for both grants. The project will immediately be started on January 15, 2019, provided the grant is awarded, and will be completed within three months, i.e. by April 15, 2019. The entire requested fund will be spent on purchasing both research and educational platforms in the first two weeks of the project, i.e. by February 2019 as they are already identified.